
Glass
Performance
Days 2025
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GLASS PERFORMANCE DAYS 2025
INVISIBLE DANGER: SAFEGUARDING GLASS FROM THE RISKS OF NICKEL SULFIDE
TECNOGLASS INC & ES

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Introduction

- Tempered glass is widely used for its strength and durability
- Nickel sulfide (NiS) inclusions: a hidden but critical safety issue
- Goal: Understand and prevent spontaneous breakage

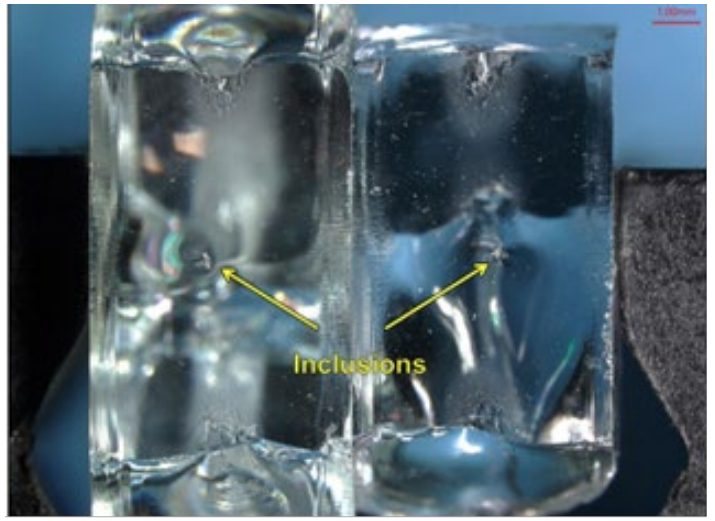
What is NiS and How Does it Form?

- NiS = contaminant, not an intentional component
- Forms from nickel + sulfur during glass manufacturing process
- Contamination sources:

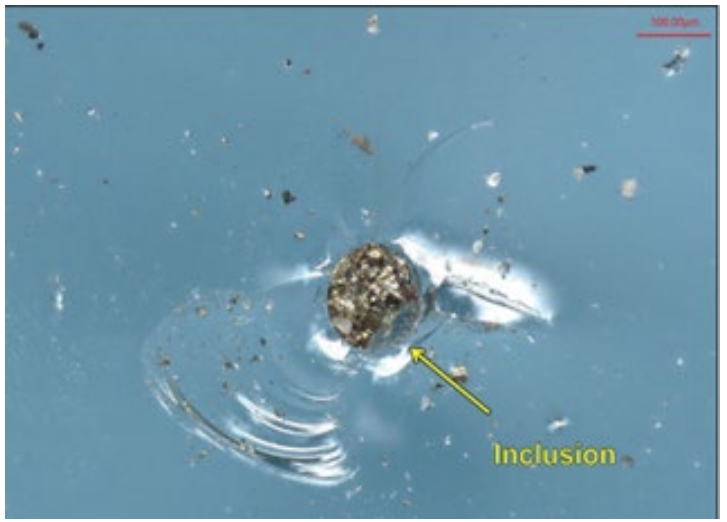
  Raw materials

  Production equipment

  Environmental exposure



Mating inclusions in the glass fragments



Inclusion in glass fragment fracture surface

The Risk of Spontaneous Breakage

- Breakage happens with no external force
- Common signs:

  Fracture starts from center

  “Butterfly” or “figure-eight” fracture pattern

  Failure may occur months/years after installation

Financial and Legal Consequences

- Direct costs: replacement, repairs, disruptions
- Legal liabilities:
  - Injury lawsuits
  - Breach of contract
  - Regulatory compliance issues
- Reputation damage

Detection Methods Overview

- NiS is microscopic — not visible during inspection
- Key detection methods:

  Heat Soak Test (HST)

  Thermal Imaging

Heat Soak Test (HST)

- Industry standard: EN 14179-1
- Exposes tempered glass to ~290°C
- Triggers early breakage inside a safe chamber

Limitations of the HST

- Doesn’t catch inclusions <50µm
- Some NiS inclusions take longer to expand
- Residual risk: 5–10%
- Expensive and not adopted by all manufacturers

Thermal Imaging

- IR camera detects surface temperature anomalies
- Maps internal stress regions
- Advantages:

Non-destructive

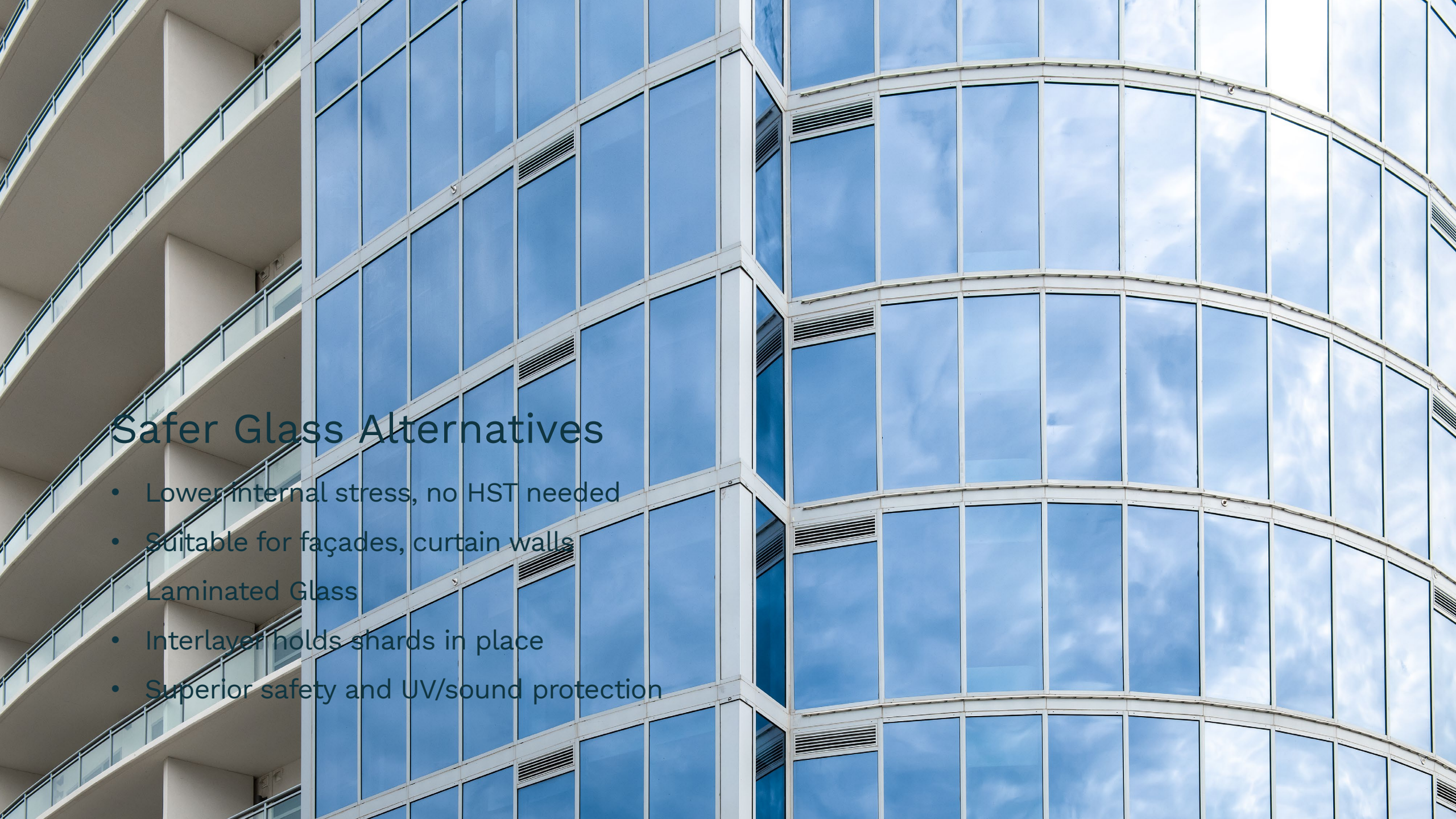
Fast scanning

Preventive Strategies

- High-purity raw materials
- Supplier certification and testing
- Segregation of recycled glass
- Moisture and contamination control

Advanced Screening & Monitoring

- XRF and ICP for material analysis
- Magnetic separation for metal particles
- AI-based optical and acoustic testing
- Real-time furnace monitoring with LIBS



Safer Glass Alternatives

- Lower internal stress, no HST needed
- Suitable for façades, curtain walls
- Laminated Glass
- Interlayer holds shards in place
- Superior safety and UV/sound protection

Glass Type Comparison Table

Type	Breakage Risk	Break Pattern	Safety Notes
Tempered (untested)	0.05%–0.3%	Small shards	HST often required
HST Tempered	~0.01%	Small shards	Reduced risk
Heat-Strengthened	~0.001%	Larger fragments	No HST needed
Laminated	Near zero	Held by interlayer	Maximum safety

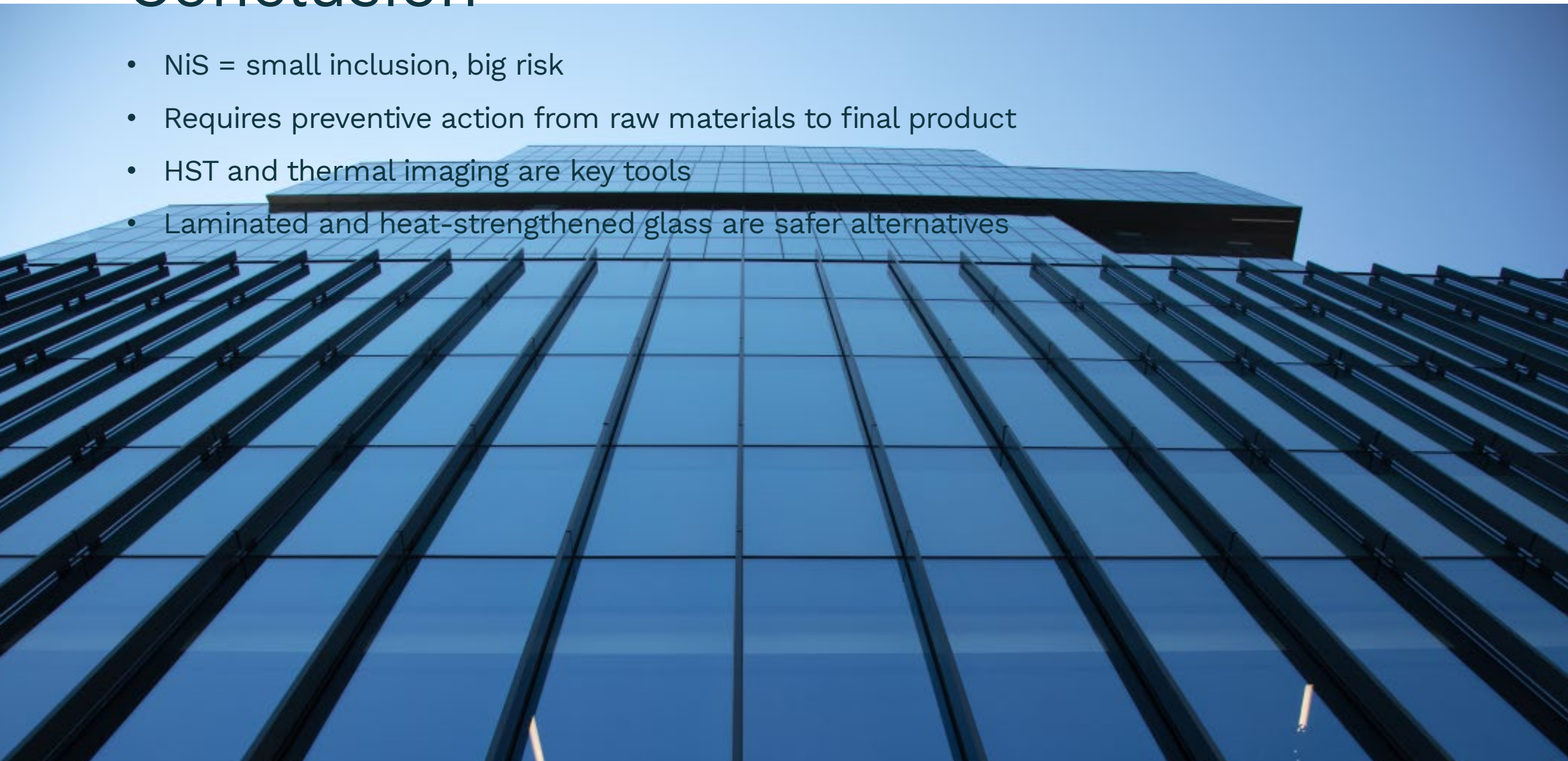

Every day, millions walk beneath massive glass facades

Industry Impact and Trends

- Code changes after breakage incidents
- Shift toward laminated glass in façades
- Tempered glass still common — but with better control and awareness

Conclusion

- NiS = small inclusion, big risk
- Requires preventive action from raw materials to final product
- HST and thermal imaging are key tools
- Laminated and heat-strengthened glass are safer alternatives



Q&A / Thank You

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