STEP 5

Dynamic Glare & Solar Control: Electrochromic glass

Summary of GPD – 2015, J.Vitkala

Source: www.gpd.fi ©Helen Sanders, SAGE & Pekka Hakkarainen, Lutron Electronics

LCD Switchable Glass

Transmission can be varied by changing voltage

>60% Transmission

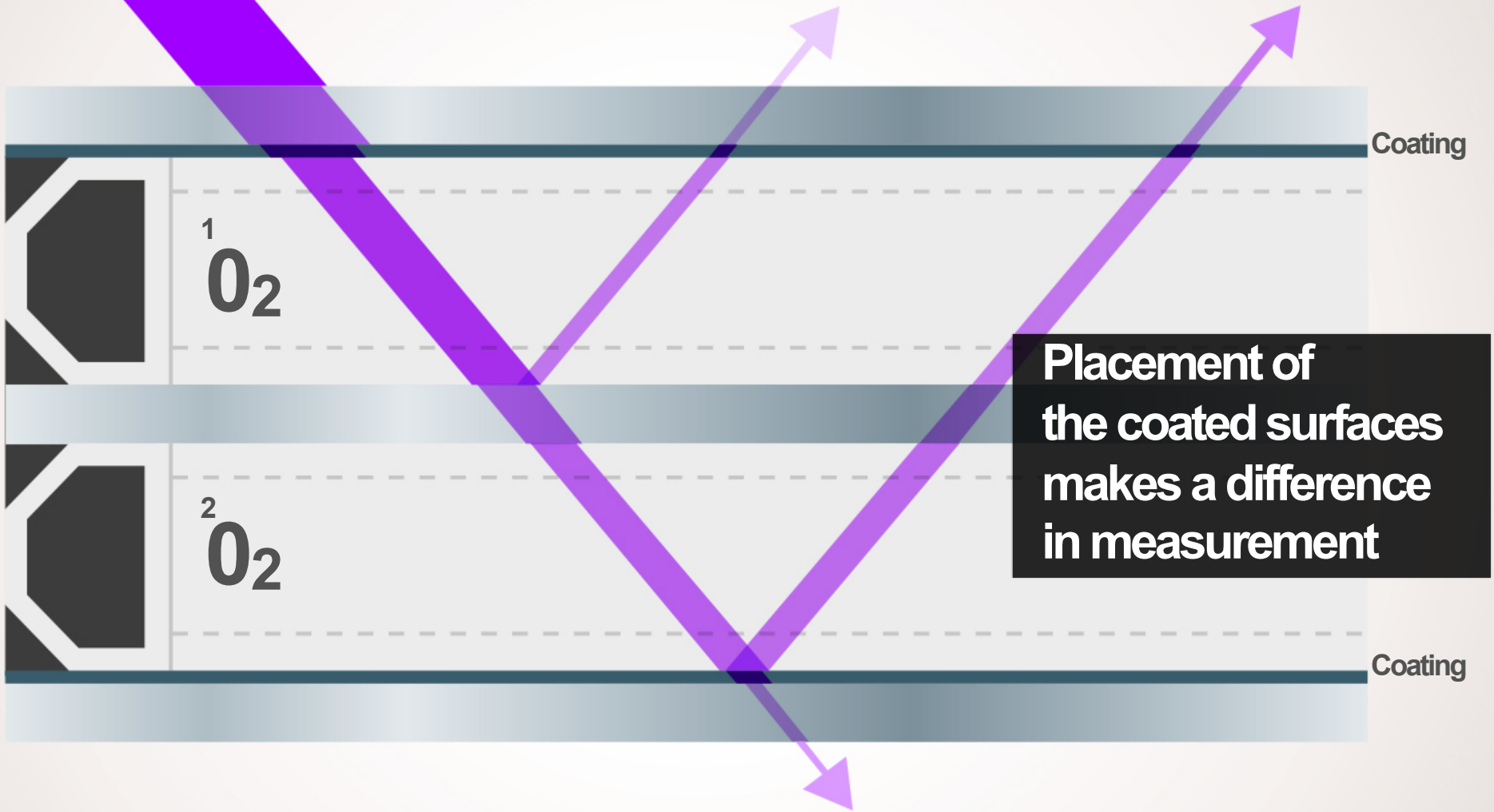
50% Transmission

40% Transmission

<10% Transmission

Source: www.gpd.fi © Damoder Reddy, Argil, Inc

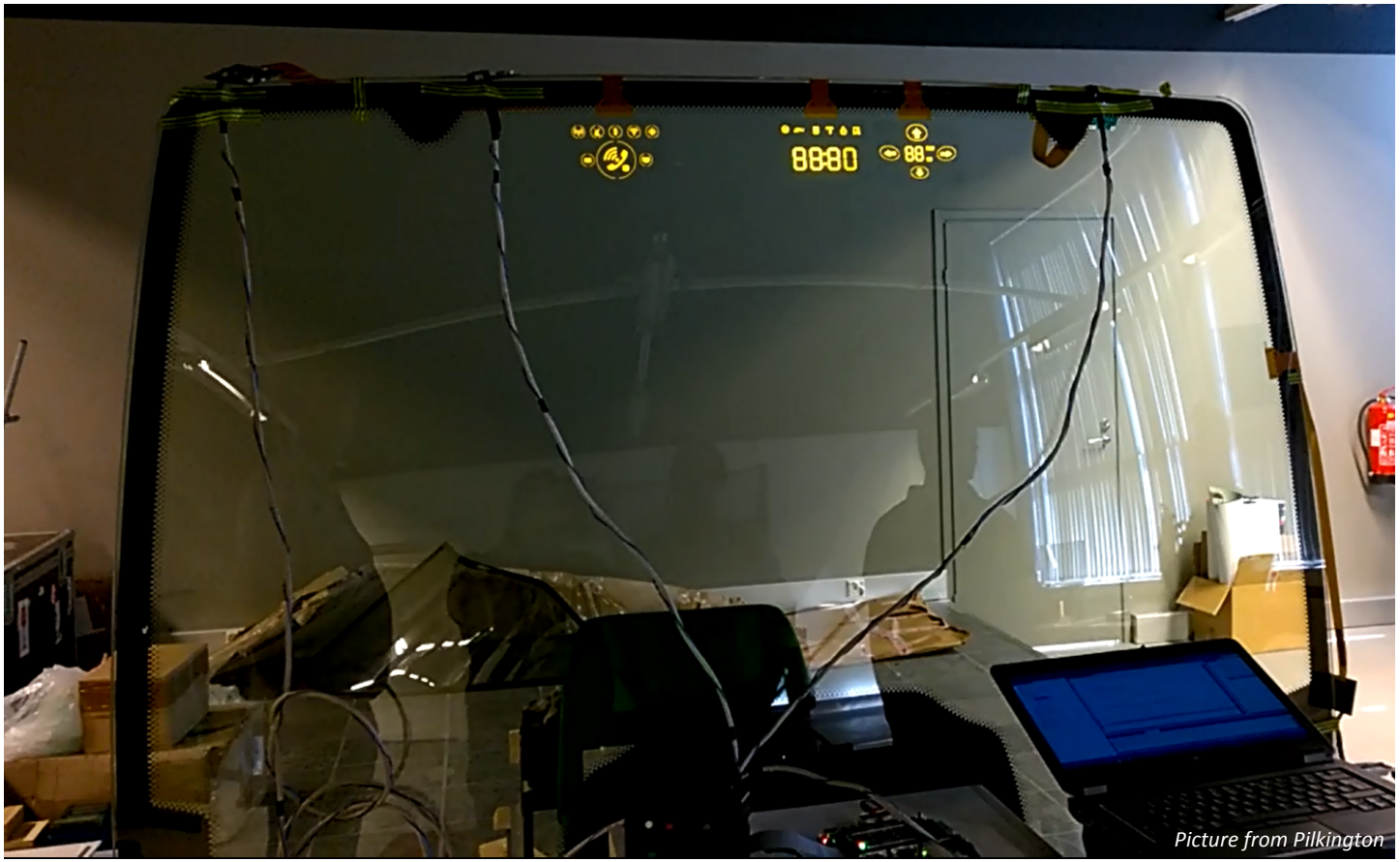
Measuring gas concentration without breaking the IGU – even on triples



Placement of the coated surfaces makes a difference in measurement

Summary of GPD – 2015, J. Vitkala

Source: www.gpd.fi © Miikkael Niemi, Sparklike



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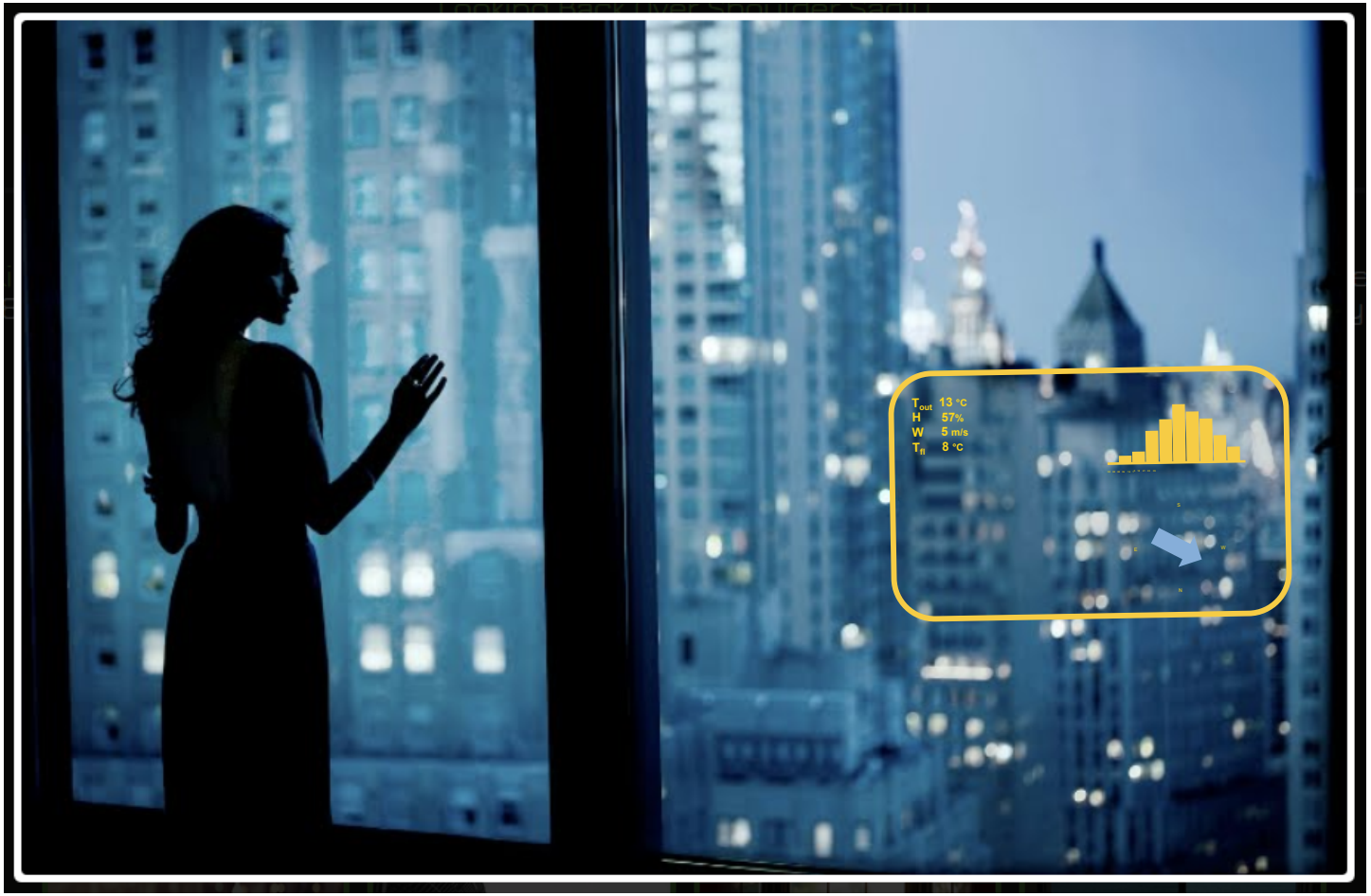
Beneq Products Oy



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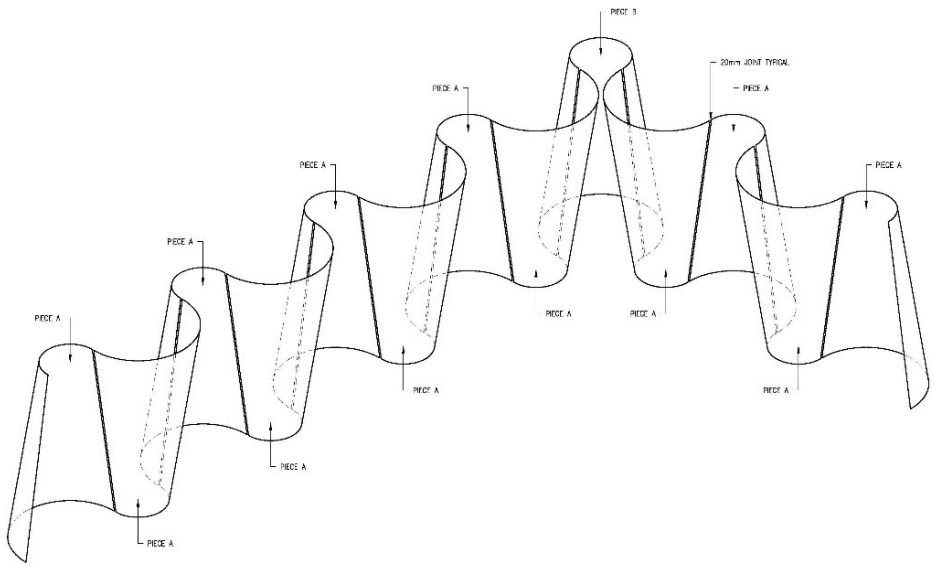
THIN GLASS & PROCESSING



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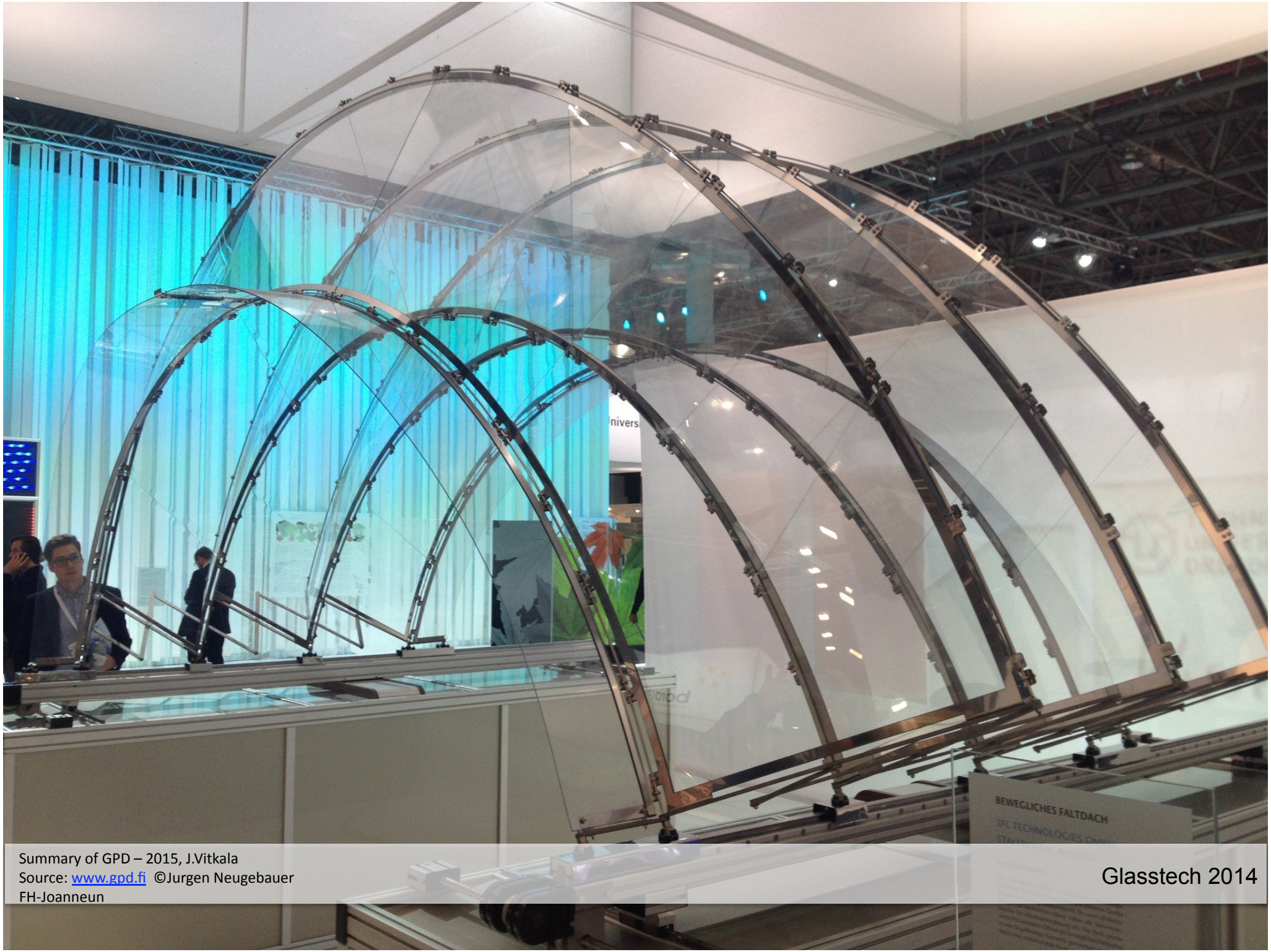
Source: www.gpd.fi ©Carpenter / Lowings Architecture & Design

Thin Glass

Summary of GPD – 2015, J.Vitkala | Source: www.gpd.fi ©Jurgen Neugebaur | University of Applied Sciences, FH-Joanneum



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FH-Joanneun

Glasstech 2014

THIN GLASS
- what is it?

- It needs to be avaliable for glass units spanning floor to floor
- The processor must be able to strengthen and laminate the glass,- with an aceptable visual quality
- The glass product shall meet the requiremnts of product standards

1 ≤ 3 mm

Summary of GPD – 2015, J.Vitkala
Source: www.gpd.fi ©Hannes Spiss, Facade Engineering Arup

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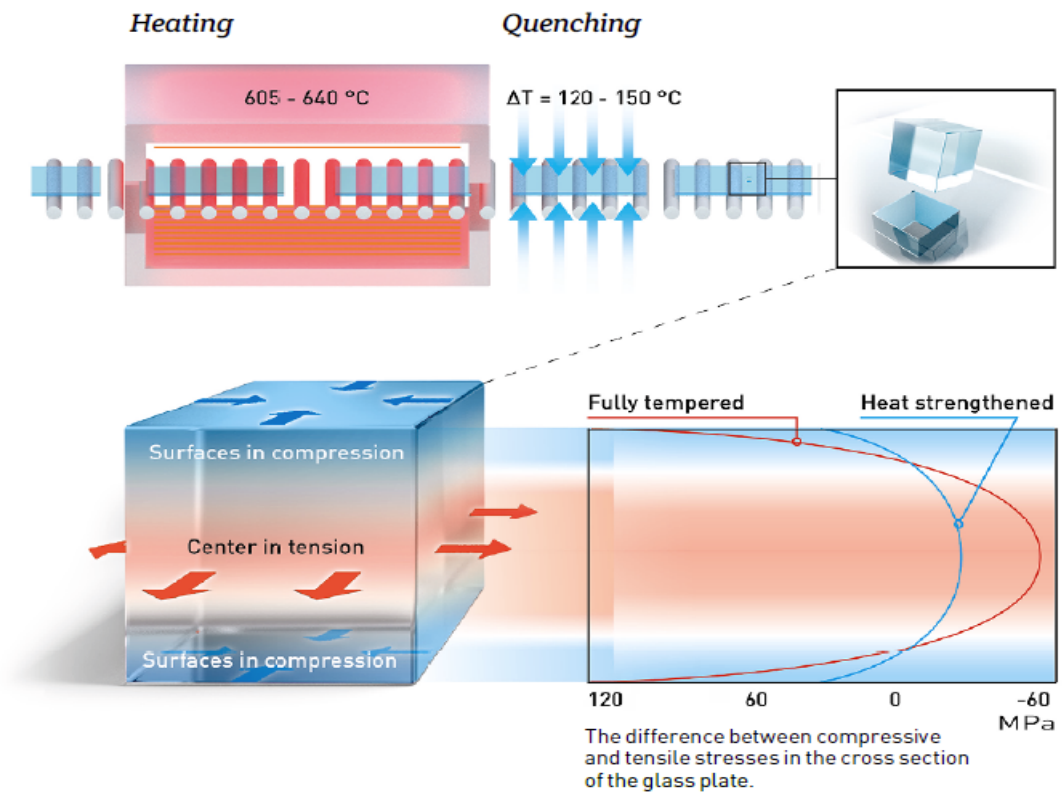
Challenge of thin glass tempering - Basics

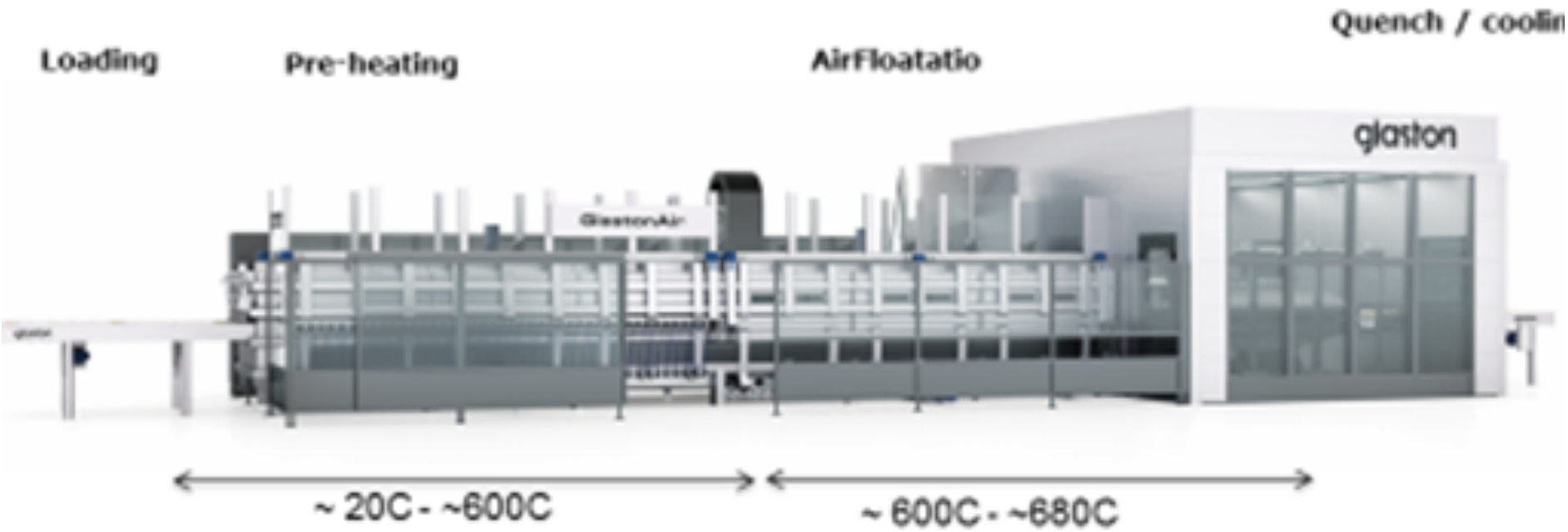


Temperature difference between surface and the mid-part is about 120˚C and temperature of midplate is still over 610˚C

The thinner the glass, the faster and more efficient the surface cooling has to be

To create ovet 15pcs fragmentation in 5cmx5cm area the surface compression level should be over 120MPa.

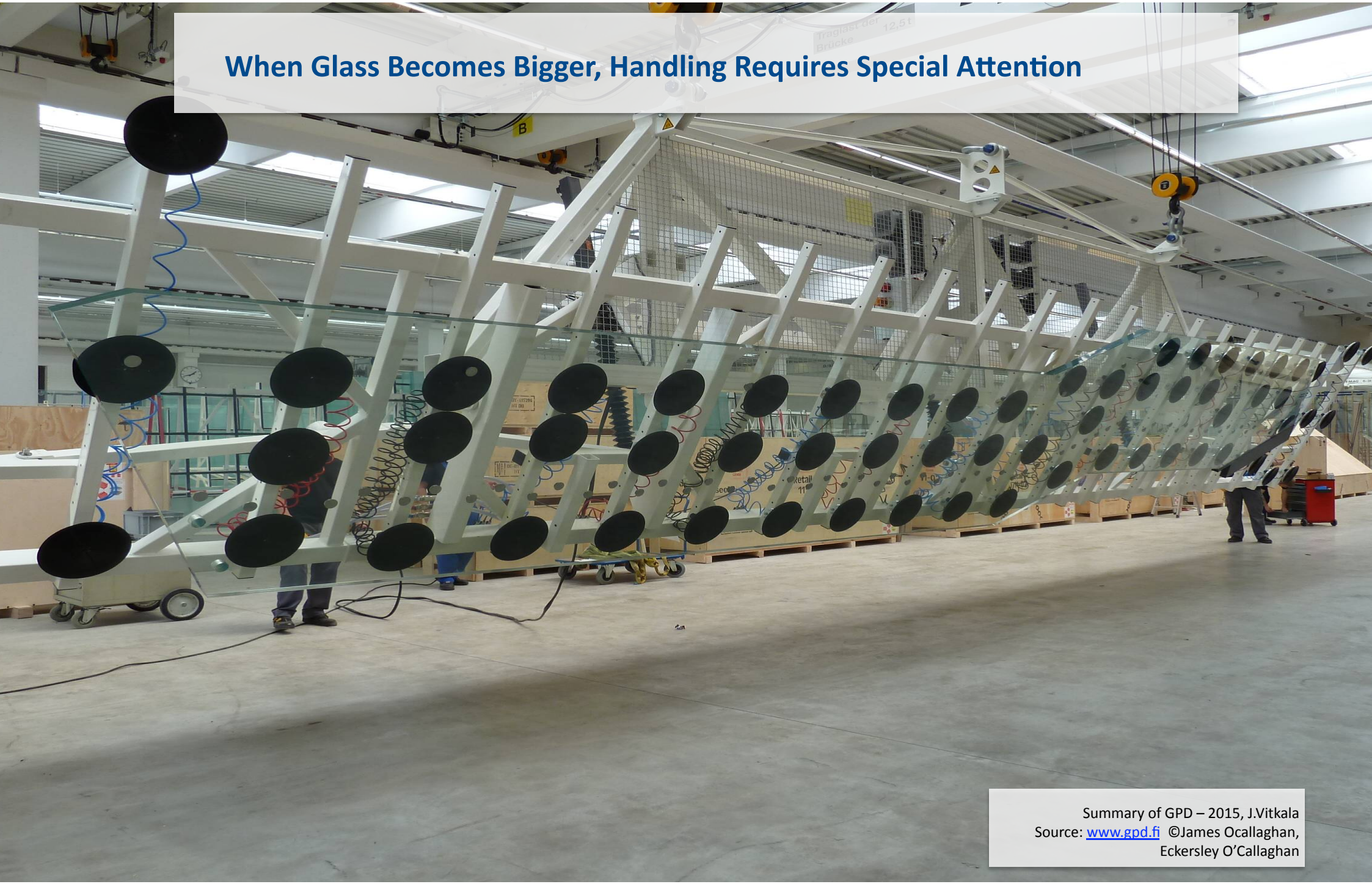
EXAMPLE SOLUTION: Air flotation technology to enable the "over heating" of the glass



With AirFloatation technology (where glass is supported and heated with an even "air film" instead of rollers) <u>glass can be heated to a higher temperature without the quality defects</u>

THICK AND LARGE GLASS

When Glass Becomes Bigger, Handling Requires Special Attention



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Large glass needs special handling equipment - **Tvitec Spain**

Summary of GPD – 2015, J.Vitkala
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Handling large glass is especially challenging

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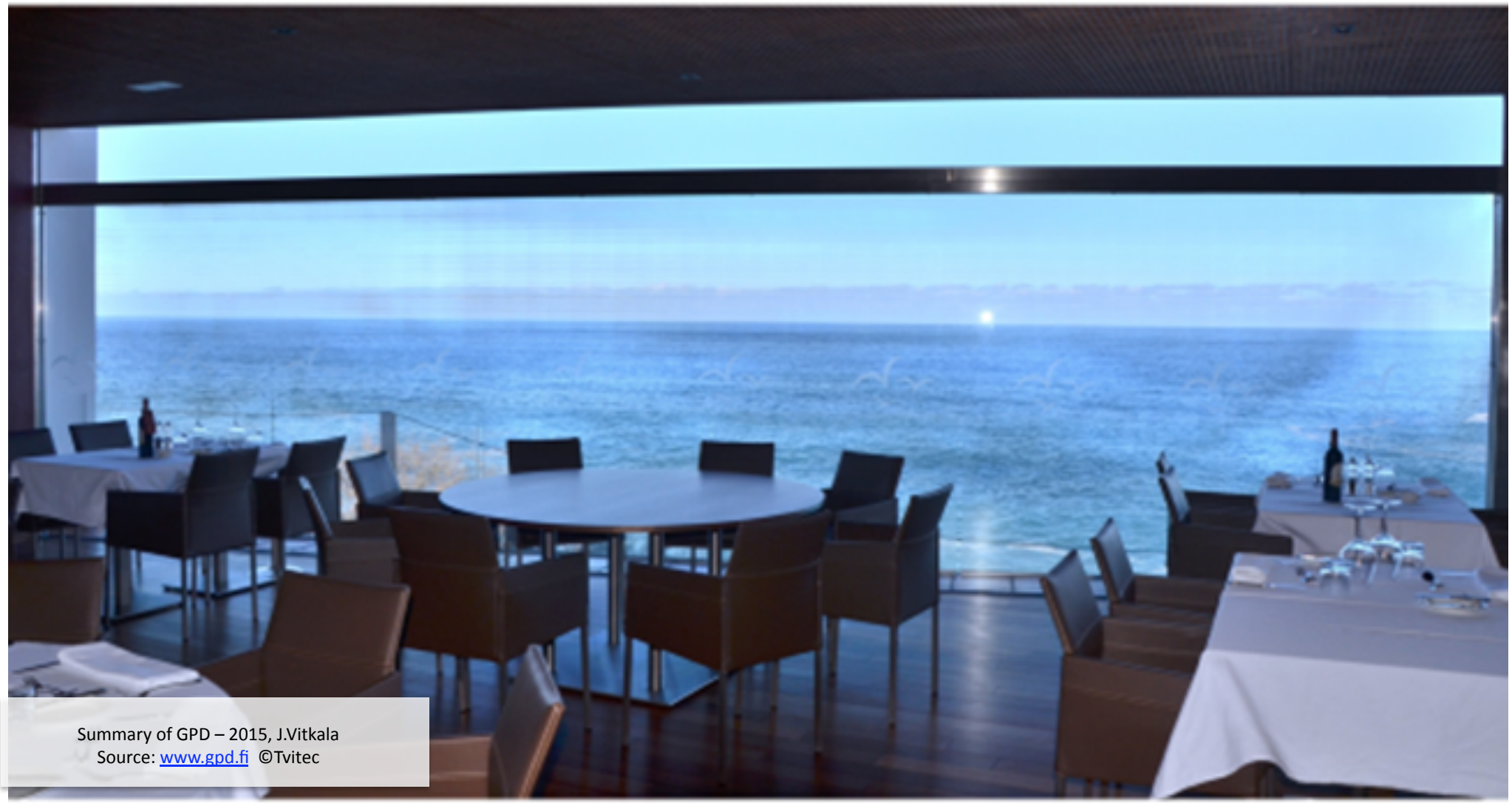
But once done, large uniform glass offers uncomparable views



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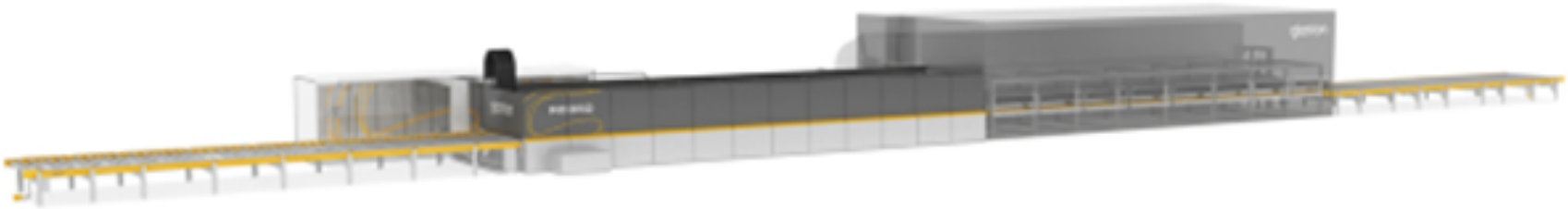
Glaston RC350™ tempering furnace



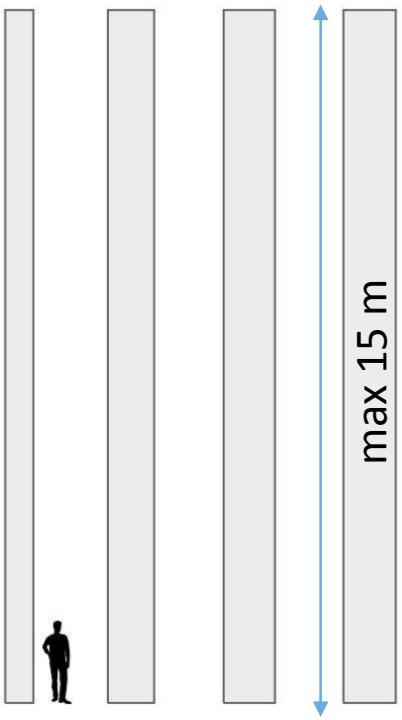
Capacity: processing glass in sizes of up to 12 x 3,3 m

Introduction

… A new facade system

iconic skin glass sandwich panel

- pre-fabricated building component
- cost-efficient glass façade
- coated HS glass
- flush surface
- up to 15 m long
- 600, 1000, 1100, 1150 mm wide
- vertical or horizontal
- openings / windows
- invisible fixings
- shadow gap



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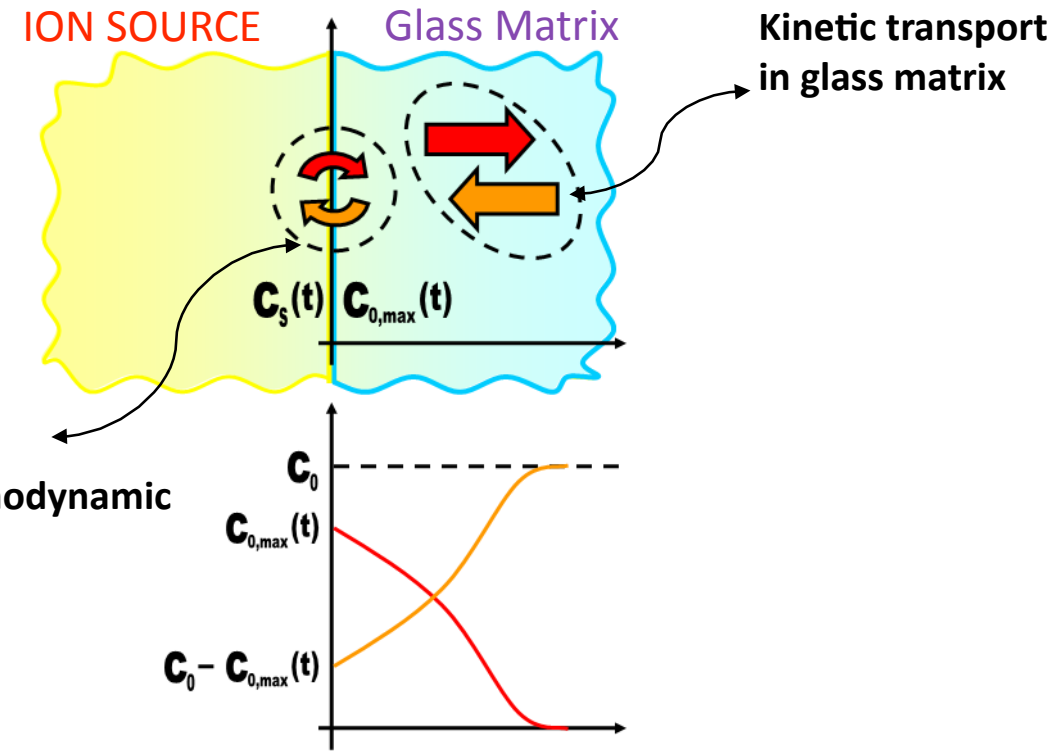
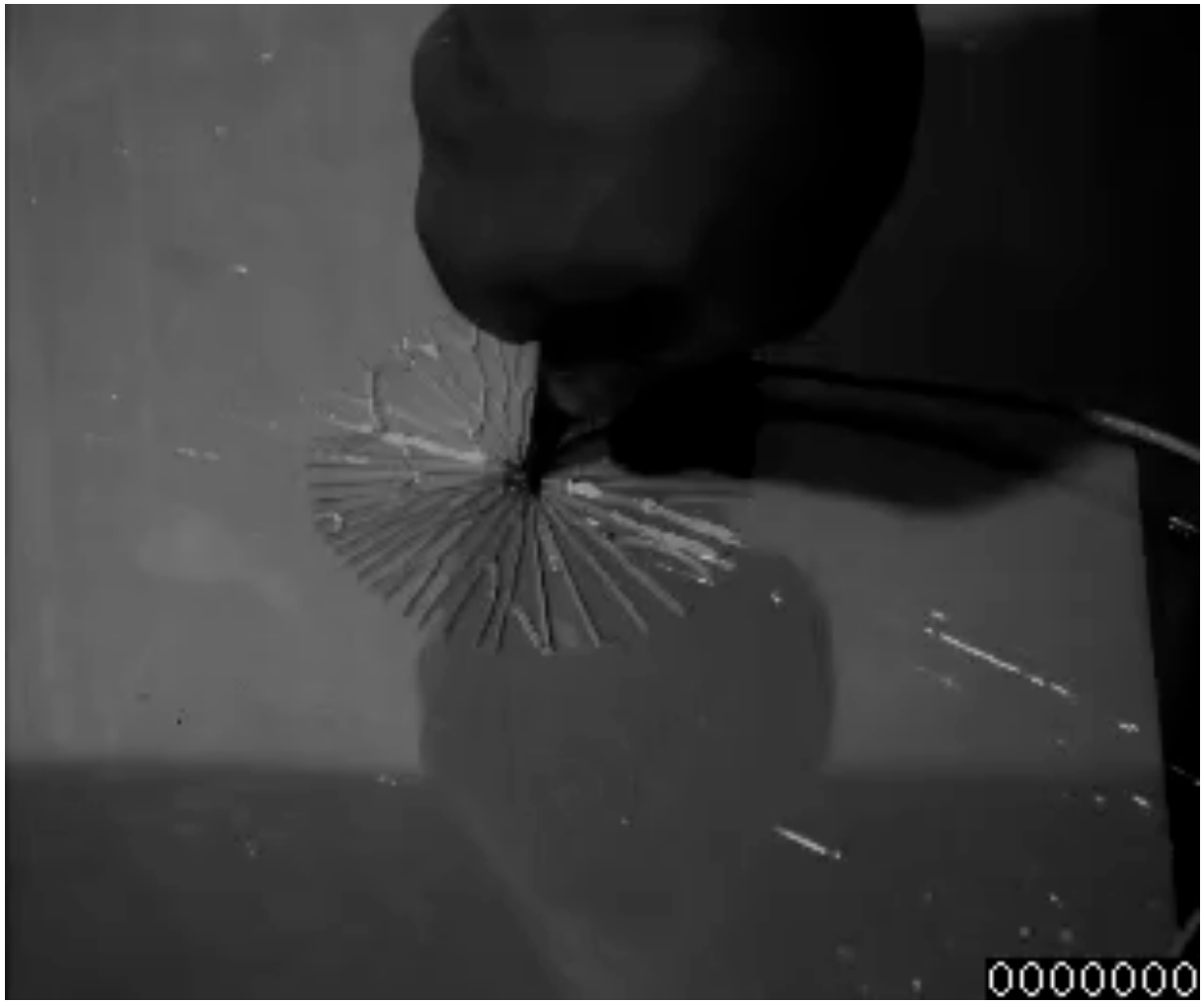
Source: www.gpd.fi © Dr. –Ing. Martien Teich, Seele GmbH

The Ion-Exchange Process



Surface Thermodynamic Equilibrium Process t >> τ

Effect of impact point on glass fragmentation



Frame rate 0.5 Mfps - Crack propagation speed is about 1500 m/s

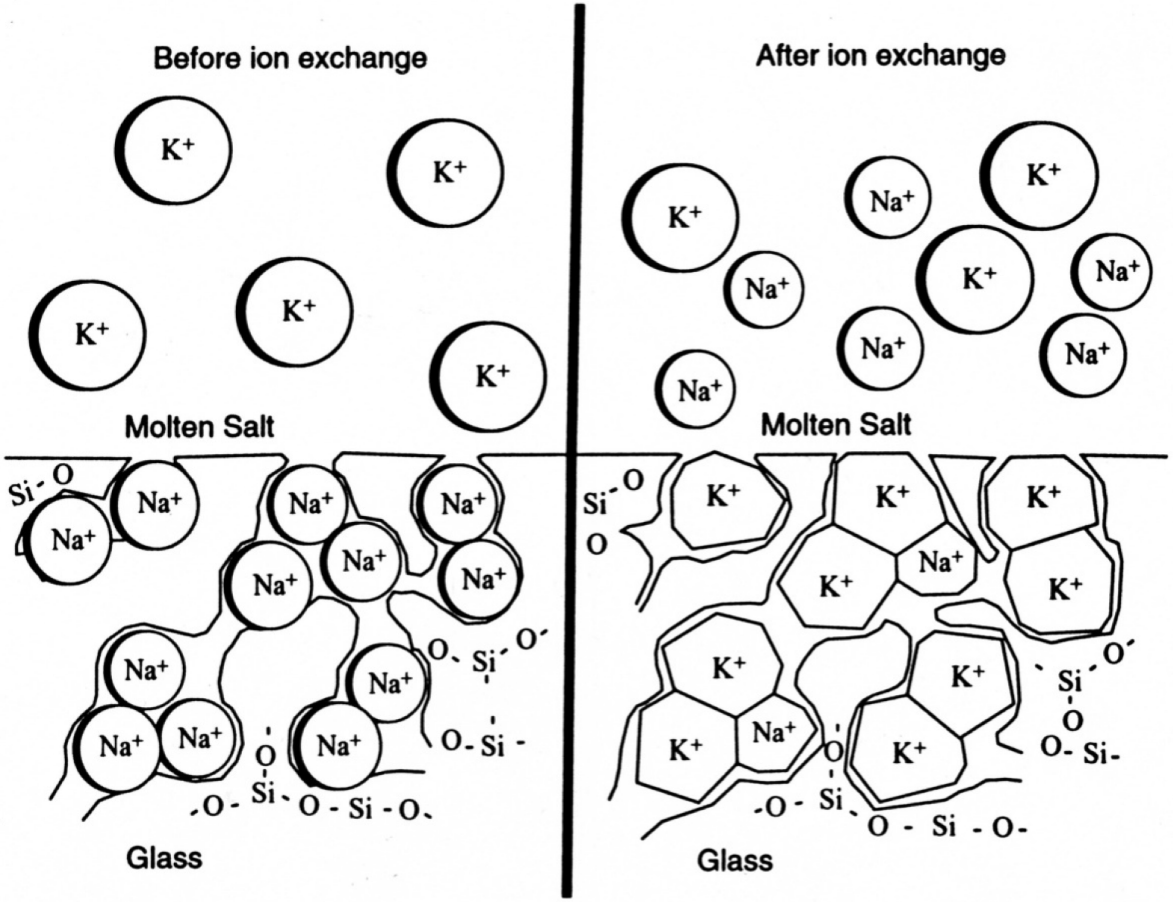


FIGURE Crowding from low-temperature exchange of K^+ for Na^- ions. (*From W. H. Dumbaugh and P. S. Danielson, Ref. 5.*)

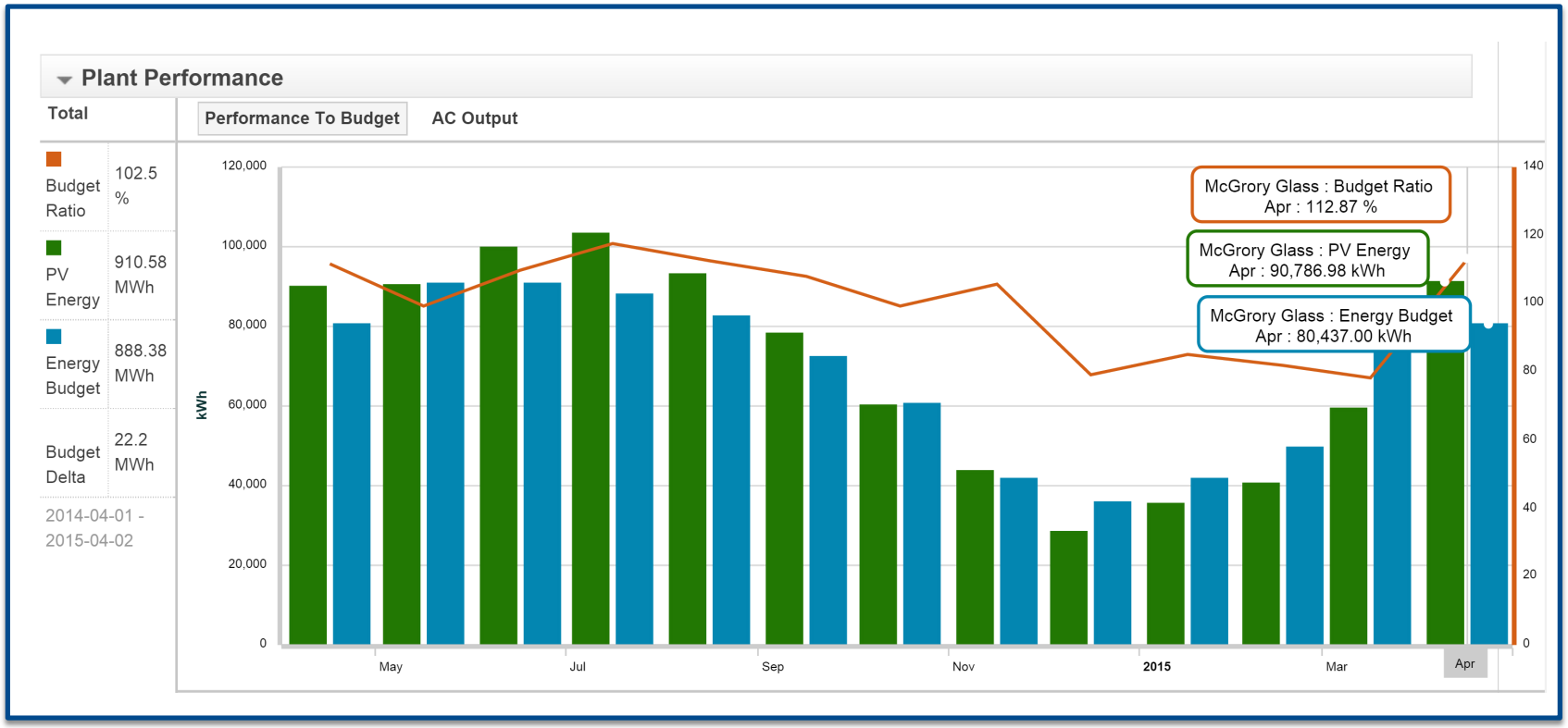
SOLAR

Ballasted system

Source: www.gpd.fi ©Jim Gulnick, McGrory Glass, Inc.

Actual view

Monitoring Solar Project



Summary of GPD – 2015, J.Vitkala
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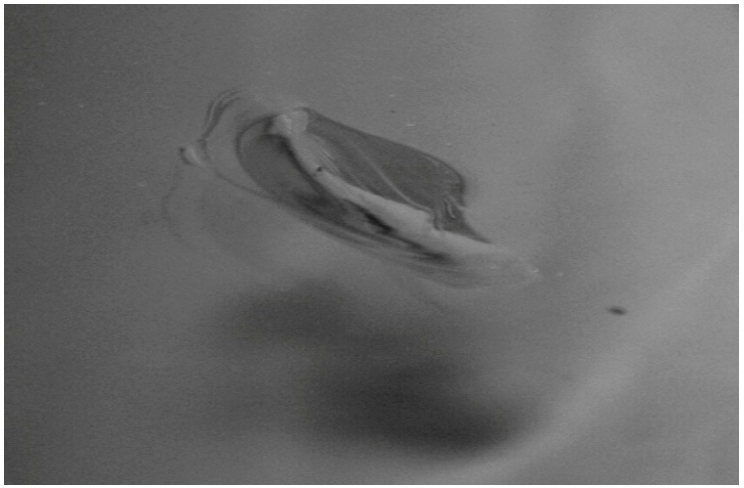
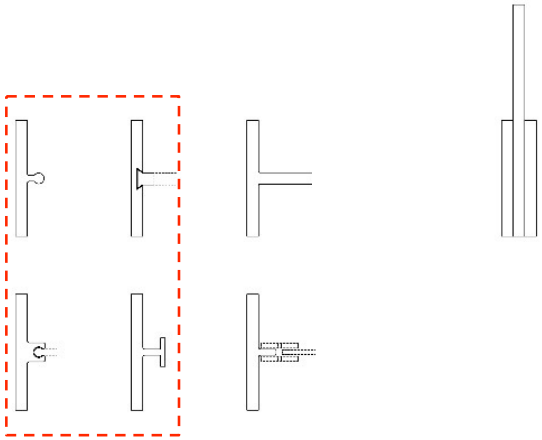
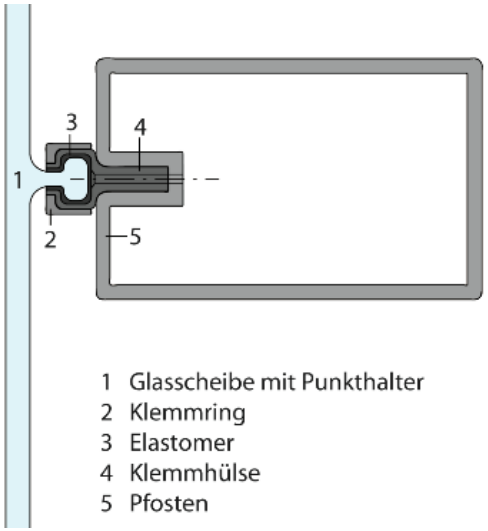
WELDED GLASS CONNECTIONS

- Fully transparent glass connections
- To simulate the automated process manually, glass is manually welded in layers







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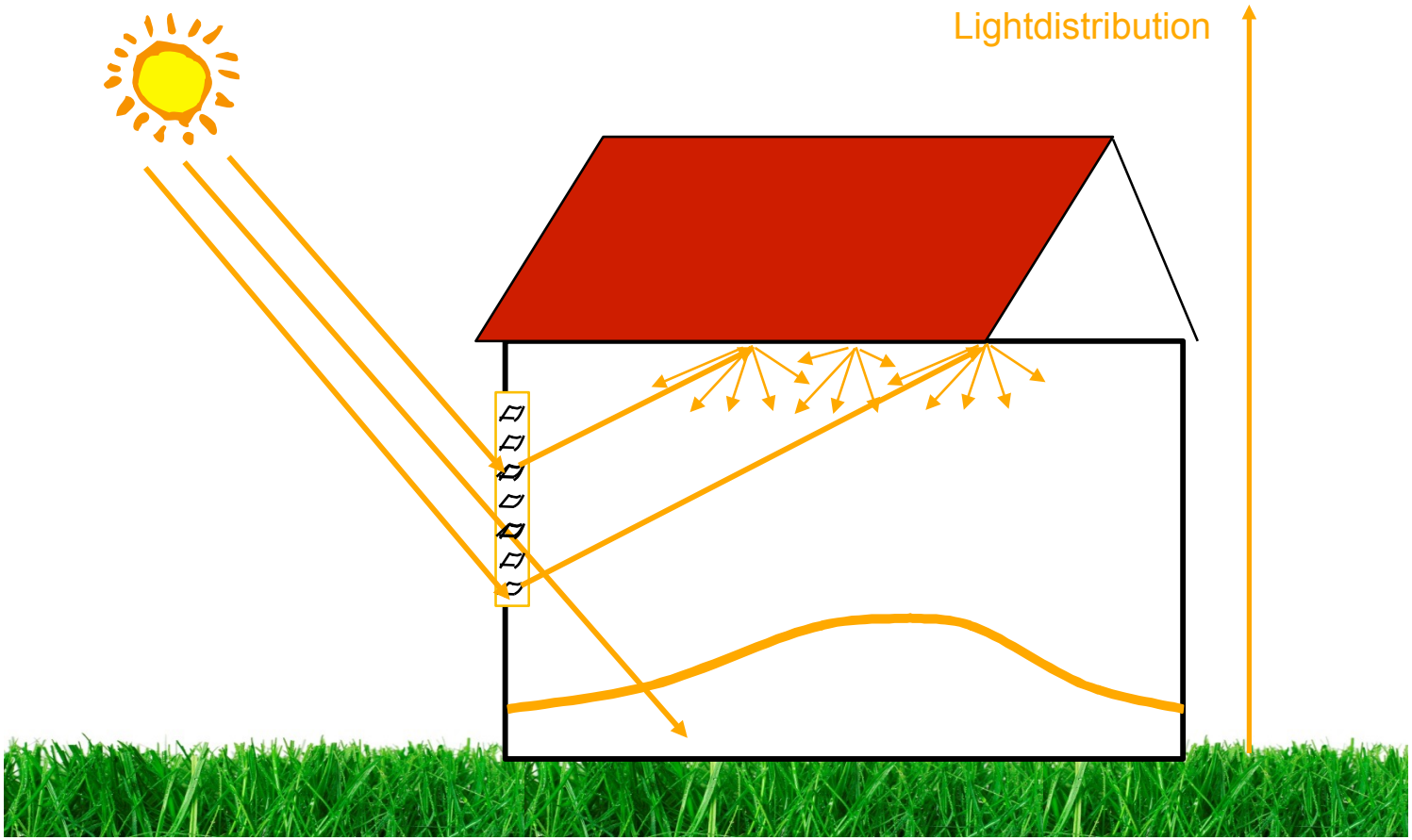
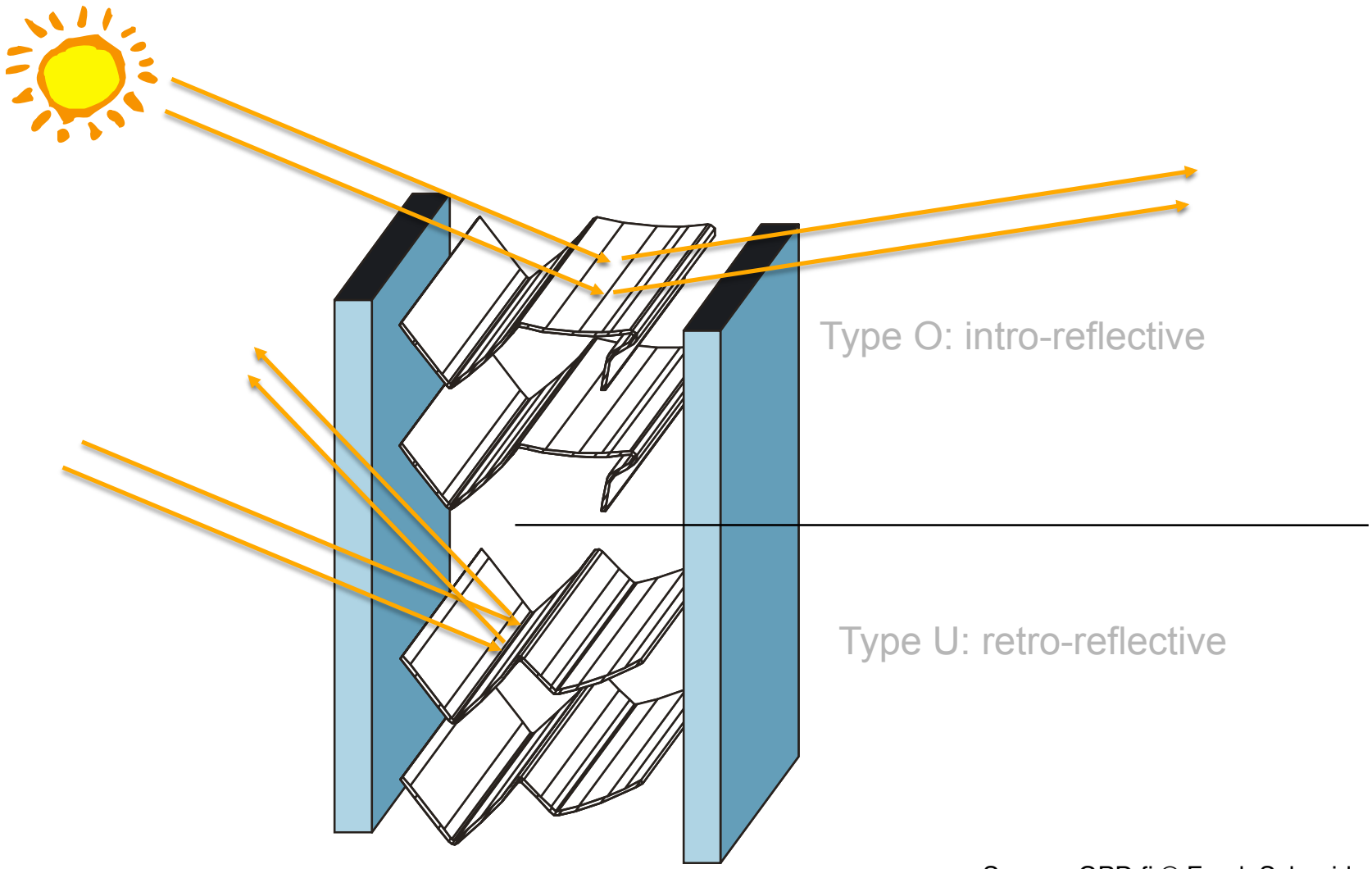
AM glass, PhD research at Facade Research Group,TU Delft, Lisa Rammig

Redirecting the light



Source: GPD.fi © Frank Schneider, Okalux

Function of reflective blinds



Source: GPD.fi © Frank Schneider, Okalux

Finnish invention
Heatable glass as technical solution for thermal comfort

- Themostate adjusts glass surface temperature to right level independently from conditions and weather (sunshine, cloudiness etc.)
- Reacts quickly to changing conditions
- Savings

Source: GPD.fi © Rolf Kochs, Saint-Gobain Glass/Quantum

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25 YEARS

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