



Advanced Glass Technology
Secure in the Knowledge

The beautiful Achilles heel?

The dichotomy of glass

Martin Westney

Managing Director - AGT



The next 20 minutes

Despite its obvious beauty and practical advantages, glass is a vulnerable material. We will look at how advances in technology should complement not compromise future design, safety and security

The presentation will cover two main areas:

- Architectural and construction
- Automotive and public transportation

An opportunity for questions at the end



A material in vogue

- Glass is now considered an art form as much as it is a building material
- Production techniques and additives enable architects to push the envelope of aesthetics - glass cladding or curtain walls can be used to cover the entire facade of a building, or span over a wide roof structure in a space frame e.g. London Museum, Stansted Airport
- Architectural glass no longer merely glazes - it controls energy use, protects against UV rays and fire, insulates against noise, provides safety and security, offers decoration and privacy and even cleans itself
- Global demand for flat glass continues to increase with significant demand in the Middle East, China and India
- Approx 50 million tonnes per year > 5% growth per year



Clear and present danger

- Glazed buildings are often targeted by terrorists as the glass structure is used as a weapon
- Glass fragmentation is the single biggest cause of death and injury amongst building occupants resulting from a bomb attack
- Use of security film provides an invisible and efficient form of protection
- Window retention systems provide extra strength and improve blast mitigation for buildings in medium to high risk areas



An easy target

- City centre luxury goods retailers, including car showrooms are prime targets for anti-capitalist demonstrations
- Retailers in London during the recent student protests faced losses in excess of £5million and a major damage bill on top
- Large expanses of glass are a double edged sword – they entice customers in but they afford highly visual imagery for the media when attacked – with the corporate brand on full view!
- Manifestation technology can supplement protective glazing without compromising light



Spontaneous Glass Breakage

Damage is not just a result of direct human intervention

Spontaneous Glass Breakage is a phenomenon by which toughened glass may crack or even explode without any apparent reason. The most common causes are:

- Minor damage during installation such as nicked or chipped edges which later develop into larger breaks
- Binding of glass in the frame causing stresses to develop as the glass expands and contracts due to thermal changes or deflects due to wind pressure
- Internal defects within the glass such as nickel sulphide inclusions or 'stones' as a result of the manufacturing process
- Thermal stresses in the glass
- Inadequate glass thickness to resist wind load

Case study: Waterloo Station

Eurostar services had to be suspended due to roof panels suffering from SGB

Approx cost of interruption = >£1million

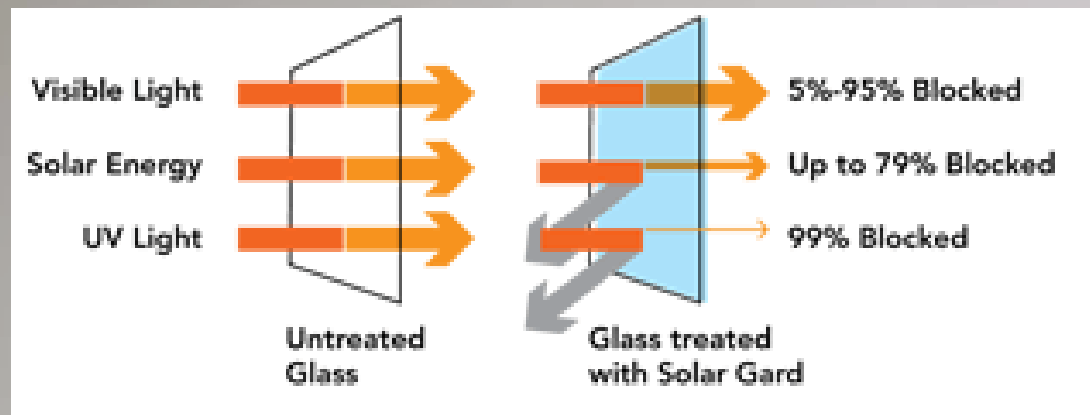


Sick Building Syndrome

- It is estimated that most of us spend 90% of our time indoors
- First coined by the World Health Organisation in 1984, the term 'Sick Building Syndrome' has become synonymous with ailments affecting people working for prolonged periods in a building
- Government research suggests SBS is a major contributor to the £60 billion per year in lost productivity and associated costs to the economy of ill health in the national workforce
- WHO report suggests that 30% of new or refurbished buildings worldwide could be related to this condition
- Sickness costs most businesses at least 1% of their annual turnover so it's important to create a healthy symbiosis between the building and its occupants

Getting the balance right

➤ Solar control film can be fitted to any OEM solar glazing to further enhance performance



➤ Solar films reject heat and keep interior temperatures more controllable and stable, thereby improving working conditions

➤ By running air conditioning less, energy consumption is reduced, thereby decreasing the carbon footprint as well as saving money on utilities



Future directions

- Film manufacturers are spending millions on research and development to respond to environmental legislation and increased global threat levels
- Photo-voltaic films are being developed to provide self-sustaining solutions for buildings in terms of heating and air-conditioning



On the move

- Glazing constitutes 30% of modern vehicles, yet is still vulnerable in the event of attack or accident
- Issues to consider in the protection of high profile people in transit
- Bullet-proof glazing is heavy and very expensive
- Entrapment in the event of an accident
- Laminated glass standard fitment on top end vehicles but same issues exist
- Film offers protection across the board
- Retro-fitment to any vehicle



On the move

- Public transportation can benefit from anti-graffiti films as well as passenger protection
- Security film applications are also relevant to emergency service vehicles
- Cost benefit of additional protection
- Downtime /personnel injury costs are prohibitive, particularly in light of recent budget cuts to public services



Recap

- Glass is fashionable and used to make a design statement
- Architects and vehicle manufacturers are incorporating greater volumes of glass
- Global glass production is on the increase
- Global security threats are on the increase
- Environmental legislation is getting more stringent
- Glazing technology is becoming highly sophisticated



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Any questions?



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