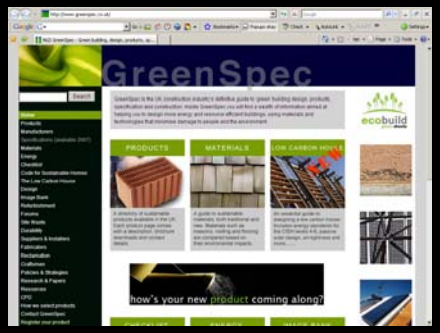

COMMENDED
The UK eWell-Being Awards 2004
www.sustainit.org

GreenSpec
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H11 Curtain Walling

CI/SfB (21.4) Curtain Walls

LSBU Tech 2 Lecture

- Domestic, Small & Medium size buildings
- Construction methods, materials, services and systems
- External walls: H11 Curtain Walling

THIRD EDITION

PRINCIPLES OF element design

Peter Rich &
Yvonne Dean

ARCHITECTURE/DESIGN

PRINCIPLES OF
element
design THIRD EDITION

Peter Rich & Yvonne Dean

- **Unique in its approach to detail design**
- **Invaluable for both students and practising architects, builders and surveyors**
- **Completely updated in a convenient reference sheet format**

The construction of buildings is learnt through experience and the inheritance of a tradition in forming buildings over several thousand years. Successful construction learns from this experience which becomes embodied in principles of application. Though materials and techniques change, various elements have to perform the same function. **Principles of Element Design** identifies all the relevant elements and then breaks these elements down into all their basic constituents, making it possible for students to fully understand the given theory and principles behind each part. As all building projects are subject to guidance through the Building Regulations and British Standards, this book gives an immediate reference back to relevant information to help practitioners and contractors identify key documents needed.

Peter Rich AA Dipl (Hons) Architect, started his career with 14 years' experience as a qualified architectural technician. He then joined the AA School of Architecture, working with Bill Allen and John Bickerdike after his graduation, later becoming a partner of Bickerdike Allen Rich and Partners. He also taught building construction at the Bartlett School of Architecture, University College London, and architectural design at the Polytechnic of North London. He now acts as a Consultant.

Yvonne Dean B.A. (Hons) B.A.(Dipl.) RIBA, is an architect, energy consultant and materials technologist. She also has 15 years' experience as a lecturer, travels widely and is a guest lecturer at many universities. She pioneered an access course for Women into Architecture and Building, which has been used as a template by others, and has been instrumental in helping to change the teaching of technology for architects and designers.

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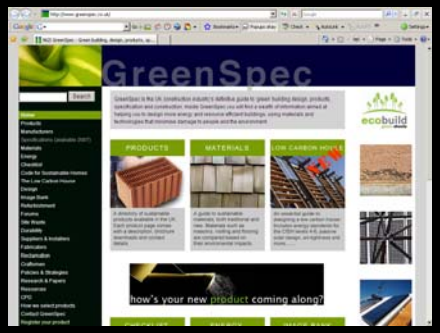

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Performance Requirements

Principles of Element Design

Windows Actions

- Gravity: downward pull
- Wind: Motive, Destructive, Penetrative
- Rain: Moisture deposition, penetration
- Snow: Moisture deposition, loading
- Sun: Temp variation, thermal movement, heat gains, Chemical decomposition
- Dirt and Dust: infiltration, deposition, surface pollution
- Chemicals: corrosion, disintegration, decomposition
- Sound: Noise nuisance, from within and from without
- Attack: Manual, Ballistics, Bomb Blast

Windows Reactions

- Gravity: Support & restraint
- Wind: rigidity, resilience, sealing
- Rain: deflection, impervious skin, absorption and drainage, sealing
- Snow: deflection, impervious skin, absorption and drainage, sealing
- Sun: movement joints, insulation, shielding, invulnerable materials
- Dirt and Dust: repulsion, exclusion, sheilding, cleaning
- Chemicals: invulnerable materials, exclusion,
- Sound: Insulation
- Attack: toughness, lamination, edge restraint, edge protection

Windows Outside

- Daylight, Sunlight, Glare, Solar Heat gains,
- Sound Insulation
- Fresh air, ventilation and Smoke control
- Wind driven rain and snow
- Privacy from overlooking
- Cleaning
- Security
- Insect exclusion

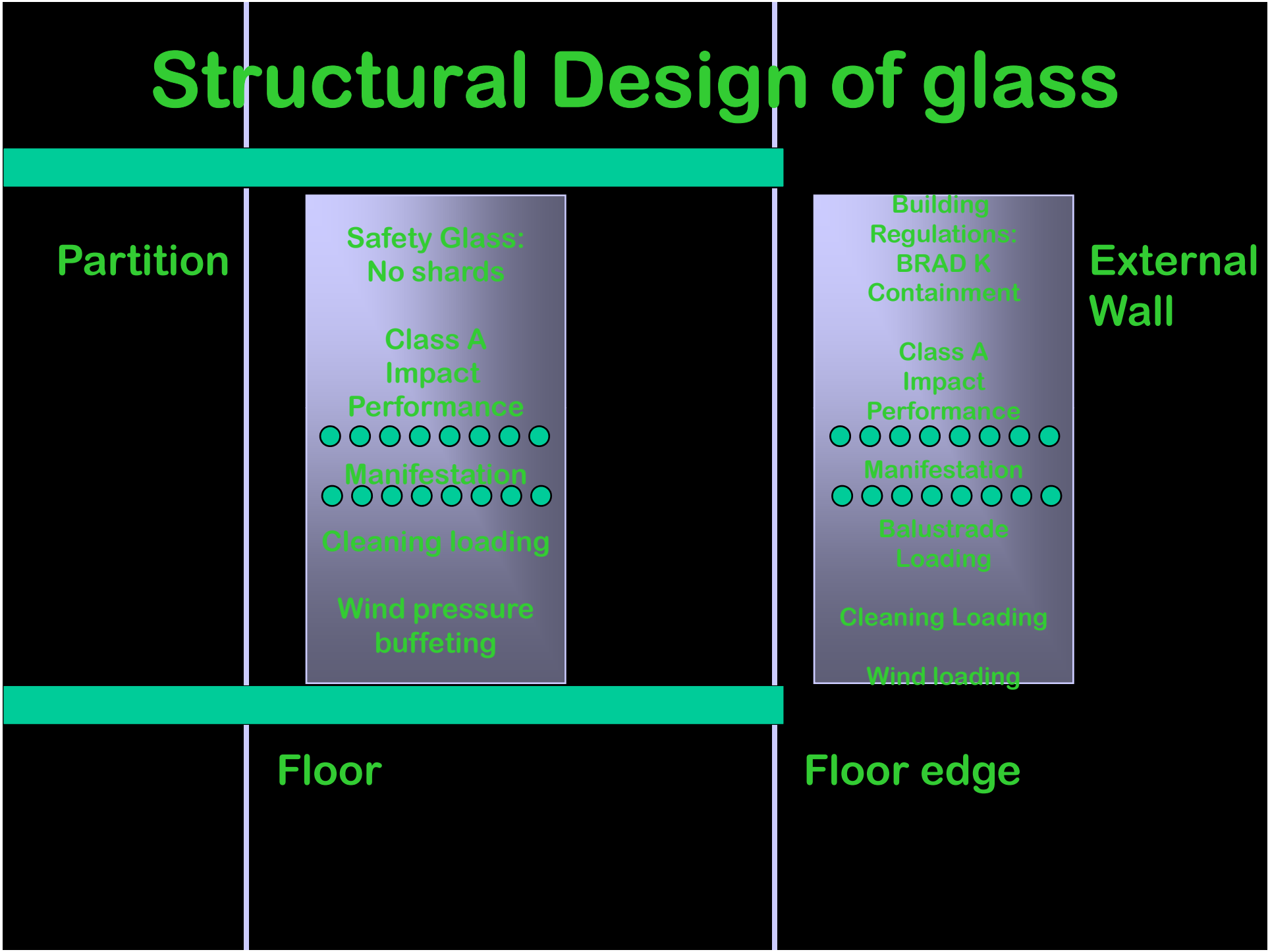
Windows Inside

- Statutory Ventilation, trickle ventilation
- Thermal insulation, heat losses
- Emissivity,
- Comfort conditions
- Views out and eye level
- Safety, Containment, Impact, Balustrade
- Fire
- Statutory Window Area

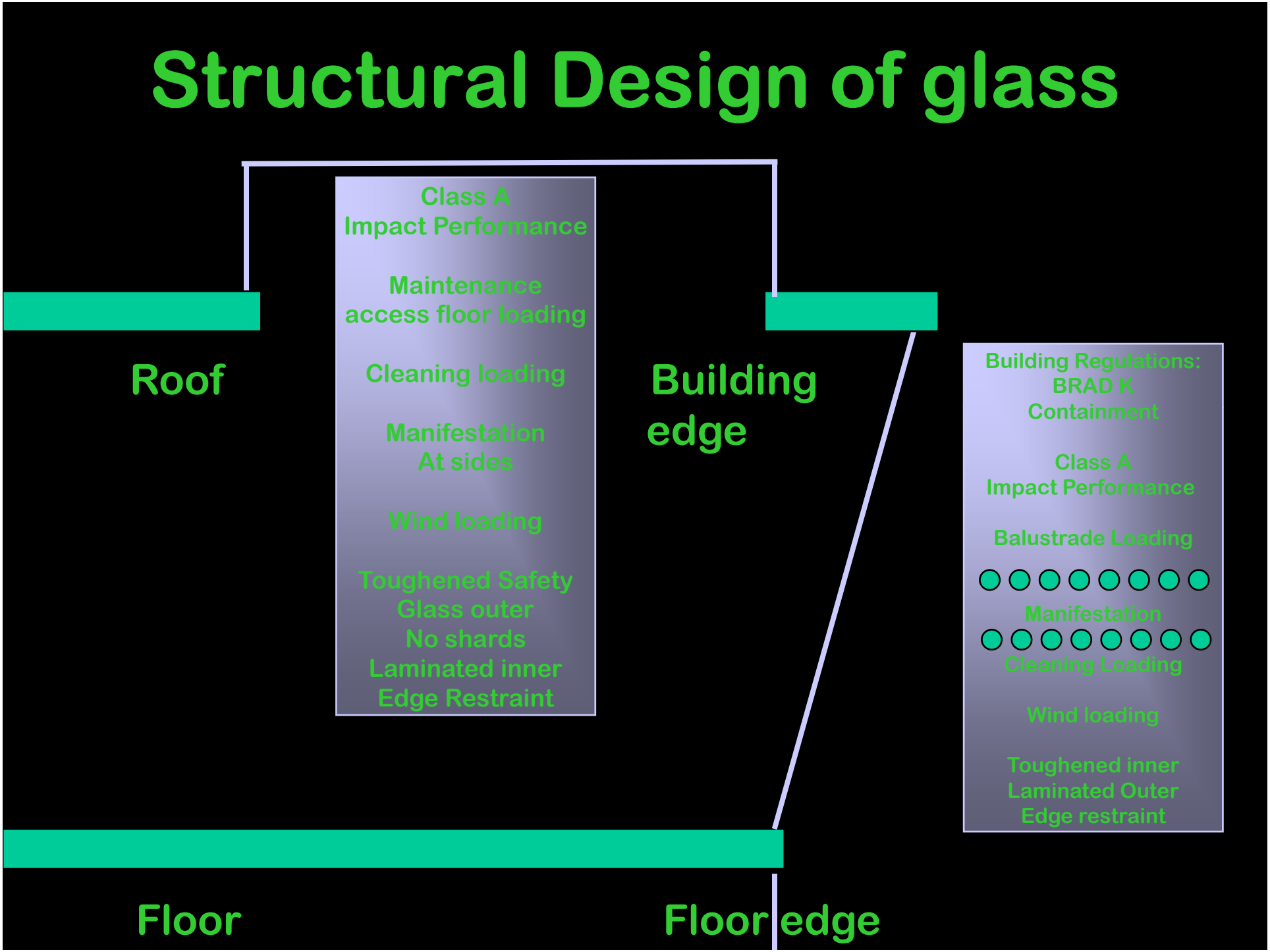
Weather Envelope

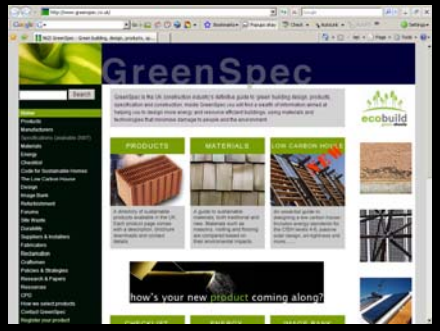
Absorbent – Repellent – Open Joint Panelled
Masonry – Curtain Wall – Rainscreen

Structural Design of glass



Structural Design of glass





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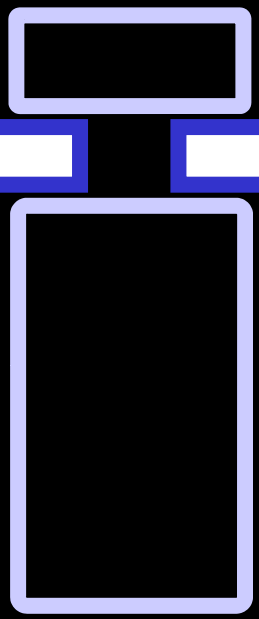
Systems & Assemblies

Curtain Walling



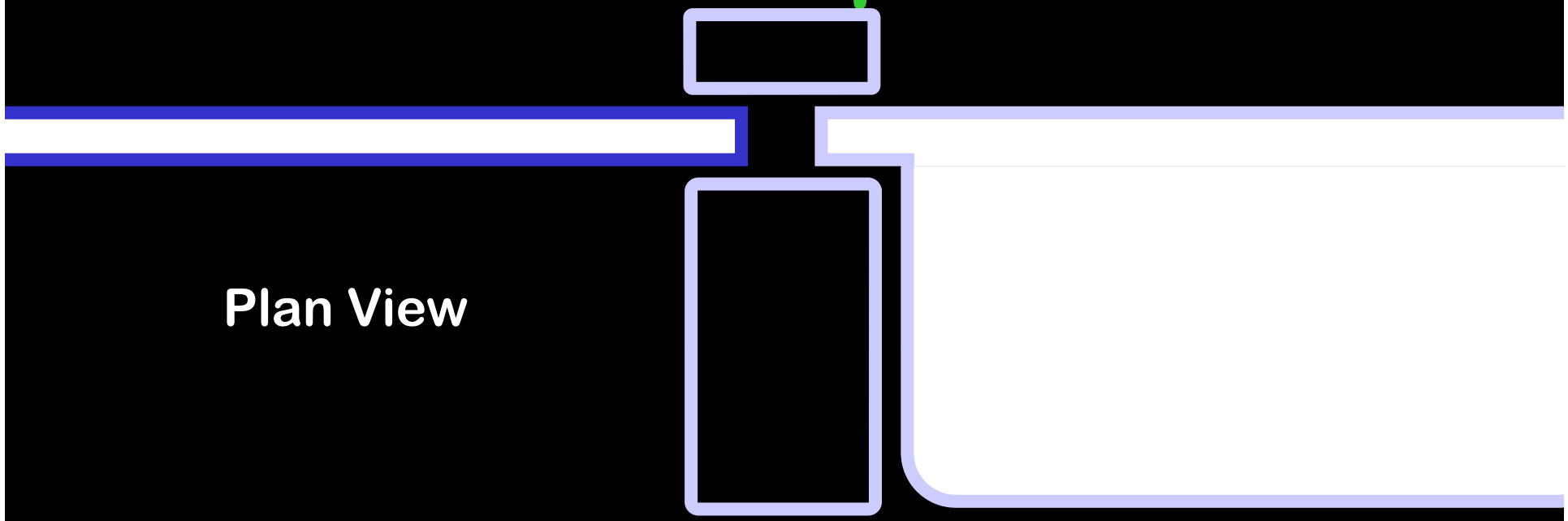
Plan View

Recycled Aluminium Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating

- H11
- Curtain Walling
- Recycled Aluminium extrusions
- Powder coatings
- Glazing
- Opaque infill panels at floor edge level & modesty at floor levels

- E10 Concrete
- G10 Steel Frame
- Framed structure
- H51 Stone Cladding

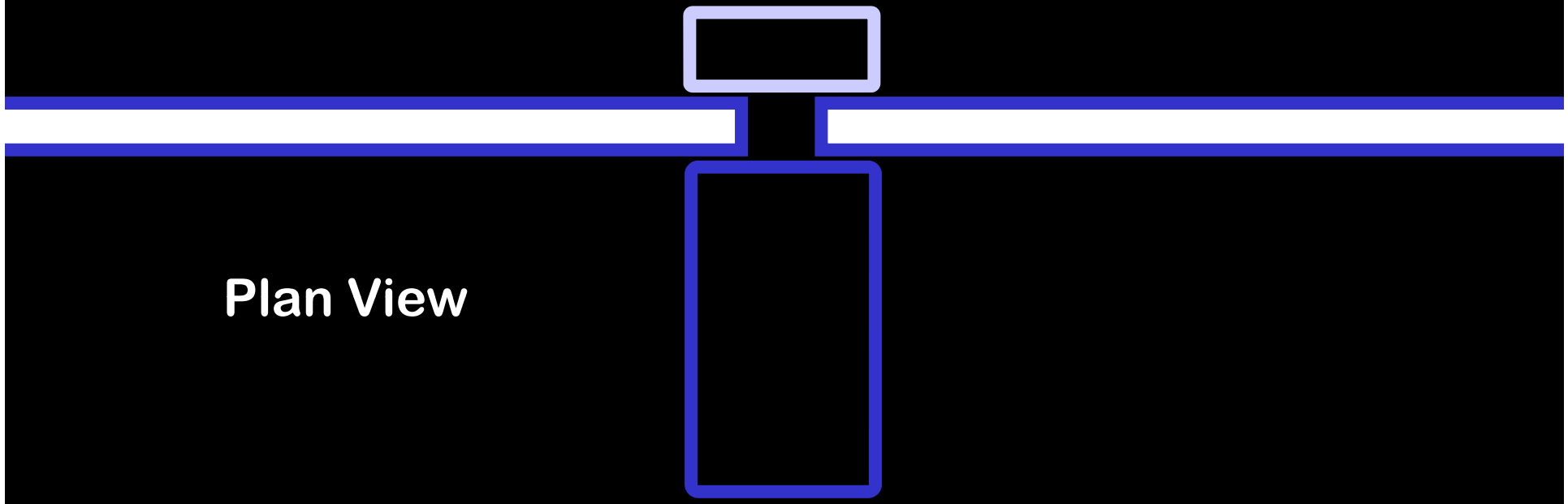
Cassette panels



Recycled Aluminium Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium skin insulated cassette panels
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating

Solar Wall Cassette panels into glazing systems

Fire Resistant Curtain Walling



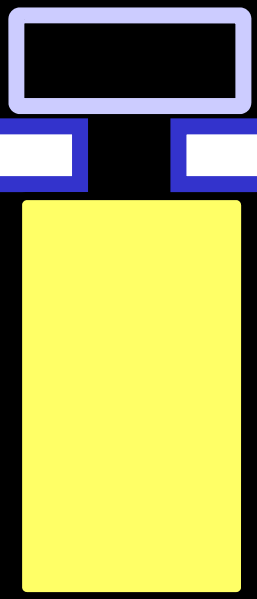
Plan View

Recycled Steel Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating

Fire Resistant Curtain Walling

- Used at British Library:
  - rooflight construction spanning over tall spaces
  - Kings library collection
    - 7 storey single compartment book stack
    - FR and thermal shock resistant
      - Sprinkler water on hot glass

Timber Curtain Walling



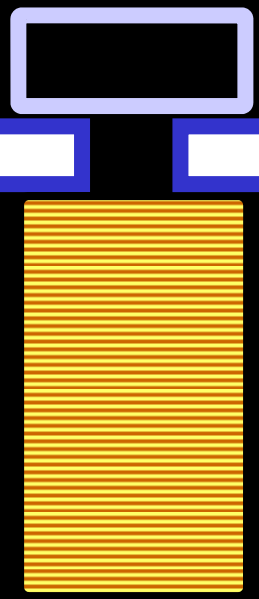
Plan View

FSC Timber Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating or Polyester Powder Coating

Timber Structure,
Curtain Walling,
Doors and Boarding,
Minimise cold bridges
Less condensation
Natural sustainable material
Mostly recycled timber

Visitors Centre, Café, Retail: Earth Centre Doncaster Architect: Dr Bill Dunster

Timber Curtain Walling

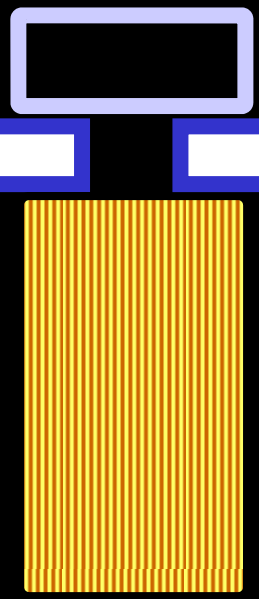


Plan View

Seufert-Niklause GMBH

Laminated Lumber Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating

Timber Curtain Walling



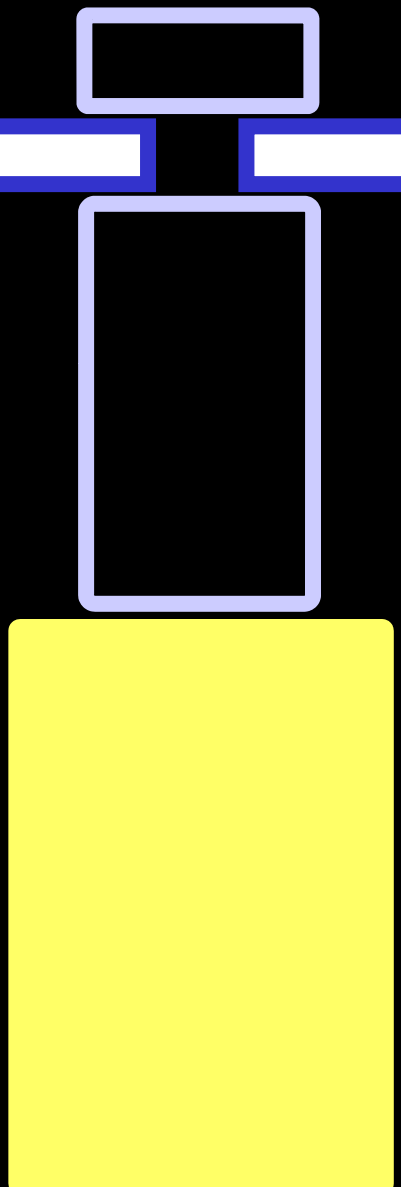
Plan View

Seufert-Niklause GMBH

Laminated Lumber Mullions and Transoms
Single, Double and Treble Glazing
Recycled Aluminium outer capping
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating

Timber/Aluminium Curtain Walling

Curtain Walling: Keyworth

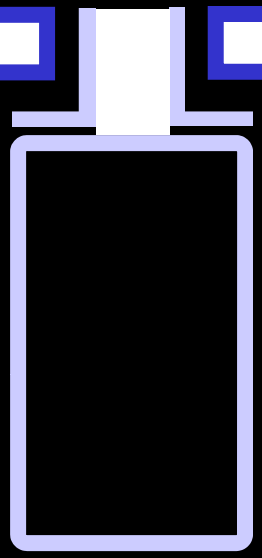


Timber Column
Double Glazing
Recycled Aluminium outer capping, inner mullions and transoms
Finish: Anodic Oxide Coating or Polyester Powder Coating
Timber Column

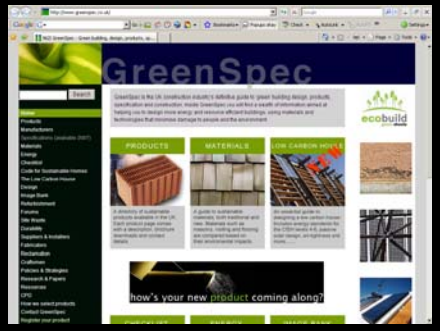
Plan View

Structural Silicon Curtain Walling

Plan View



Recycled Aluminium Mullions and Transoms
Single, Double or Treble Glazing
Recycled Aluminium outer frame angles
Aluminium Finish: Anodic Oxide Coating
or Polyester Powder Coating
Structural Silicon



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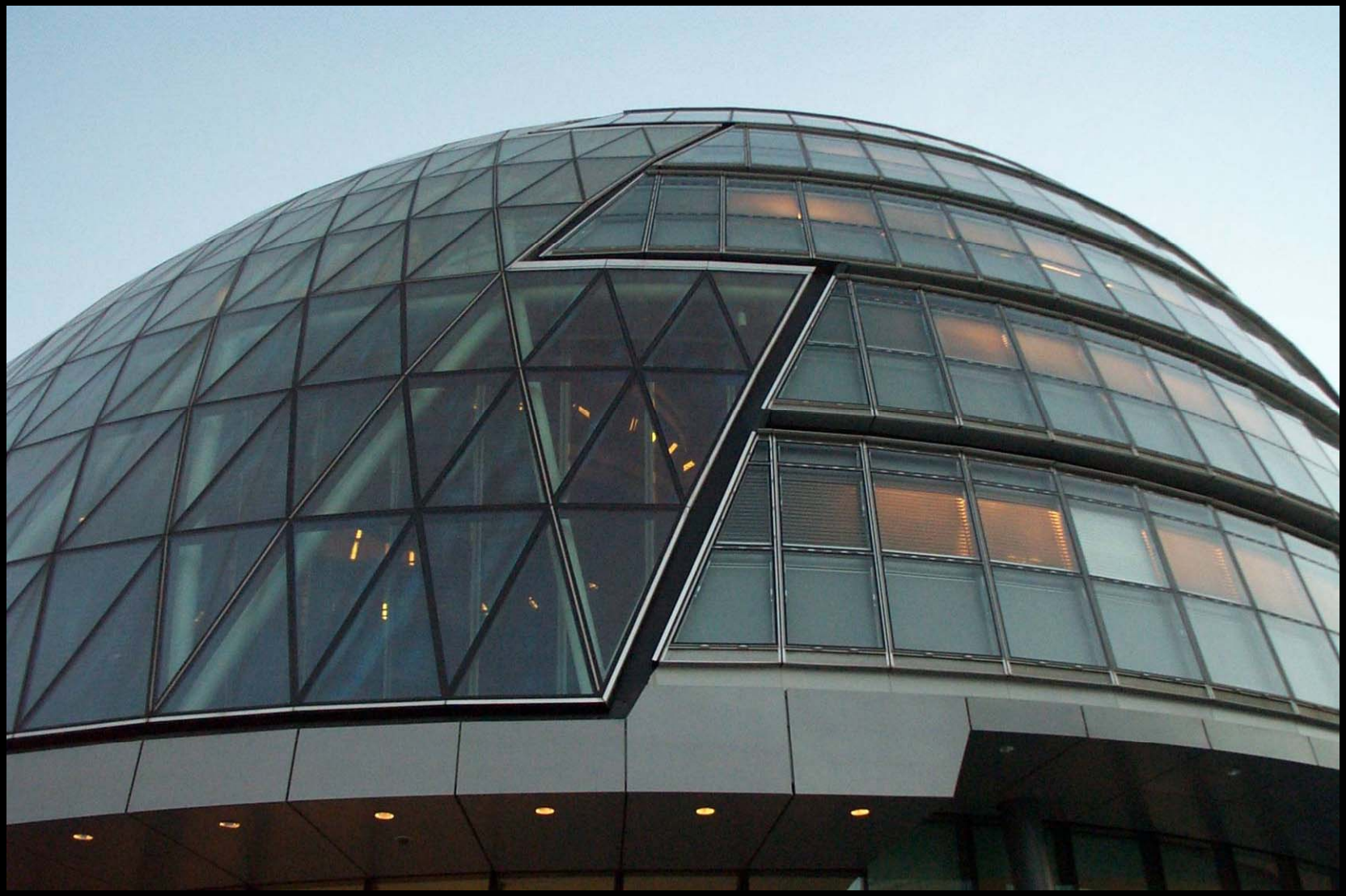
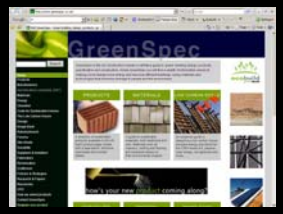
Glass retention

- When introduced in USA SSG had some failures
- UK BCO Building Control Officers reluctant to accept without:
  - 4 sides edge retention with metal clamp
  - 2 sided edge retention with metal clamp
  - 4 corner retention with metal clamps
- Today structural silicone is enough

GLA HQ
SSG & Curtain Walling





GreenSpec
www.greenspec.co.uk

H13 Structural Glass Assemblies

CPD topic

Another GreenSpec CPD to download soon

Resource Efficiency

Waste minimisation

GreenSpec
www.greenspec.co.uk

Design to Reduce Waste

Easy steps to reduce your share
of the 106 m tonnes of construction and
demolition and excavation waste each year

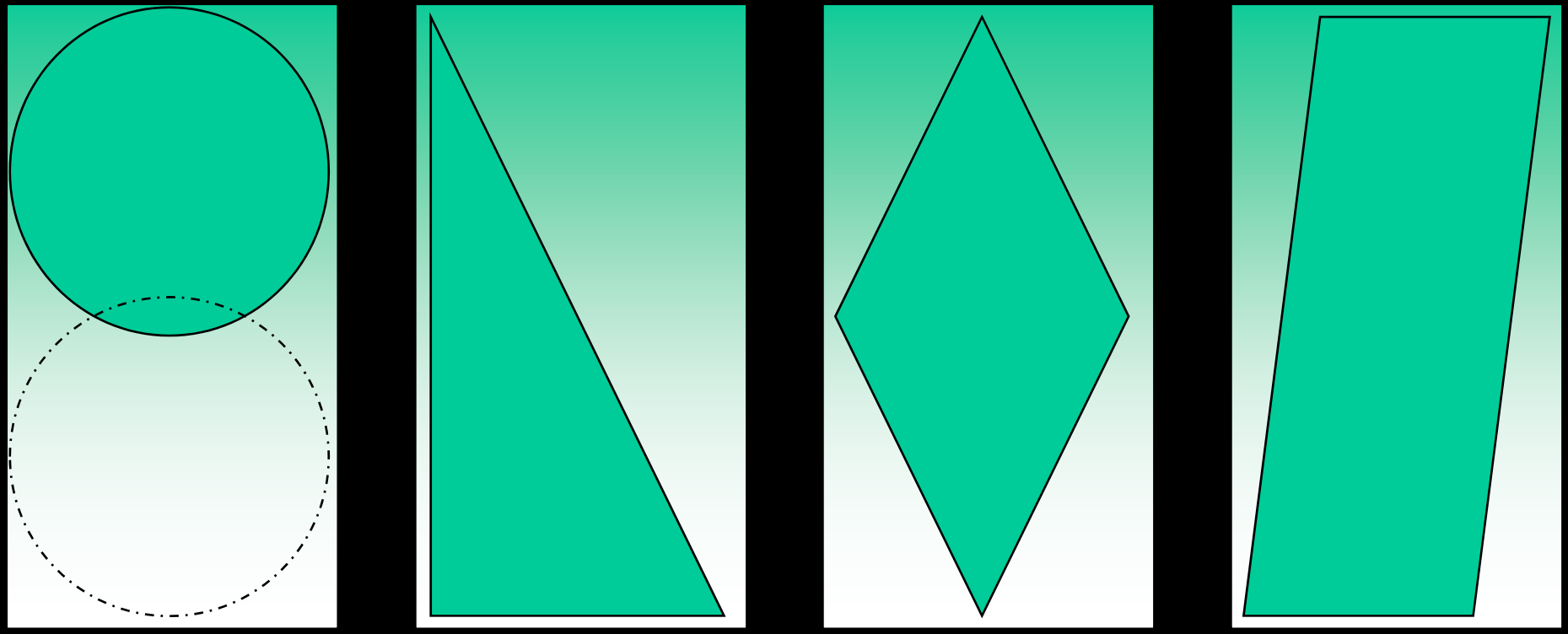
Another GreenSpec CPD to download soon

Glass Cutting: Almost Rectangular

SMM7 Standard Method of Measurement

- All shapes cut for closest rectangle
- All off-cuts are waste
- Accuracy +/-10%
- No concern about waste or site ordering from quantities
- Contractor expected to re-measure

Glass Cutting SMM



Consistent glass triangles within each level

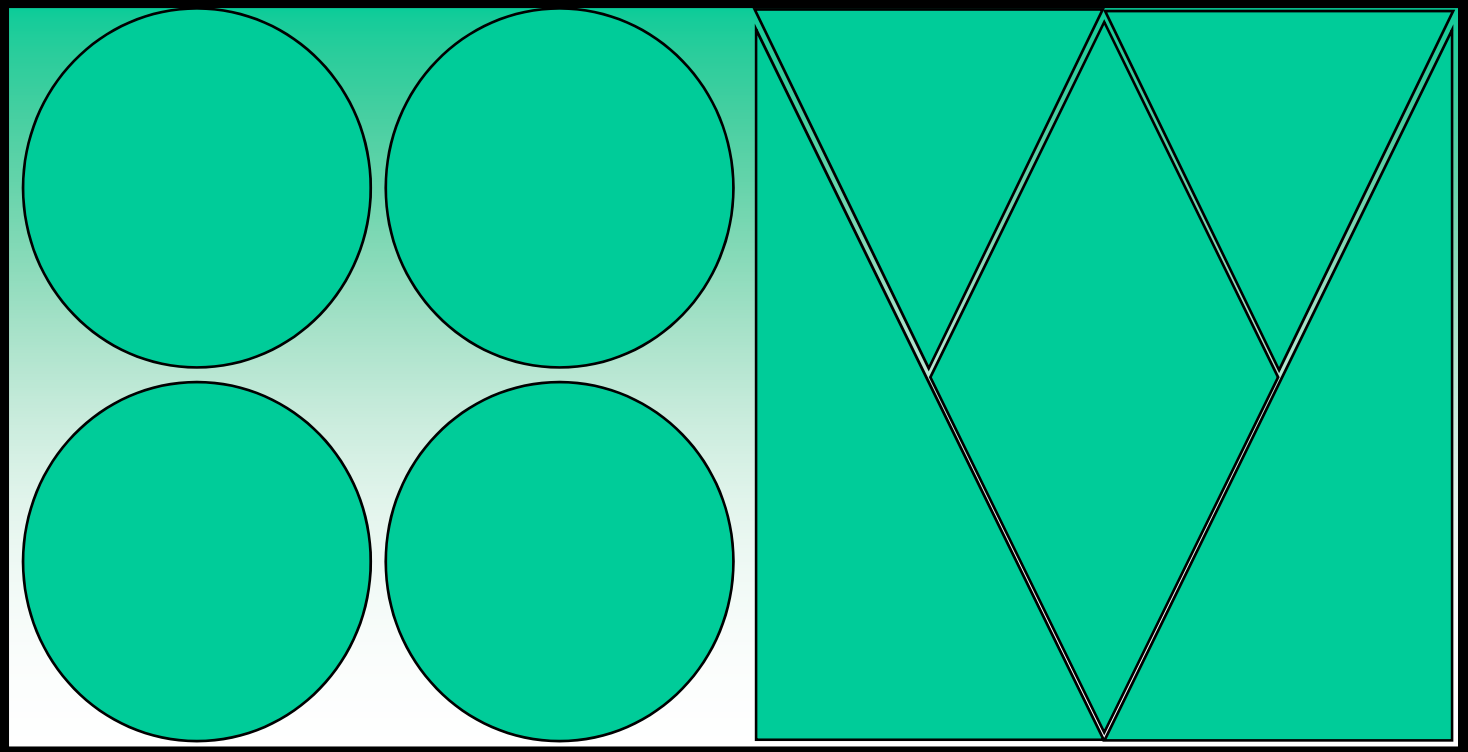
Different triangles at almost all levels

No vertical columns

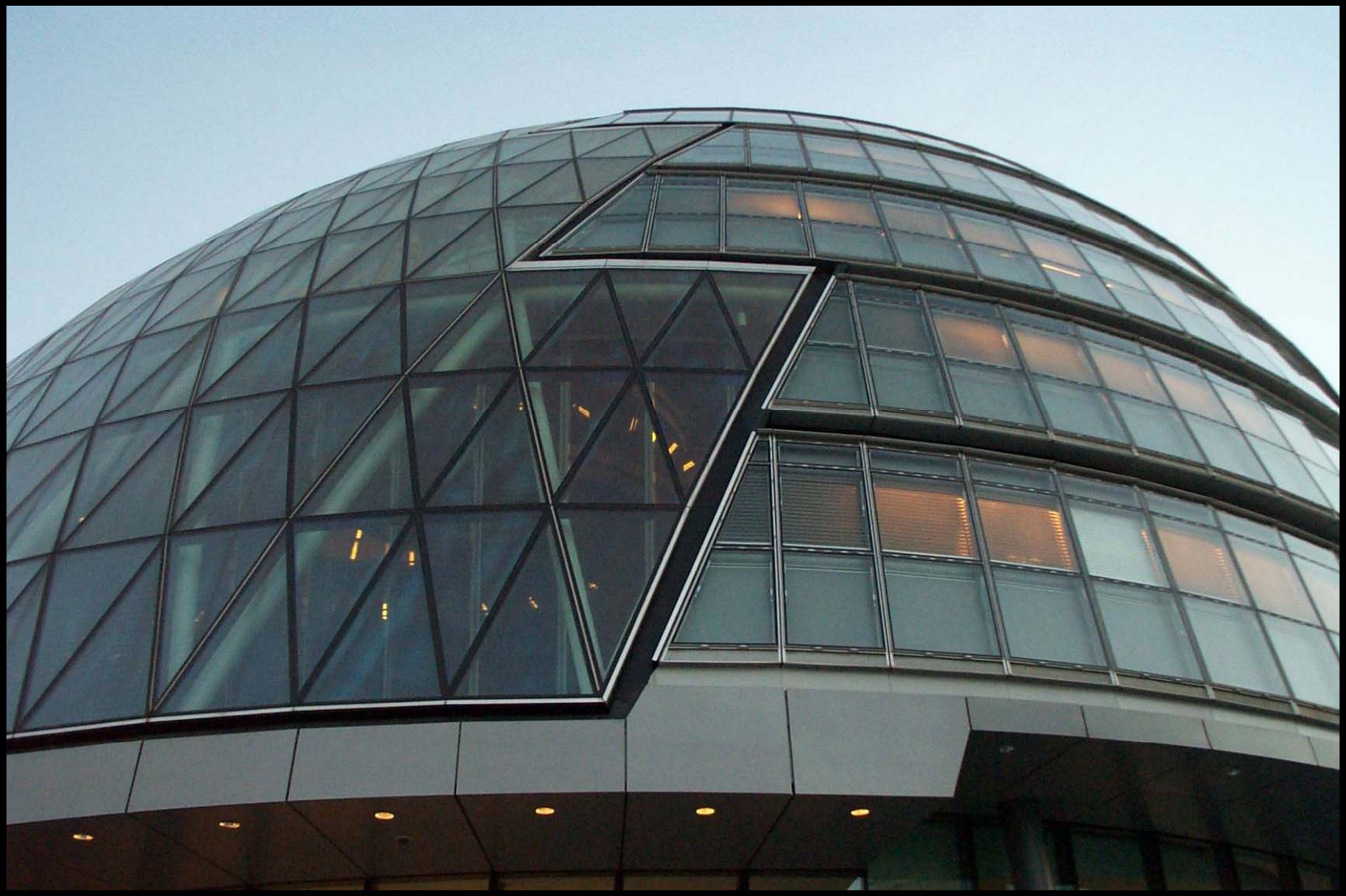
Vast amounts of off cuts on the factory floor

We hope its all recycled in manufacture

Glass Cutting CADCAM tailoring



I Can CAD, CAD can, So I Do

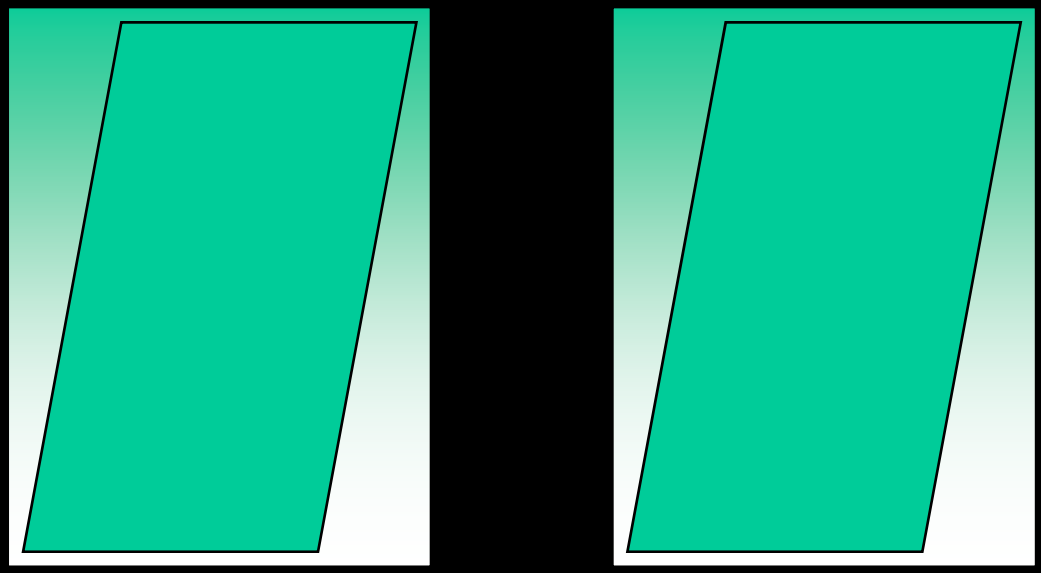



PROUDLY

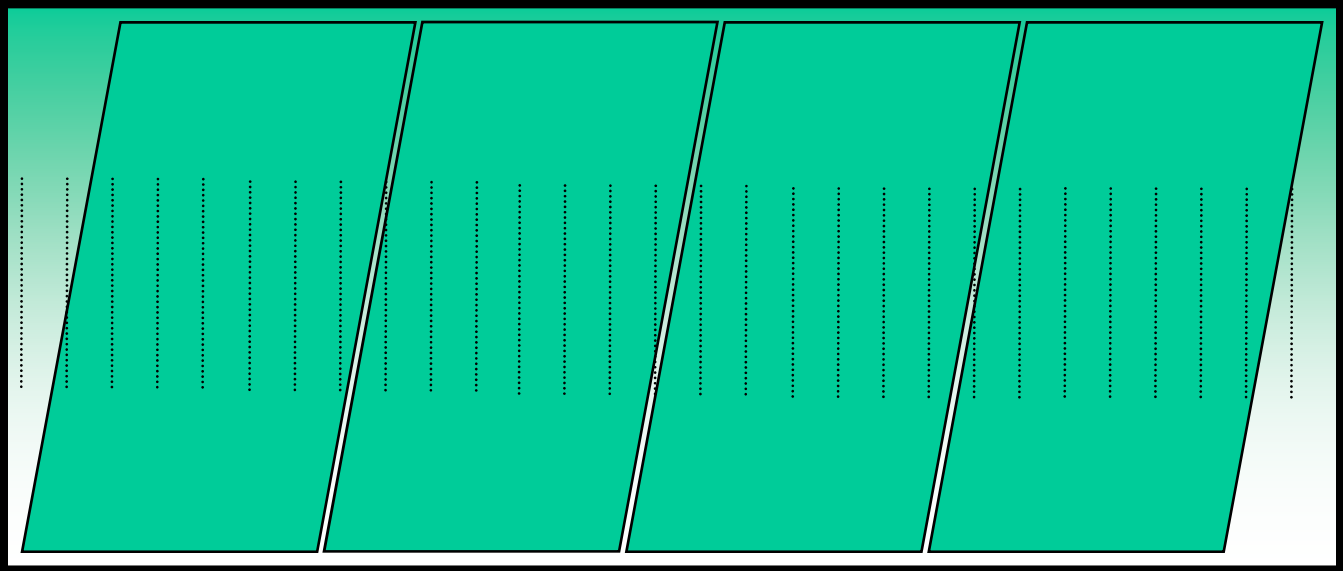
CADCAM Tailoring = Iteration

- Maximising the yield from sheets of glass
- Many pieces arranged to get more pieces from smallest glass pane
- Pieces cut from sheet
- Just like a tailor and fabric directionality is important
- Potential conflict with ‘Roller Wave Pattern’
- RWP occurs as glass is rolled off zinc float and ‘slumps’ over supporting rollers

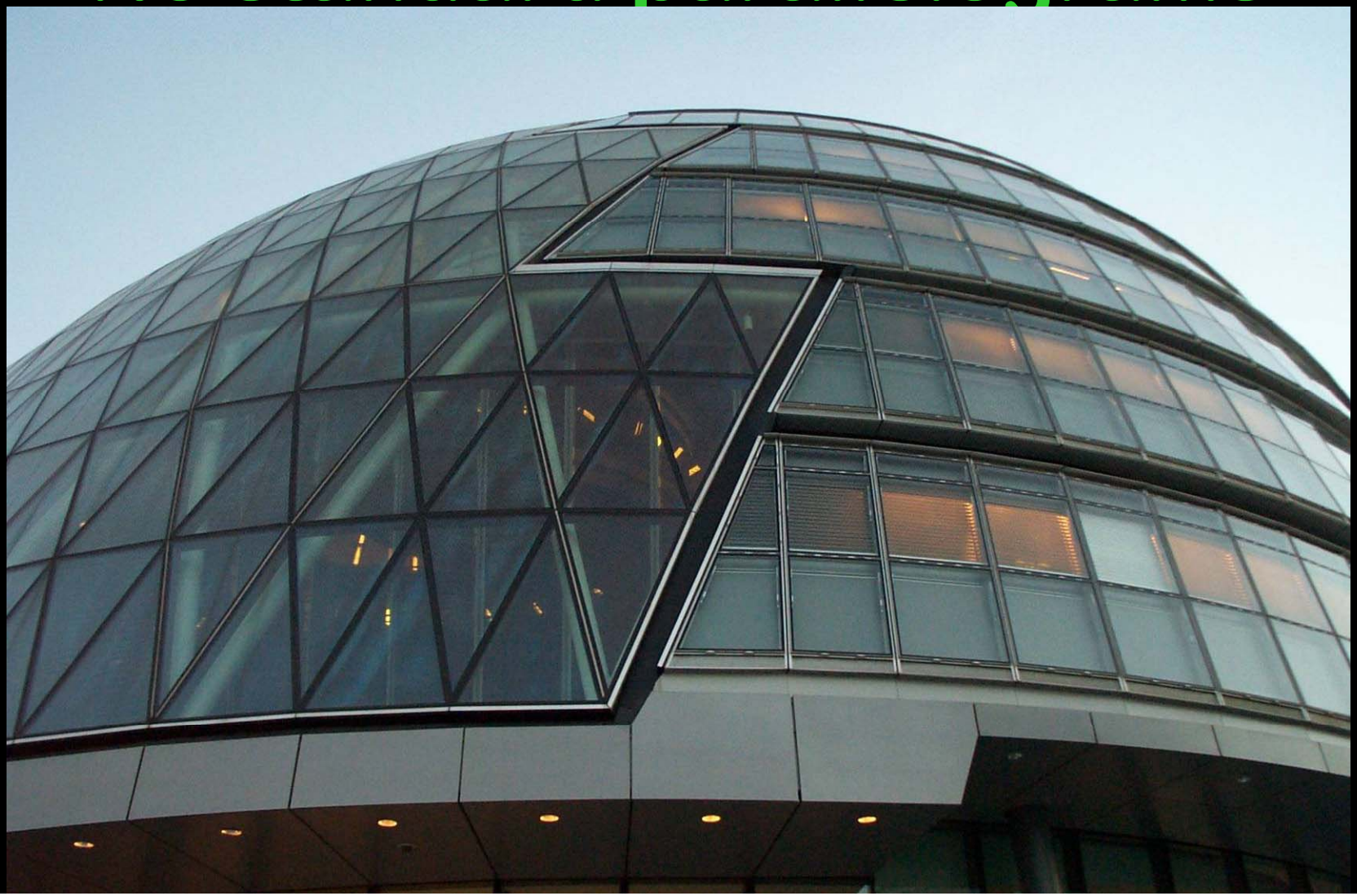
SMM Glass Cutting
simple parallelograms



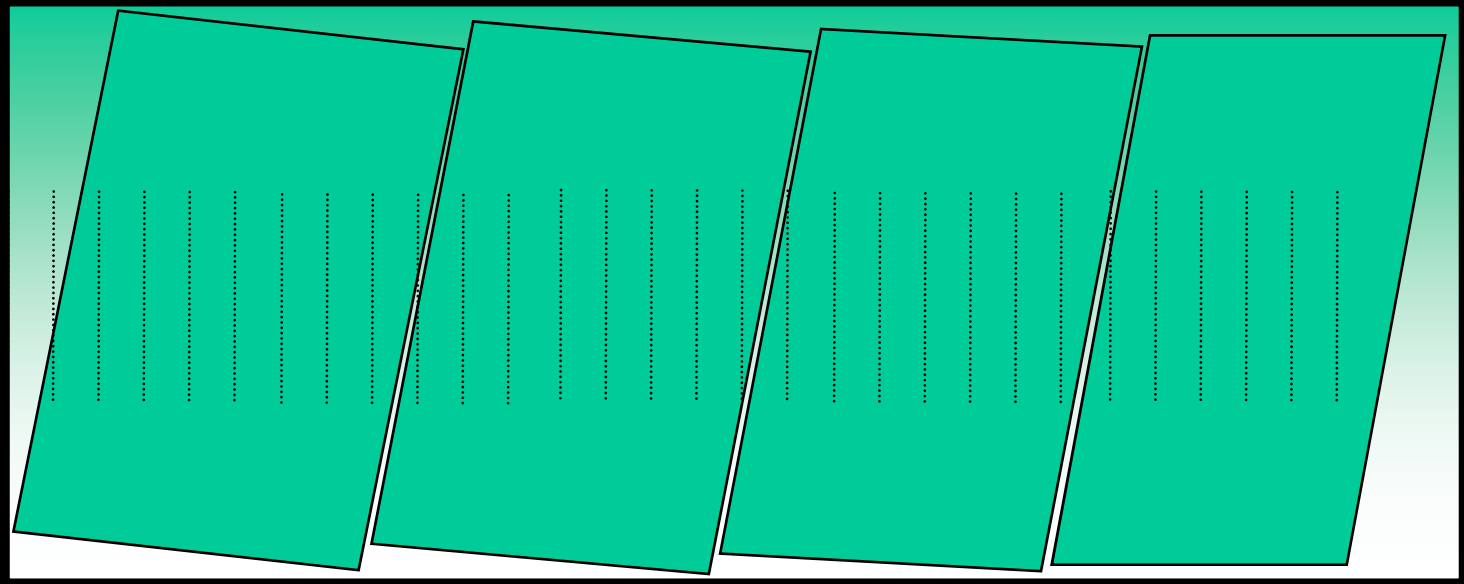
Glass Cutting CADCAM tailoring with simple parallelograms



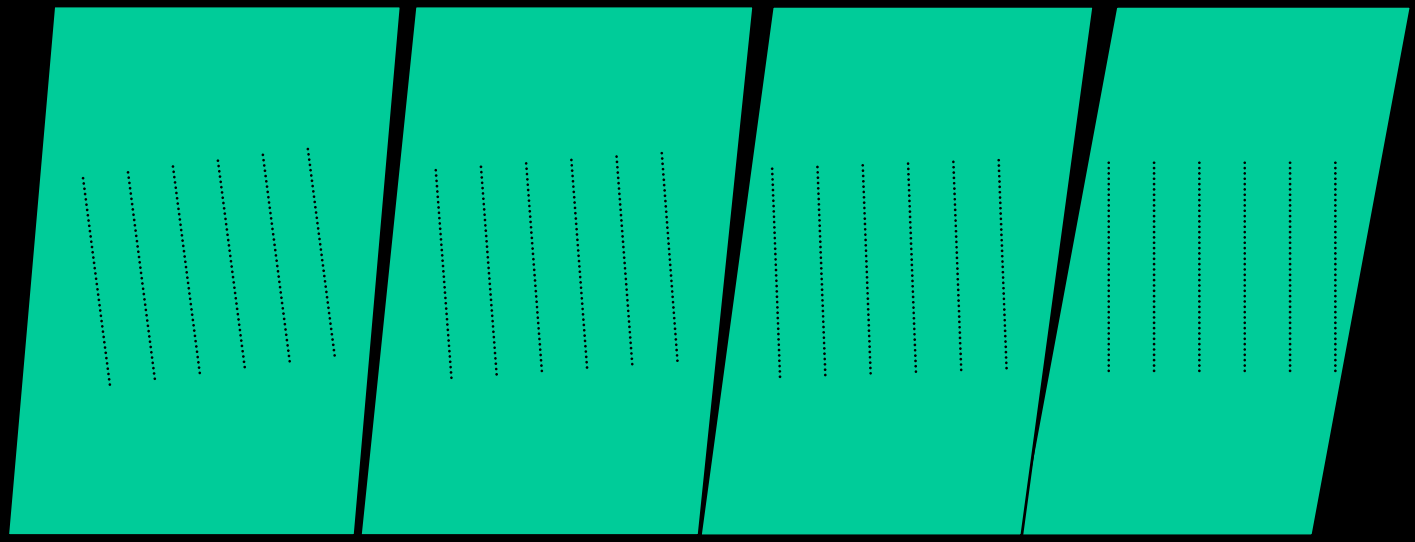
Facetted triangles consistent on any one level No standard parallelograms



Glass Cutting CADCAM
No pane is the same
efficient tailoring or iteration &
efficient resource use



Could lead to irregular roller wave pattern when installed



Glass Cutting CADCAM
less efficient tailoring/iteration
regular installed roller wave pattern
Less efficient resource use