

Daylighting: More than Glass



By Blair Davies, P.Eng., VP, Engineered Assemblies

Think about where we have come from and where we are going. Man used to live in dark places because it kept the cold out and heat in but meant that precious fuel was used to bring light. Light brought safety, the ability to function and get things done and the ability to broaden productivity beyond the daylight hours. Then we figured out how to create good building envelopes and bring light into the space during the day. Precious fuel could be used only before and after daylight hours.

Then glass. Seems that although glass jewelry and decorations are centuries old, sheet glass and the production of windows is only a few hundred years old. This brought massive amounts of glass into buildings. Architects and, indeed, citizens reveled in the use of natural light in buildings. Precious fuel can be saved from lighting but, wow, was

a big problem created. Glass does not have the thermal properties or building envelope performance of solid walls. By allowing too much glass, the interior environment was cold or hot. Precious fuel is now used to cool or heat the environment. Why, we could build entire building envelopes with glass if we could solve the thermal question. Glass also creates other structural issues, like the need to have frames that keep it stiff to endure, which cannot be structural for the building, and other issues not discussed here.

But hold it. Why, again, do we want glass? Natural light makes us feel good and reduces the need for lighting in the daytime. For heating season, the light can improve solar heat gain, thereby reducing heating costs. Why is transparency needed? Is it for safety, aesthetics, communication, etc.? These needs

are not completely aligned. Can we get thermal performance and natural light, where transparency is not needed? Can we put transparency where needed but get natural light in another way?

Yes; with translucent, high performance walls and skylights! Light gets through but vision does not and translucent walls and skylights provide much better thermal performance. Polycarbonate, specially engineered as a building envelope, brings together these aspects (20-56 per cent light transmission in a wall configuration, R 4.2-10, which is 100 per cent better than typical glazing, proven air vapour barrier building envelope performance) with other attributes that allows architects to design much more natural light into a space. The benefits of these types of systems are:

- Much more light anywhere in the building without peak heat gain,



glare, safety issues or other negative aspects of direct sunlight;

- Much higher thermal performance than glass, with systems reaching up to the low-end solid wall performance;
- Easier structural engineering because it does not have to be kept stiff like glass and is 1/10 the weight of glass;
- Lower purchase and maintenance costs, due to the simple assembly;
- A whole new aesthetic—you can spend a fortune on glass trying to make it translucent;
- Higher safety in case of crisis (i.e., earthquake, fire, flood); and
- Suitable for outdoor structures, too (i.e., bus and bike shelters and building entrances).

POLYCARBONATE

Polycarbonate is plastic, which used to be only made into solid sheets. In that configuration, it was bulletproof but it was expensive. It tried to mimic glass but did not achieve that. Extruded multi-cell polycarbonate achieves the ability to create a translucent panel and better structural elements at lower material usage and cost. The light going through a translucent panel is diffuse because the honeycomb aspect of the panel spreads the light. So, no glare. With as much as 50 per cent of the light, there is less heat gain but enough light to work under. And at a price that

allows the architect to design it in places glass won't go. More skylights, more walls, more canopies bringing natural light into people's lives with higher thermal performance for walls, skylights and roofs. Excellent safety features like fire performance, in which it will melt but not spread fire.

Architects and owners are looking for ways to get back to the original purpose of buildings: keeping us safe and comfortable but using energy only when it is needed; using daylight during the daytime to light our buildings but without

sacrificing thermal performance that would end up using much more energy. And, oh yeah, cool aesthetics. Did I mention that? ■

Blair Davies, P.Eng. is the VP and GM of Engineered Assemblies(EA), which designs façades with architects, sources products across Canada and provides installation and construction services in Ontario. CPI Daylighting is a leading product in EA's portfolio, providing extruded multi-cell polycarbonate building envelopes for over 30 years.



L.M. TEMPERATURE CONTROL INC.
Industrial • Commercial • Special Events

Air Conditioners Rental & Sales *rental equipment that fits...*

From 1.5 Ton to 30 Ton Capacity

- Rental and sales of Topaz Portable Air Conditioning units from 1.5 Ton to 5 Ton
- Packages air conditioning units 10 Ton to 30 Ton
- Air and water-cooled chillers
- 24-hour emergency rental service

TOPAZ
PORTABLE AIR CONDITIONERS

Small Topaz 'Spot Cooler' A/C
1 Ton, 1.5 Ton, 2 Ton, 3 Ton and 5 Ton
Available in either air- or water-cooled.



LARGE PORTABLE AIR CONDITIONERS
10 Ton to 60 Ton



CHILLERS WITH 20 - 400 Ton



L.M. Temperature Control also offers:

- Cooling Towers
- Heaters/Make-up Air
- Dehumidifiers/Humidifiers
- Generators
- Transformers
- Loadbanks/Power Distribution

CHILLERS AND PUMPS 10 Ton to 440 Ton

L.M. Temperature Control Inc. • 7060 Pacific Circle, Mississauga ON L5T 2A7
1-855-LM EQUIPMENT (563-7847) • info@lmtemperature.com • www.lmtemperature.com

