Eneref Institute

NATURAL INTERIOR DAYLIGHT

A REPORT TO ADVOCATE FOR SOCIALLY RESPONSIBLE SUSTAINABLE DEVELOPMENT

# LIGHTING PROJECT BRINGS NATURAL DAYLIGHT INTO **KARNDEAN WAREHOUSE**

## ENEREF INSTITUTE EXAMINES HOW A HOLISTIC APPROACH TO LIGHTING IMPROVES MORALE AND PERFORMANCE IN A WAREHOUSE FACILITY.

**Karndean is an international vinyl tile flooring manufacturer with their US headquarters and warehouse near Pittsburgh, PA.** In this facility, the company has moved aggressively toward environmental stewardship and social responsibility.

Karndean has won 'Top Workplaces' by WorkplaceDynamics and the Pittsburgh Post-Gazette four years in a row, based solely on employee feedback. And in 2015 the company constructed a new warehouse and distribution center employing an

v2.8

**“MY REASONING IS I’M TRYING TO MAKE TOMORROW A LITTLE BETTER FOR MY SON. AND HOPEFULLY, FOR THE WORLD AS A WHOLE.”**

## Chris Wettling, Warehouse Manager, Karndean DesignFlooring

innovative lighting system designed to significantly reduce energy use while improving the work environment.

“We looked for opportunities to leverage best practices within budget that are environmentally conscious and give our employees the best working environment to help them do their jobs,” said Bill Anderson Vice President of Operations of Karndean. “And we definitely made the right decision. But it is even better to hear the reaction of our employees.”

Karndean is a global company with manufacturing facilities in numerous countries throughout the world. The US distribution center ships merchandise, and also designs and creates flooring display boards for show rooms across the US. Within the flooring industry the company is known for their high-quality display boards that are large enough for customers to get the look and feel of what a floor will look like in their homes.

Sometimes there are subtle manufacturing variances between factories, so the proper lighting needed to see the differences is crucial to their business.

As part of our Natural Interior Daylight initiative Eneref Institute examined the lighting installed in the Karndean warehouse. Eneref interviewed key stakeholders, including Karndean’s Bill Anderson, Vice President of Operations; Jim Horan, Facility Manager; Chris Wettling, Warehouse Manager, and Tim Molnar, Production Manager. Eneref also interviewed Jim Roos, Senior Architect with RSSC Architects; Jason Whitfield, Engineer with Allen & Shariff; and from LaFace McGovern Lighting, Valerie Mckee and Tim Leonard.

### SEEING THE VARIANCES IN COLOR, SHEEN AND TEXTURE OF FLOORING

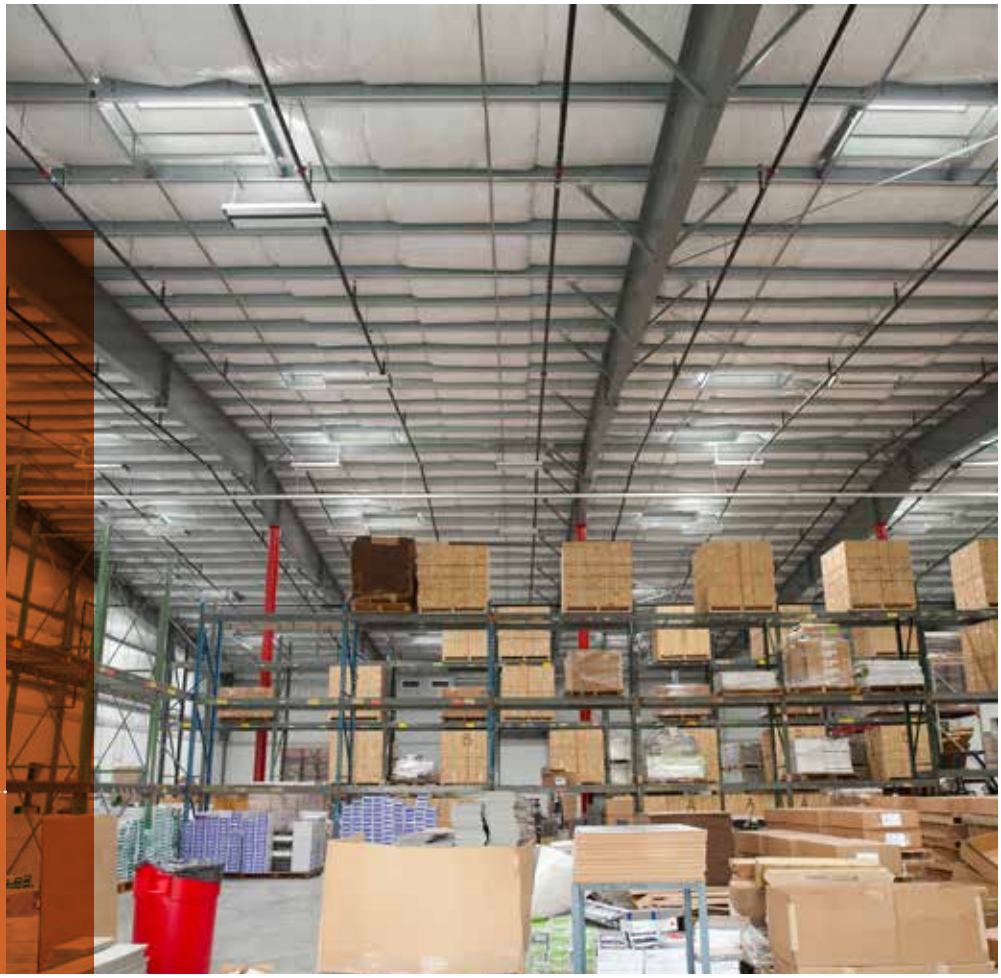
“We have many SKUs in our product line. Sometimes it’s hard to tell them apart. Before, we had to actually take them outside and look at our products under natural light to tell them apart,” said Tim Molnar, Production Manager at Karndean.

“But now, we don’t have to do that anymore. There’s tons of natural light in this new building,” said Molnar.

Furthermore, with different facilities in Asia having slightly different equipment, there can always be very small shades or variants in color, thickness or shape.

“With the skylights mixed in with the new LED lights, it certainly makes a large difference for us, from that ability to be able to see if there are any variances, not only in the color but also in the sheen and texture of the flooring we are shipping out,” said Chris Wettling, Warehouse Manager for Karndean.

“Before, we would lay out the flooring in the showroom by the fully-glassed front of the building,” explained Wettling. “Now I can easily do that where there’s skylights.”



HOLISTIC APPROACH TO LIGHTING

*The warehouse installed Sunoptics prismatic skylights along with Lithonia Lighting high bay fixtures.*

"Time is a very precious commodity. Anything that can save five minutes is a huge help," he said. "And the lighting has helped us immensely."

## THE PHOTO SENSORS MAXIMIZED THE NATURAL INTERIOR DAYLIGHT

When the lease for their rented warehouse ended, the company decided to significantly increase the size of their Karndean-owned facility. In their larger, newly constructed warehouse the LED lighting was supplemented with natural interior daylight.

"You go into the new warehouse and the impact is like, 'Wow,'" said Wettling. "We never had any outside light coming into the middle of our warehouse. Even when we had our doors open, daylight very rarely made it to the middle part of our warehouse," said Wettling.

The warehouse space installed Sunoptics® Signature series prismatic skylights along with I-BEAM® IBL LED high bay fixtures from Lithonia Lighting®.

While LEDs require less energy than the previous T8 fluorescent lights in their old warehouse to achieve the same light levels, the new lighting system also employs light sensors to further reduce energy by dimming the LEDs based on the amount of daylight available in the facility.

The daylighting sensors were carefully positioned and calibrated to maximize the natural interior daylight by LaFace & McGovern technicians, using an Acuity Controls LC&D GR 2400 control system. LaFace & McGovern specialize in commercial and residential LED lighting and control systems.

In total, two hundred LED light fixtures and seventy-three skylights were installed during the construction project.

# THE SKYLIGHTS PROVIDED A HIGH LEVEL OF LIGHT TRANSMISSION WITH 100% DIFFUSION

The LED high bay fixtures included integrated controls and photo dimming sensors to reduce energy costs and help extend the life of the fixture.

Wettling reports the subtle brightening or dimming of the LEDs is barely noticeable as the sunlight triggers the sensors to reduce or increase the light output of the LEDs.

## THE SPREADSHEET HAD QUANTIFIABLE ENERGY SAVINGS DOLLARS

According to Karndean's Jim Horan, Facility Manager, the decision to incorporate daylighting into the warehouse was also in line with the company's philosophy, "to do everything as efficiently as possible."

Karndean began their discussions with Allen & Shariff and architect Jim Roos.

"We started out saying, 'Hey, we can make the warehouse and production floor nicer.' And we were always going with LEDs—that was definitely in our specs from the beginning," said Horan.

Architect Roos explained, "We had been coming from the vantage point of budgets, budgets, budgets. Then, all of a sudden, they said 'We want skylights,' and we said, 'Okay, that wasn't in our original budget, but we certainly can pursue that,'" said Roos.

Roos said the owners understood the payback value of daylight harvesting—reducing the electric light load when skylights and windows can make up the difference.

"I agreed. It was a good idea," said Roos.

For electrical lighting, Roos specified "Linear LED high bay fixtures that we would suspend down." He explained the reason he specified LEDs over fluorescent or HID was because of their "long life, and especially the dimmable characteristics." LEDs were also suggested by Allen & Shariff.

Jason Whitfield, Engineer with Allen & Shariff, determined foot candle requirements for the three building areas and Valerie Mckee of LaFace McGovern created lighting calculations based on Whitfield's specifications. She integrated the light output from the LEDs with the anticipated light available from the sun. Using SkyCalc, a spreadsheet tool, Mckee determined the optimum skylighting strategy to achieve maximum lighting and HVAC energy savings.

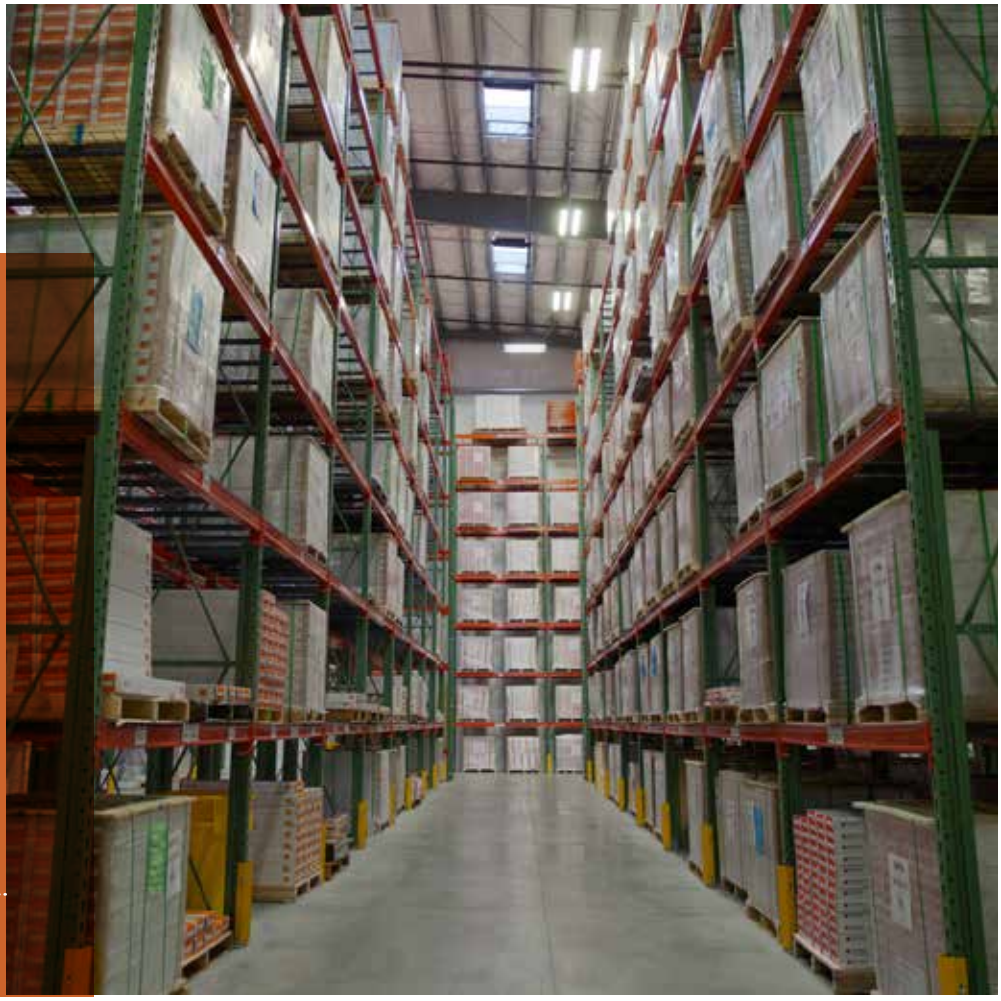
Encouraged by the lighting calculations provided by Mckee, Whitfield agreed with the Acuity brand fixtures and controls that Mckee recommended.

"The spreadsheet had quantifiable energy savings dollars the owner would see," explained Mckee, "so they can present this to the owner and convince them 'Look, let's cut holes in your roof.'"

The original specification called for clear, plastic skylight domes, which, according to Mckee, would not have provided as much usable light as the prismatic skylight technology offered by the Sunoptics skylights. A prismatic skylight with proper diffusion will redirect light evenly across the daylight area. Sunoptics light transmittance is 68%, said Mckee.

"We quantified that the reduction in usable light attributed to the clear skylights would have translated into a significant decrease in daylighting into the space, and therefore not reaping the maximum benefits of a Sunoptics prismatic skylighting system," said Mckee.

Mckee examined the energy savings in the three building areas, comparing the lighting when Sunoptics prismatic skylights



**DAYLIGHT HARVESTING**

*Sensors to dim the LEDs when sunlight was available.*

were included in the spec, versus specifying the lighting with just LEDs and no skylights. LaFace & McGovern targeted 30 foot-candles using just 3.0% of the roof space for skylights.

In the first building area, 18 skylights offered a 48% savings in the lighting load. In the second area, 30 skylights resulted in a 49% lighting load savings. The third area calculated a 49% savings as well, but with 33 skylights specified. The savings assumed an additional specification of light photo cell sensors to dim the LEDs when sunlight was available. And the older warehouse saw an energy savings as well, where T8 fluorescent fixtures were replaced with IBL LED but without any skylights.

"I explained the sensors are a very small add-on, and showed the calculations. They were only going to achieve the savings if they used daylight harvesting," said Mckee. "They wanted to do it, they just needed to have the information to back it up. It was more than what they anticipated saving."

Architect Jim Roos agreed.

"When I compared Mckee's calculations to what I specified, there were some factors in my light transmission and diffusion that weren't quite as good. I didn't want to cut any corners with what we were specifying," said Roos.

According to Karndean's Jim Horan, another "big sell" was that, "all the controls were compatible and from the same manufacturer. Acuity was the whole system."

The new, larger warehouse paired seventy-three 30-inch by 50-inch Sunoptics Signature Series skylights with two hundred IBL LED and one GR 2400 control panel. Three

photosensors were used.

One draw for LaFace McGovern's Tim Leonard was that the IBL are DesignLights Consortium listed. DLC is a non-profit with a mission to accelerate energy efficiency. Another advantage, he said, was that the thermal management of the IBL allowed for significant energy savings along with system longevity.

There are three indoor photocell sensors each managing a group of about fifty of the IBL. Each fixture offers up to 18,000 lumens.

## ARCHITECT POSITIONED THE SKYLIGHTS FOR OPTIMAL LIGHTING

The new warehouse facility is a pre-engineered, insulated steel building with a metal roof on three acres in an industrial park.

The existing production facility, including assembly and cutting, was expanded an additional 8,700 sq. ft. with a ceiling height of 25 ft.  The new warehouse facility, an L-shaped building, totals 21,700 sq. ft. with a 35 ft. ceiling height. A 10,000 sq. ft. office space was included as part of the warehouse facility.

The complete construction project required two years from design to finish.

Architect Roos positioned the skylight spacing for optimal foot-candles and uniformity. To assure against leaks, Sunoptics provided metal curbs, designed for the sloped steel roof that, "integrated seamlessly into the metal building specific roof profile," said McKee.

Roos was careful to avoid placing skylights above anticipated warehouse racking, aiming more of the daylight into the aisle ways. And both the LEDs and skylights needed to work around the steel building's structural X-bracing.

"We did a lot of homework to avoid LED lights under the skylights," explained Roos, further clarifying that some sprinkler piping passed underneath a few skylights. "That was virtually unavoidable," he said. Altering sprinkler system lines is problematic because they are designed to calculate pressure created by every pipe turn, or angle, in order to maximize the hydraulic pressure needed at the sprinkler heads.

The placement, integration and calibration of the light sensors was the responsibility of LaFace McGovern field technician team.

## EMPLOYEE MORALE

"I think there are going to be hard savings and soft savings," said Bill Anderson, Vice President of Operations of Karndean, "employee morale and the ability to do your job better. And we can actually say to customers and to potential vendors, 'We made these decisions and look how great it looks.'"

*Research and reporting compiled and provided by Eneref Institute. Additional information generously provided by Karndean DesignFlooring, RSSC Architects, Allen & Shariff, LaFace McGovern Lighting and Acuity Brands Lighting.*

# PR FOR PLANET EARTH™

***Every organization possesses the opportunity to improve our planet and society.***

Our initiatives encourage organizations to grow sustainably and act responsibly by raising awareness for clear, specific solutions that offer an efficient use of natural resources, demonstrate social responsibility and foster a peaceful, earth-friendly economy.

We launch initiatives designed to encourage the best that commerce has to offer—for people and for our planet. We promote the idea that being resource-efficient and socially responsible, is also profitable. Our Advocacy Reports demonstrate the benefits of successful solutions.

™Eneref Institute

Eneref Institute

PHILADELPHIA. LONDON. NAIROBI. BOGOTA.


 twitter.com/eneref  facebook.com/eneref  vimeo.com/eneref

917.779.8600 | **eneref.org**