

Damage Engineering INSIGHTS

habitational • commercial • manufacturing

21st Century Impact on the Building Envelope

Subsoil to Rooftop



Apartment complex



Moisture damage



Atrium

Cause Cost Downtime

—solutions since 1971

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Building code revisions, changes in standards set by technical groups, and the commercial and governmental incentives for sustainability are expanding building envelope options and at times damage repair requirements.

The building envelope provides a barrier between the exterior forces and elements and the interior components, consisting of:

- **Below-grade systems** (foundation walls, floor slabs)—moisture control is now a greater consideration—buildings are much tighter
- **Walls and their openings**
 - Cast-in-place and precast concrete, exterior insulation finishing systems (EFIS), masonry, panelized metal, thin stone
 - Fenestration systems (glazing, windows, curtain walls, exterior doors)
- **Roofing systems**—materials, coatings, vegetation, etc.
- **Atriums**—often overlooked

Some examples of increased options, requirements, and the unintended consequences of progress that we are encountering in a wide variety of buildings:

Geotechnical Moisture Protection

In recent years code requirements for below-grade systems moisture protection have increased durability and resistance to ground water variations and flooding. Sustainable building requirements dictate that below-grade systems perform optimally to be healthier and safer for occupants.

Adhesives & Flashing

EFIS product design failures in wall systems have called attention to adhesion deficiencies that allowed water infiltration.

Flashing at building angle changes, such as in atrium corners, can be water entry damage points. An example was a building whose design did not anticipate handling runoff from heavy plantings within the atrium.

Walls

LEED® is the Green Building Council's building design, construction, and operation sustainability rating system. It gives potential credits for:

- Reusing building materials in rehabilitating buildings
- Using building materials with recycled content
- Socially responsible procurement—buying locally, certified foresters, etc.

Call us when you need equipment or building damage engineering investigations into the cause, cost and downtime aspects of habitational, commercial or manufacturing damage—be it building envelope damage or some other type of damage. We probably have someone right nearby—we have a staff of over 1,000 engineers and consultants around the country.

Glazing

Sustainability is now a driving force behind improvements in energy code requirements that impact fenestrations (exterior windows, doors and skylights). The commercial and tax benefits of meeting LEED certification levels is driving the fenestration system design, like other parts of buildings, to exceed many local codes.

There are other rating systems and standards, for example:

The National Fenestration Rating Council (NFRC) is an organization that administers the only independent certification rating program for fenestrated products and is referenced in the International Energy Conservation Code (IECC).

The genesis of the NFRC rating program was the Energy Policy Act of 1992 and associated federal government programs. It was designed to facilitate fenestration product design and testing that would demonstrate conformance to the Energy Policy Act. There are minimum performance requirements for:

- U-factor (resistance to heat flow)
- Solar heat gain (based on climate zones)
- Visible transmittance
- Air leakage
- Condensation resistance

Roofing

Building owners are becoming more educated and are demanding sustainable roof systems:

- Foam roofs are being marketed as being renewable, since they can be re-coated rather than replaced every 10, 15 or 20 years (depending on the design).
- Vegetative roofs incorporate plantings for thermal and eco benefits.
- Coating manufactures are coming up with more ways to use their products to extend the life of existing roofs and add reflectivity—which has in some circumstances reduced repair costs by avoiding the need to replace the whole roof.

Utility company practices are also having an impact. For example:

- Power companies are offering rebates for increasing reflectivity.
- Photovoltaics are decreasing in cost and increasing in efficiency leading to increased popularity among owners of large roofs.