Eneref Institute

PR FOR PLANET EARTH™

A REPORT ADVOCATING FOR SOCIALLY RESPONSIBLE SUSTAINABLE DEVELOPMENT

POLYCARBONATE SKYLIGHTS ADD LIGHT & SAFETY TO **POST BRANDS WAREHOUSE**

ENEREF INSTITUTE EXAMINES HOW A LARGE FOOD WAREHOUSE EMPLOYED SKYLIGHTS TO IMPROVE THE WORKSPACE.

Honey Bunches of Oats, made by Post Consumer Brands, is among the top three most popular cereal brands in the US, and Post's optimism for their future is apparent by the newly constructed, one-million-square-foot Salt Lake City warehouse the company occupied in October 2017.

Spread across 45 acres, the building is one of the largest warehouse and distribution facilities ever built in Salt Lake. Americans spend $10 billion on cereal each year, and Post Consumer Brands, a company founded in 1895, hopes this new facility will help them capture a larger share of the cereal market.

THE WORD IS GETTING OUT. THEY ARE BEING SPECIFIED MORE AND MORE.

JEFF KEATE | *Aladdin Industries President*

IMPORTANCE OF LIGHTING IN LARGE COMMERCIAL FACILITIES

In any facility, lighting decisions make a great impact on the occupants' health, wellbeing and safety. But when the facility is as large as the new Post warehouse, the impact of those decisions is multiplied.

Increasingly, warehouse facility managers understand that natural daylight from skylights and windows not only saves energy, but also impacts our biological metabolism. Research shows that human performance in properly day-lit facilities is noticeably improved. Daytime alertness is also mediated by light exposure to our eyes. With proper natural daylighting, managers report lower absenteeism and fewer product defects in warehouses and factories like Post's. Indeed, when human performance results are included, the return on investment for skylights is significant.

DYNAMIC DOMES MAXIMIZE LIGHT FOR A FULL DAY OF DAYLIGHT

To bring natural interior daylight into the Post facility, the architect specified 312 polycarbonate skylights. Jeff Keate, President of Aladdin Industries, recommended VELUX Dynamic Domes, a new daylighting technology designed to bring a considerable amount of daylight into buildings over the entire course of the day.

"The architect got a bonus. He's going to get more light than he expected," said Keate. Aladdin is a custom skylight manufacturer and distributor.

Keate noted that throughout most of the year, sensors in the warehouse shut off the electric lights in the morning—and the lights remain off for the whole day.

That's because the Dynamic Dome is designed to maximize light collection with a taller, steeper dome base that allows for more light collection early and late in the day. The geometry ensures a lower angle of incidence, where more sunlight is refracted into the warehouse than is reflected outward. The pattern of ridges and ribs, as well as the taller dome shape, presents a large surface to capture and transmit sunlight, even when the sun is low in the sky.

To eliminate condensation build-up, a wicking system evacuates water to the building exterior, while a one-piece frame ensures watertightness. Though winter temperatures in Salt Lake City drop below freezing, loss of heat through the skylights is prevented by an impenetrable, thermally-broken water barrier.

During the summer months, Keate said that with the 36-foot ceiling height, "Light is a much bigger factor than the fact that there might be a little bit of heat coming in. But the domes still have a good shading coefficient. They're not going to create hot spots and make anybody inside feel uncomfortable."

20% MORE DAYLIGHT FROM INNOVATIVE DOME-SHAPED DESIGN

To capture the maximum amount of daylight, the skylight has a diffused white, upward-facing prismatic dome beneath a clear, smooth outer dome shell.

AS PART OF OUR RIGHT TO DAYLIGHT CAMPAIGN, *Eneref Institute interviewed participants in the planning and implementation. Interviewees included Jeff Keate, President of Aladdin Industries; Jared Brooks, Senior Project Manager for Big-D Construction; Kerry Emanuel, MIT hurricane expert and; Ted Trautman, Ph.D., Covestro Technical Director.*

POLYCARBONATE SKYLIGHTS

Keate recommended Dynamic Domes with polycarbonate to Big-D Construction to avoid the need for fall protection devices.

SPECIFYING POLYCARBONATE FOR HIGHER IMPACT RESISTANCE.

VELUX determined that their dome-shaped skylight system could achieve the greatest lumen output with this configuration, which allows for 100% light diffusion and 20% more daylight harvesting.

According to a study by LTI, Dynamic Domes can harvest 56 more minutes of sunlight per day than the previous VELUX system—potentially saving 340 hours of energy annually.

"We studied it quite extensively to make sure that there weren't any potential problems with it," said Aladdin President Jeff Keate. "Honestly, it's one of the best designs I've ever seen."

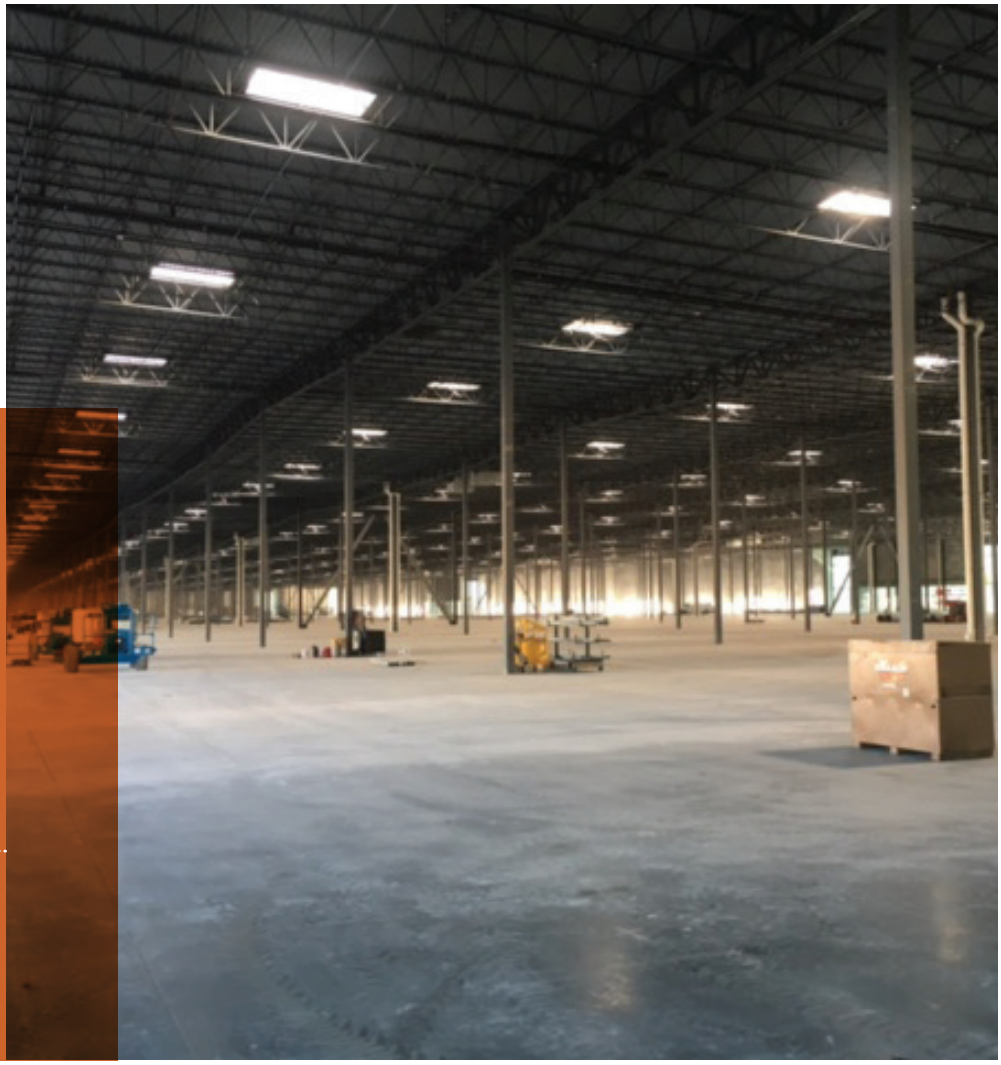
Keate reported that his company recommended Dynamic Domes with polycarbonate (instead of the more common acrylic) to the general contractor, Big-D Construction, to avoid the need for fall protection devices.

"Polycarbonate has been tested and has an OSHA-approved rating and was strong enough to meet that criteria," Keate explained. "Their spec was fairly broad."

OSHA (Occupational Safety and Health Administration) mandates the safety requirements of rooftop skylights. Polycarbonate offers much better impact resistance than acrylic and polycarbonate is also much more likely to meet OSHA regulations for fall protection or accident in skylights. Due to its strength, polycarbonate may not require the excess investments that acrylics could need to meet fall protection guidelines, including the installation of steel screen mesh.

"I'm comfortable saying polycarbonate has 10 times the toughness of impact-modified acrylic," explained Ted Trautman, Ph.D., Covestro Technical Director. Covestro is the largest supplier of polycarbonate to the US skylight market.

In fact, due to the increasing force of storms attacking the coastal areas of the United States, it is prudent to specify polycarbonate, rather than acrylic, skylights. As demonstrated by recent hurricanes, storms



NEW DAYLIGHTING TECHNOLOGY

To bring natural interior daylight into the Post facility, the architect specified 312 polycarbonate skylights.

will continue to grow in intensity, and so will their damages. Kerry Emanuel, MIT hurricane expert, has calculated that Atlantic hurricanes have become 60% more powerful in the last 10 years. The maximum wind speeds of these storms have increased by 25%.

The strong impact resistance of polycarbonate is due to its chemical structure. One test used by the plastics industry to measure polymer toughness is the Instrument Impact test, which measures the impact of a high-speed wooden 2x4. Polycarbonate demonstrates a total impact energy of 50 ft.-lbs., while acrylic gives a much lower impact energy at only 2 ft.-lbs.

THE UV-ABSORBING "CAP LAYER" IN THE POLYCARBONATE EXTENDS THE SKYLIGHTS LIFECYCLE TIME

To increase the service life of VELUX Dynamic Domes, the polycarbonate glazing has a UV-absorbing "cap layer" that nearly eliminates sunlight damage to the polycarbonate.

It is typical to replace skylights with roof retrofits. While no skylights last forever, the 15-to-20-year potential lifespan of UV-capped polycarbonate skylights means that they could be replaced during the next roof retrofit.

Compared to standard acrylic, polycarbonate also offers better fire protection. According to Factory Mutual (FM) approved testing, acrylic is more flammable than polycarbonate with a burn rate of 2.5 inches per minute, whereas polycarbonate burns at 1 inch or less.

FAST, SIMPLE SKYLIGHT INSTALLATION IN POST WAREHOUSE FACILITY

Located about 15 miles from downtown Salt Lake, the new 900,000-square-foot facility is a concrete, tilt-up panel building that was constructed in one year. Owned by Landmark West LLC, the building has thick concrete walls, with R-30 roof insulation and Firestone 60 mil TPO. Circulation fans maintain a cool and comfortable temperature. The space is heated but not air-conditioned.

Jared Brooks, Senior Project Manager for Big-D Construction, reports that the installation of skylights in the Post facility was a simple process.

"The skylights come as a unit already attached to the curb. We cut the holes in the roof with a big gas cut-off saw and slid the skylights over the hole and screwed them down to the deck. That's it," he said. "Not a real complicated installation."

For safety, a scissor lift operator stood underneath to catch the sheet of decking as workers cut the 4-by holes in the deck.

"To complete one skylight, I'd say it's 10 to 15 minutes from cutting the hole to having it screwed down in place," said Brooks.

VELUX skylights come with a sophisticated flashing system to eliminate any potential leaks, which Brooks managed during the installation process.

"In the VELUX skylights, you take the dome off, then flash it, and then put the dome back on it," he explained. "That's a major difference."

PARTICIPANTS SATISFIED AS DYNAMIC DOMES' POPULARITY SPREADS

Aladdin President Jeff Keate, whose company has been specifying skylights since 1962, expressed his satisfaction with the results of the skylight installation.

"We've got four or five of the major contractors in town that have used some quantity of the Dynamic Dome. So, the word is getting out, and they are being specified more and more," he said.

THE *SciBox:*

FLEXIBLE YET STRONG

The strong impact resistance of polycarbonate is due to its chemical structure.

The strength of polycarbonate *comes from covalent bonds within the phenyl group (benzene ring). The phenyl group attracts molecules, providing flexibility and low mobility to the skylight, ensuring high thermal resistance and transparency. With previous polycarbonate technologies, UV radiation caused electrons to detach from their chemical position. Because these electrons reacted to UV light (at wavelengths near 330 nm, around the center of the UV spectrum), the polycarbonate was vulnerable to erosion.*

By nullifying the effects of UV deterioration, the new, thin, highly concentrated polymer layer, co-extruded and fused onto a solid polycarbonate, prevents the polycarbonate from hazing, allowing more light to pass through.

LEAD BY EXAMPLE.

THE NATURAL INTERIOR DAYLIGHT INITIATIVE IS A CAMPAIGN TO PRESERVE OUR NATURAL RESOURCES AND PROMOTE NICER LIGHTING IN OUR HOMES AND BUILDINGS.

ENEREF INSTITUTE launched the Natural Interior Daylight initiative to champion solutions in line with our mission, that deliver sound ideas to significant market influencers. The initiative is designed to encourage responsible behavior within public and private organizations, municipalities and corporations by offering common sense solutions that can achieve effective results.

Our Natural Interior Daylight Virtual Campus is the repository for our Advocacy Reports and Web Forums.
Visit eneref.org.

LEAD OTHERS. INFLUENCE CAUSE. DRIVE CHANGE.
eneref.org

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. MANILA.

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

917.779.8600 | **eneref.org**