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Thanks to Suntuitive, natural light fills the interior of Masco's new world headquarters in Livonia.

# Self-Tinting Glass Technology:

## Suntuitive<sup>®</sup> Brings Masco and the World into the Light

By *Mary Kremposky McArdle*, Associate Editor

**A** picture is worth a thousand words. A Masco Corporation vice president recently sent Fenton-based glass fabricator, Thompson IG, LLC, a photo of himself leaning back in his office chair with a big smile on his face. His blinds were wide open, his southwest corner office was filled with natural light, and the indoor temperature was perfectly comfortable.

"Masco was able to open up the blinds for the first time in 28 years, and in fact, they actually removed them," said Lindhout Associates Architects President Mike Kennedy, referring to a test installation of Suntuitive<sup>®</sup> Dynamic Glass in Masco's former Taylor headquarters.

Suntuitive is a sun-sensitive interlayer laminated between the first two glass surfaces (the sun-side) of an insulated glass unit. This dynamic glass product automatically tints in response to heat from direct sunlight. In general, dynamic glass refers to a window able to change its visual properties and characteristics based on either the introduction of heat or electricity. Suntuitive Dynamic Glass appears to be a living skin, tinting and lightening in subtle, infinitesimal gradations as the sun's heat waxes and wanes over the course of the day.

Watching this chameleon-like glass darken and lighten without any wires, controls or external power seems like magic, but it's all based on Pleotint, LLC's 16 years of scientific research and the West Michigan company's incredible application of thermochromic technology. Thermochromism is the ability of a substance to change color due to a change in temperature; in this case, in response to the sun's infrared waves.

Suntuitive's technology does seem like rocket science, but you don't have to be a scientist to appreciate the benefits of this self-tinting technology, including glare mitigation, solar heat gain reduction, and the resulting opportunity to enjoy views of the great outdoors while indoors. Corporations such

PHOTOGRAPHY COURTESY OF LINDHOUT ASSOCIATES

as Masco, along with schools, hospitals and homeowners, not only appreciate the product, they are embracing this off-the-grid technology at a pace as amazing as the product itself.

#### **Suntuitive: Ubiquitous as the Sun**

Released to the market only a few years ago, Suntuitive Dynamic Glass is now enjoying an explosive level of growth, both nationally and internationally. “Over the last two years we’ve experienced tremendous growth internationally,” said Pleotint and Thompson IG President Tom Donovan. “Once in only two countries, Suntuitive is now in place in 25 countries around the world and in over 450 projects globally.”

Pleotint manufactures rolls of the Suntuitive interlayer in its Jenison plant located near Grand Rapids, and currently sells the interlayer to 20 different glass fabricators across the globe, including fabricators in Australia, Canada, Singapore, Germany, Lithuania, Korea and Bahrain. “There is no other dynamic glass technology that is being utilized by glass fabricators worldwide,” said Donovan. Pleotint owns Thompson IG, the sole U.S. glass fabricator responsible for laminating the Suntuitive interlayer and fabricating the actual insulated glass unit.

Like the sun, Suntuitive seems to be everywhere. Suntuitive is in place from Ann Arbor to Singapore and from Korea to Toronto. According to Donovan, Suntuitive is the glass of choice in the observation deck of the iconic CN Tower in Toronto, making it the highest dynamic glass installation in the world. The largest Suntuitive installation globally is soon to be a government building in the community of Geelong, Australia, near Melbourne. This “down under” building has just fewer than 30,000-square-feet of Suntuitive Dynamic Glass. As its prime repeat customer, a high-end day care, called Children’s Learning Adventure, now has it in 36 different facilities across the United States, including Ohio, Nevada, Oklahoma, Colorado and Texas.

Back in the home territory of this Michigan-invented and Michigan-made product, Calvin & Co., a Flint-based glazing contractor, has installed Suntuitive Dynamic Glass on several projects in the Great Lakes State, including the Horizon Building in Fenton and the University of Michigan’s Glenn E. Schembechler Hall Football Performance Center, as well as several projects outside of Michigan. According to Donovan, the University of Michigan’s second Suntuitive installation is the Richard Postma Clubhouse at the U-M Golf Course, installed courtesy of Curtis Glass Company, Troy. “A Michigan-based

real estate developer installed Suntuitive at one of its student housing projects in Ann Arbor as well,” Donovan added.

#### **Masco: The Largest Suntuitive Installation in the United States**

For Masco, the Suntuitive story began about a year-and-a-half ago. As its very first use of Suntuitive, Lindhout Associates specified this innovative dynamic glass on Eberspaecher’s new North American facility in Brighton. Lindhout was eager to let the light into Masco’s new home in Livonia after the successful completion of the Eberspaecher building in fall 2016. “It is not hard to explain the additional benefits of Suntuitive Dynamic Glass over a typical insulated glass unit system to our clients since





Shining through this self-tinting glass interlayer, natural light brightens the monumental stair in Masco's grand atrium. Suntuitive's long list of benefits includes the ability to introduce natural light and great views into a building, while enjoying solar heat gain reduction, glare mitigation and even improved acoustical control.

the increased initial costs can be offset by equal savings in many other areas of the building," said Kennedy.

Masco wanted to first experience Suntuitive directly in the interior of its existing Taylor headquarters. "Before Masco made the decision to put Suntuitive on the new headquarters, Masco requested prototypes to be placed on their existing facility," said Donovan. "They wanted to directly live, see and experience it."

Thompson IG fabricated 10 units for Masco's Taylor office, testing the performance of several different glass constructions by varying the type of low-E coatings, the tint, and the location of the tint on different glass sheets of the insulated glass units.

Ultimately, Masco selected a CrystalGray® tint on the second glass surface and a Guardian Glass triple silver low-E coating on the buildingside of the insulated glass unit. "We tailored the design of our systems to accommodate Masco's specific needs," said Donovan. "In this case, we configured Masco's chosen glass construction to perform better in colder months."

At Masco's "testing grounds" in Taylor, even though Thompson IG purposely installed

**SUNTUITIVE®**  
Dynamic Glass

Bringing Brilliance into the Classroom

Unity Christian High School  
Hudsonville, MI

*The high school achieved optimized daylighting by using Suntuitive® Dynamic Glass. Suntuitive thermochromic technology continuously adapts the tint of the glass to the environment, providing year-round occupant comfort.*

suntuitive.com - Call Dan Danese at Thompson IG 1-800-650-9001 ext 390

THOMPSON IG

Suntuitive in the worst possible direction for solar heat gain – the southwest – this innovative product still aced the test. Extremely satisfied with the results, Masco went full throttle and decided to install 18,000 square feet of Suntuitive as the exclusive exterior glass for its new world headquarters in Livonia. What began as only a test case became the largest installation of Suntuitive Dynamic Glass in the entire United States.

#### Suntuitive-Inspired Design

Suntuitive actually transformed the design of this 91,000-square-foot building. “One of Masco’s priorities for their new headquarters was unobstructed views and ample natural light – a building without the need for window blinds,” said Kennedy. “The initial design concept of the new headquarters was that of a lantern gently illuminating the site from within. None of this would have been possible without the incorporation of this thermochromic glazing system.”

Taking full advantage of Suntuitive’s capabilities, Lindhout actually canted the entire building and altered its site orientation. Kennedy explains: “We were able to take advantage of the natural walkout topography and orient the main axis of the building 30 degrees farther to the west without the typical solar heat gain issues associated with west-facing glazing. The natural light is then able to penetrate into the center of the building, passing through the glass office wall along the building perimeter.”

Because of Suntuitive, Lindhout could incorporate more glass on the building’s exterior and throughout the interior as well. “Suntuitive enabled us to maximize the areas of glazing on the east, south and west exposures using common design details for all three conditions,” said Kennedy. “Suntuitive provided a balanced level of light from the shaded, or indirect light, glazing surfaces and full sun, or direct light, surfaces.”

Suntuitive’s ability to draw in natural light without drawing in heat or introducing glare not only completely erased the need for blinds, it inspired Masco to request pure glass office walls in lieu of the originally specified drywall. “They wanted the natural light to flow from one side of the building to the other,” said Thompson IG Associate Dan Danese, CSI.

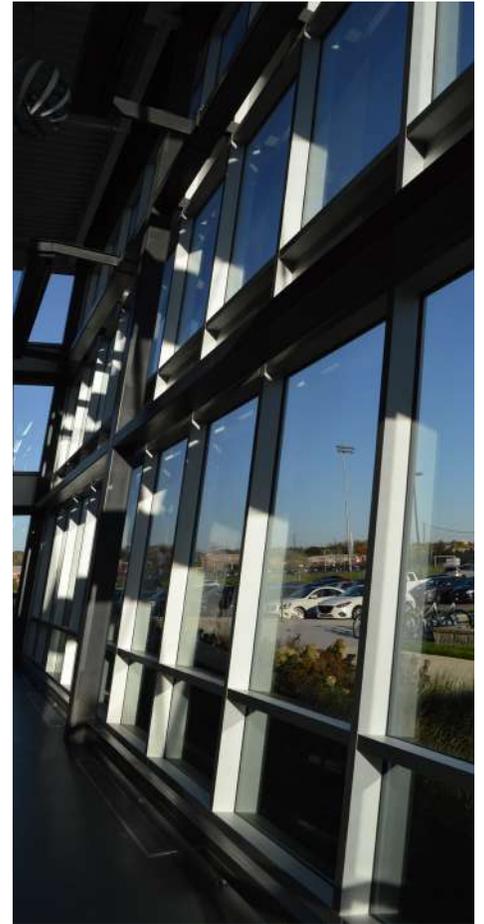
Even though this request was initiated while the building interior was under construction, Lindhout Associates and the George W. Auch Company, the building’s Pontiac-based construction manager, both mustered their professional expertise to make this building of light become a reality for Masco.

#### Suntuitive’s Sustainable Synergy

Today, Masco enjoys thermal comfort, beautiful views and an interior simply glowing with natural light. Once the George W. Auch Company completed construction of the building in June 2017, Masco began enjoying the full benefits of this cutting-edge, self-tinting technology.

For Masco, sweltering in the office during a summer heat wave is a thing of the past. The building registers a solar heat gain coefficient of 0.25 in modest sunlight and outdoor temperatures, but “when the glass fully tints in strong sunlight on a hot day, the solar heat gain coefficient drops down to 0.12,” said Danese. “This means less solar heat gain enters the building and people are comfortable inside during the hottest parts of the day.”

This innovative interlayer amplifies the sustainability of other building systems, most notably conferring the ability to downsize the mechanical system for new construction. Kennedy often conducts tours of the Masco facility. According to Danese, when Kennedy was asked during a recent tour how he would design the building differently, he replied, “I would reduce the cooling by 20 percent.”



## GLASS/GLAZING

Kennedy himself adds, “With Suntuitive, the peak cooling loads are eliminated, saving energy and reducing the size of the required cooling components. During the daylight hours, artificial lighting can be dimmed dramatically as well.”

As more architects, contractors and building owners come to not only understand Suntuitive in principle but to experience it directly in practice, the product’s synergy with other sustainable systems can only increase. “I believe Suntuitive is the top glass product to incorporate with all the other sustainable building products in today’s buildings,” said Danese. “It also helps in so many different LEED categories that, depending on the project, a building might be able to leap from LEED Silver to LEED Gold just by using Suntuitive.”

Suntuitive Dynamic Glass can help a building project achieve LEED v.4 certification, earning credits in seven different areas. The seven areas range from credits granted for thermal comfort, daylight and quality views to acoustic performance, interior lighting and building innovation. As the highest credit level possible, Suntuitive can contribute 18 LEED credits in the Energy & Atmosphere category for optimizing



**Masco's new headquarters is designed as a lantern gently illuminating the site from within. The unique LED light fixtures can be programmed to display a variety of colors.**

energy performance. Suntuitive also helps projects achieve a higher Building Research Establishment Environmental Assessment Method (BREEAM) score, earning credits in six different areas.

Masco also appreciates Suntuitive’s ability to boost acoustical control. “Suntuitive provides acoustical value due to being a laminated product,” said Danese. “A regular insulated glass unit is 30 on the Sound Transmission Class (STC) scale, but with Suntuitive it is in the neighborhood of 39 STC.”

The Suntuitive laminate interlayer offers “inherently less distortion and additional safety protection over non-laminated insulated glass units,” added Kennedy. “It can also be used in sloped glazing and skylight locations. The damaging exposure of the sun on the interior building finishes and furniture is eliminated as well.” In fact, Suntuitive blocks up to 99 percent of harmful UV light.

From thermal comfort to UV control, Suntuitive Dynamic Glass met Masco’s high performance standards. “Suntuitive delivered and exceeded Masco’s expectations,” said Donovan. “Masco is extremely happy.”

### **Rx: More Natural Daylight**

Donovan believes the core benefit of Suntuitive is its ability to boost productivity in the office, learning in schools and healing in hospitals. Suntuitive aligns with Masco’s desire “to provide the best workspace for their staff,” said Donovan. “Providing occupant comfort contributes to productivity in an office, and studies demonstrate that productivity is six percent higher in environments with proper natural daylighting.

“Over the 30-year lifespan of a building the biggest cost in a corporate setting is a company’s employees,” continued Donovan. “That outweighs construction costs over a 30-year period, and studies show that productivity



costs are 112 times greater than energy costs in the workplace.”

Studies in school and healthcare environments show similar positive impacts on building occupants. “Schools with natural daylighting show children learn 20 percent to 26 percent faster,” said Donovan. “Test scores drop 17 percent in classrooms without windows and a connection to the outdoors. Patients in day-lit hospital rooms spend up to 20 percent less time recovering in the hospital. Patients exposed to greater dosages of sunlight perceive less pain and took 22 percent less pain medication. All these benefits apply to residential applications as well.”

Suntuitive Dynamic Glass is a technology capable of fostering all of these life-giving benefits. Even more fortunately, both fabrication of the laminate and installation on the construction site is the same as conventional glass. There is no learning curve in working with Suntuitive technology. “Suntuitive is simple to use from an installation standpoint and it’s manufactured the same as any other laminated glass product,” said Donovan. “Because it is convenient and simple, we can easily integrate Suntuitive into the local supply chain in each country. We complement the whole supply chain, so that is what makes us the world’s most utilized dynamic glass.”

#### Thompson IG Ramps Up Production

Given the growing interest in Suntuitive, Thompson IG has increased its lamination capacity by 300 percent and upgraded its entire lamination department. In summary, the company has constructed three additions to its Fenton fabrication facility since 2012, invested in a second autoclave, upgraded the tempering line, and most importantly, the fabricator ramped up investment in training of its 120- to 140-person staff.

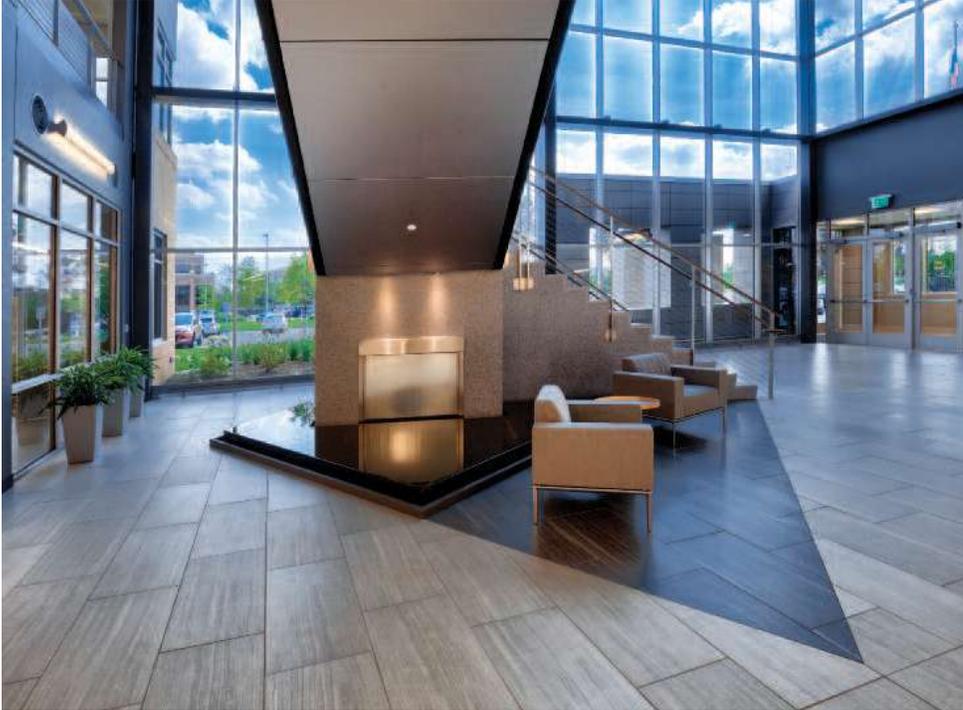
“We’ve improved our whole process, including our glass-cutting, tempering or heatstrengthening capabilities, our lamination, and our process of fabricating insulated glass,” said Donovan.

Building-wise, “we’ve just completed a 5,000-square-foot addition at the beginning of this year, and we are planning another expansion later this year as well,” Donovan added. Product-wise, Thompson IG is expanding its ability to fabricate Suntuitive in bullet-resistant glass. “Suntuitive is only one of our product lines,” said Donovan. “As a full-service glass fabricator, Thompson IG fabricates architectural, interior, safety, printed, bullet-resistant and other glass products. We are a full-service platform of all different glass products.”

Equipment-wise, a second autoclave assists in ramping up production, as laminated glass may spend several hours in an autoclave as a means of removing the very last vestige of air and moisture. The new tempering system offers a precise means of consistently producing flat, undistorted glass. “We are now producing some of the flattest glass in the country on a daily basis all day long,” said Danese. “In the world of glass, flatness equals clarity.”

The company’s upgraded tempering line is a true miracle technology. In tempering or heating the glass, maintaining a consistent, even temperature across the entire glass surface is notoriously difficult. Without an even temperature, the glass will not be flat enough to meet industry standards or customers’ expectations.





**With Suntuitive installed in every exterior window, Masco enjoys comfortable temperatures and natural light throughout the facility, including in this intimate nook with a small waterfall and infinity pool located within the building's atrium.**



The new technology is part software program and part mechanical system that helps to evenly distribute heat across the glass during the tempering process. "The system automatically customizes how much air is blown and where the air is blown across the glass to achieve even heat distribution," said Danese.

More importantly, Donovan believes in investing in people. "We could have the best facility and the best equipment, but we have zero chance of success without properly trained operators," said Donovan. "People are the true source of quality. We have training videos and written procedures for every process in the plant. Training was our largest investment this past year."

The training videos are used to certify newly hired employees, and to continually re-certify staff on procedures and processes. "Those training videos are always available on the plant floor, so that anyone can go and watch them," said Donovan.

Thompson IG has also formulated a new employee Enterprise Resource Planning (ERP) system to work smarter by having one uniform system control the entire process. "It's a whole system to be able to have everyone working in unison throughout the shop across all three of our shifts," said Donovan. "The key is to have every shift properly trained and working in the same manner. The ERP ensures the proper hand-off of jobs and projects from one shift to another.

"The feedback we receive from employees has been very positive," Donovan adds. "The employees know that we are investing in them to make their jobs simpler, and to make them more productive and more skilled in their jobs. They have been given the right tools to do their jobs better. It's a win-win situation for everyone."

Suntuitive is also a winning asset for any building owner and occupant. The applications and clients for this award-winning dynamic glass are continually increasing. Wayne State University's Elaine Jacobs Gallery installed Suntuitive, and now the gallery can display art work in areas once rendered inaccessible due to potential UV sun damage to expensive and original art pieces. Suntuitive has been installed on 14 Sheetz high-end convenience stores and gas stations in North Carolina and Pennsylvania as well. Clearly, the answer to Pleotint's and Thompson IG's brand question, "Are you ready to let the light in?" is a resounding "Yes." 