

SMART GLASS

AUGUST 2018 TECH BRIEF FOR
CONSTRUCTION AND UTILITIES
TALENT NETWORK



[HTTPS://WWW.BCCRESEARCH.COM/MARKET-RESEARCH/ADVANCED-MATERIALS/GLOBAL-MARKETS-AND-TECHNOLOGIES-FOR-SMART-GLASS-AVM065D.HTML](https://www.bccresearch.com/market-research/advanced-materials/global-markets-and-technologies-for-smart-glass-avm065d.html)

Architects Love Specialty Glass

Smart materials are part of a solution to help reduce energy consumption in buildings. Because buildings are responsible for much of the carbon dioxide emissions which contribute to global warming, reducing the amount of electricity or natural gas used to provide building functionality is an important aspect of sustainability. **Smart glass** products are some of the most beautiful and dramatic smart building materials.

Commercial office buildings are one of the major areas utilizing smart glass because building owners can achieve significant cost savings while enhancing the occupant experience and workplace productivity. Buildings are currently a modestly-sized market for smart glass technologies. Potentially, the construction sector could be a high-volume market; second only to the transportation sector – both automotive and aerospace – where the additional functionality of smart glass can reduce weight.

Architects designing commercial buildings use smart glass for both interior and exterior design. The photos shown above provide an example of how functional glass (e.g. smart glass) starts transparent and with the flick of a switch the glass can be rendered semi-opaque without darkening the interior conference room.

Labor Force Takeaway

Knowledge of **smart glass**, like an understanding of **LEED accreditation** for buildings (see May 2018 CUTN Tech Brief), as well as knowledge of other aspects of sustainable design/construction practices is extremely valuable. The reason is not to prepare one for a new job title, but to qualify a laborer to work on complex structures. As buildings get smarter, upskilling will become increasingly important in moving along a career pathway.

Smart material familiarity is a differentiator when bidding to work on a state-of-the-art building. Architects must know critical information about smart materials, e.g. smart glass skylights come with wires attached and may be susceptible to fingerprints, meaning a crew/manager needs to be aware of the different features to avoid rework, schedule slips or damage to expensive modules.

Eventually, companies providing smart glass components may certify installers using the business model of roofing companies. High-end roofs are warranted for performance only if installed by a certified crew.

TAN recommends that public, private and philanthropic entities issuing RFPs for upskilling or for apprenticeship programs specify inclusion of a module about glass manufacturing and smart glass

Urban Centers and Designer Homes

Smart/functional glass is a subset of specialty glass. Custom-designed curtainwall glass is very common for skyscrapers built in major cities. Curtainwalls may be curved, ornate or tinted to match the building façade. Examples from the One57 Building in Manhattan are provided.

Glass block can be used as a structural material or as a translucent window. Privacy glass may be considered specialty glass. Like [glass block](#), light is transmitted, but detailed images cannot be seen due to a [rain-pattern](#), [reeded texture](#) (tiny, parallel waves) or [etching](#). Privacy glass is used for shower stall doors, bathroom windows and front door [slide lights](#). Many of the applications of smart glass are for privacy purposes.



Figure 1 Permasteelisa curtainwall glass on the One57 Building NYC

The distinction of smart glass is that can change tinting or other properties, then returns to a resting state. Smart glass may be active or passive depending on the [technology](#)



Figure 2 Curtainwall of NYC's One57 Building from Wikicommons

used. Prescription eyewear that darkens in the sunlight is an example of passive smart glass. Active glass technologies use electricity to [switch mode](#) – typically from transparent to opaque. Some [technologies](#) are tunable – allowing one to adjust the degree of opacity. Fully opaque windows make excellent projection screens; photochromic glass can be used in rear-projection mode as well. Other modalities include UV protection and glare-control, which are prized by museums and art galleries.

For most forms of smart glass, electricity is used to adjust the temperature of the glass, which in turn changes the [transmission properties of the glass](#). Other advantages include:

- View to the outside is optimized even during low/no-sun periods
- Variable shading does not obstruct view
- Space consumption is relatively low
- Sensors adjust light conditions automatically or manual control with the turn of a dial
- [Daylighting](#), which [imparts a sense of wellness](#), is optimized.

Current examples of smart glass in commercial use are primarily in transportation, although not exclusively.

- Boeing's 787 [Dreamliner](#) features smart-glass windows in lieu of window shades, in part because the technology chosen is better at managing the interior thermal environment than are shades.
- [Elevators](#) inside the Washington Monument use smart glass so that passengers may view the commemorative stones within the monument clearly.
- YouTube has many demos of smart glass for hospital [curtain walls](#) and [interior partition](#) uses. Note that the benefit to the use of smart glass is that the current fabric dividers in [hospitals](#) can harbor and grow bacteria, while glass is easily disinfected surface.

In terms of economic development, South Jersey, with its established glass fabrication expertise, may want to consider licensing opportunities for smart glass manufacturing and/or construction module fabrication. New York City is a large market for architectural glass. Since glass is expensive to ship, a local provider may be welcomed by this market.