
New Way Air Bearings
UD MPI 2012
NEWWAY®
air bearings
glaston
seeing it through

Background

- Thermal glass tempering is currently achieved by heating glass sheets in a furnace to above the softening point of the glass (~640 deg C) then quenching the glass in a quench chamber.
- The quench air pressure required to successfully temper glass varies with glass thickness. The rate of cooling, and the required air pressure, increase as the thickness of the glass decreases.
- The thinnest glass that is currently economical to temper is 3mm. Great economic advantage to be able to temper 2mm glass.
- New Way and Glaston developing new surface cooling process utilizing viscous shear by a high velocity air film.
- Glass is introduced into a narrow slot, supported by air bearings, and with a thin clearance gap (25 um) above and below the glass.
- High pressure air introduced into the gaps above and below the glass sheet to provide rapid cooling of the glass surface by effectively removing the insulation provided by the convection boundary layer

Super-E System

Frictionless Motion™

ZERO FRICTION

ZERO WEAR

INEXPENSIVE

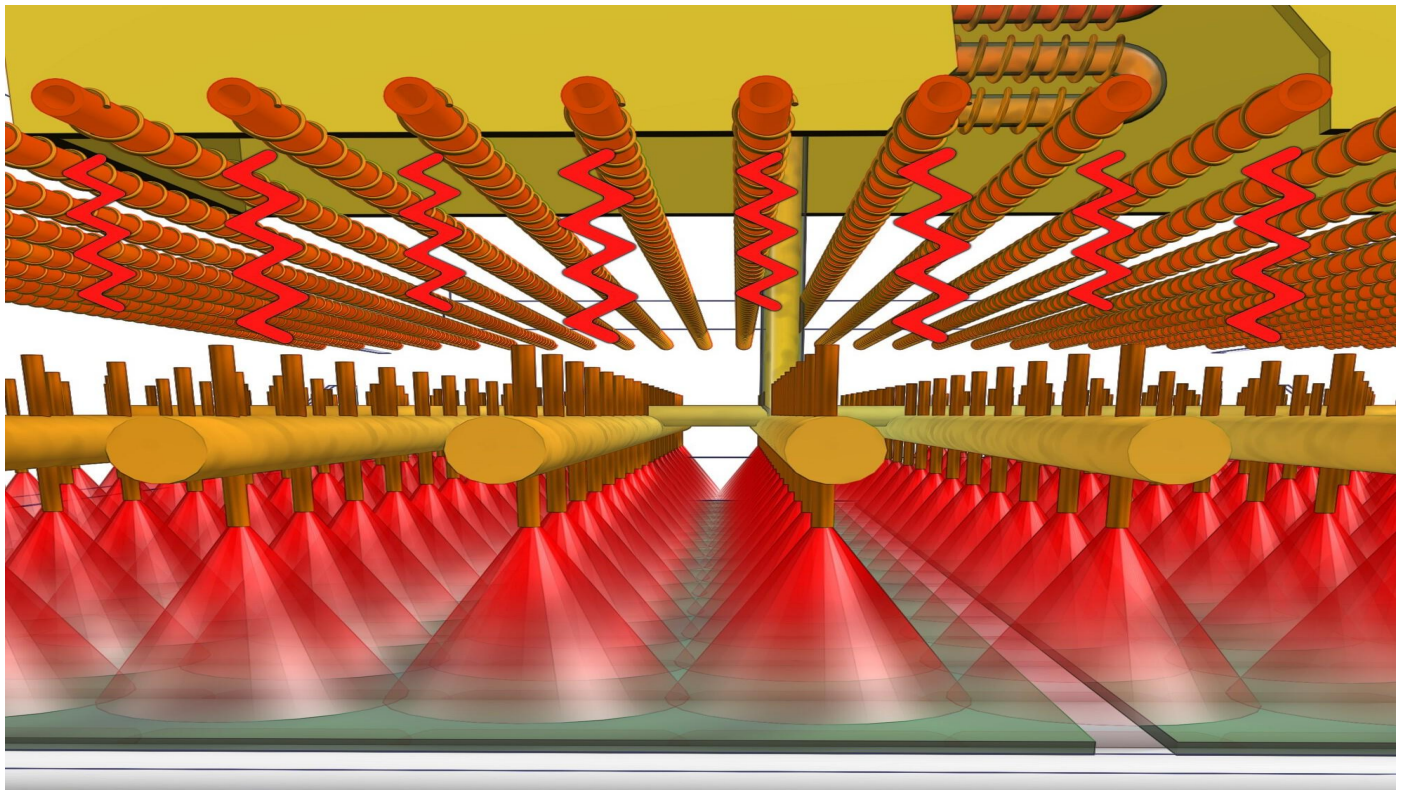
HIGH PERFORMANCE

EASY TO USE

ROBUST

SILENT AND SMOOTH

NO LUBRICANT



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Paint The Glass with Convective Heat

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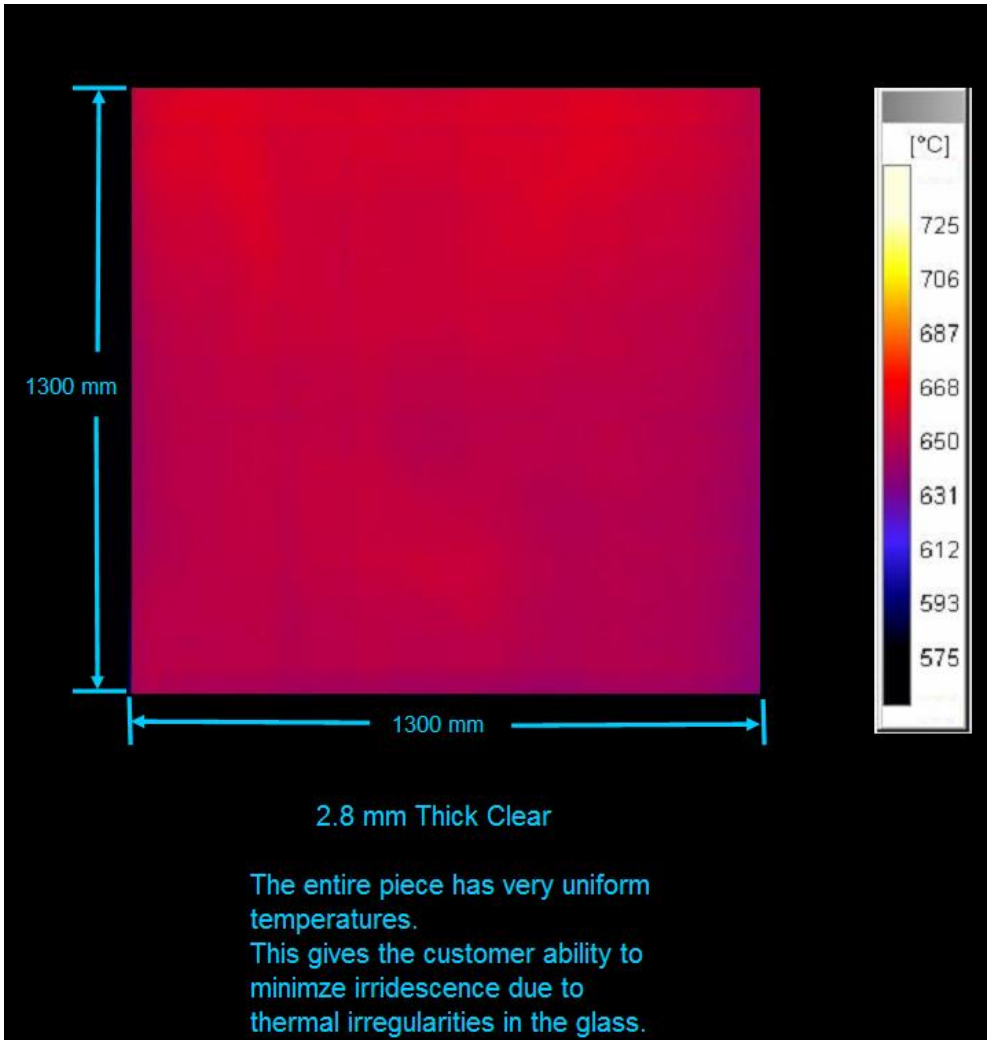

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Super-E Thermal Scan

Frictionless Motion™

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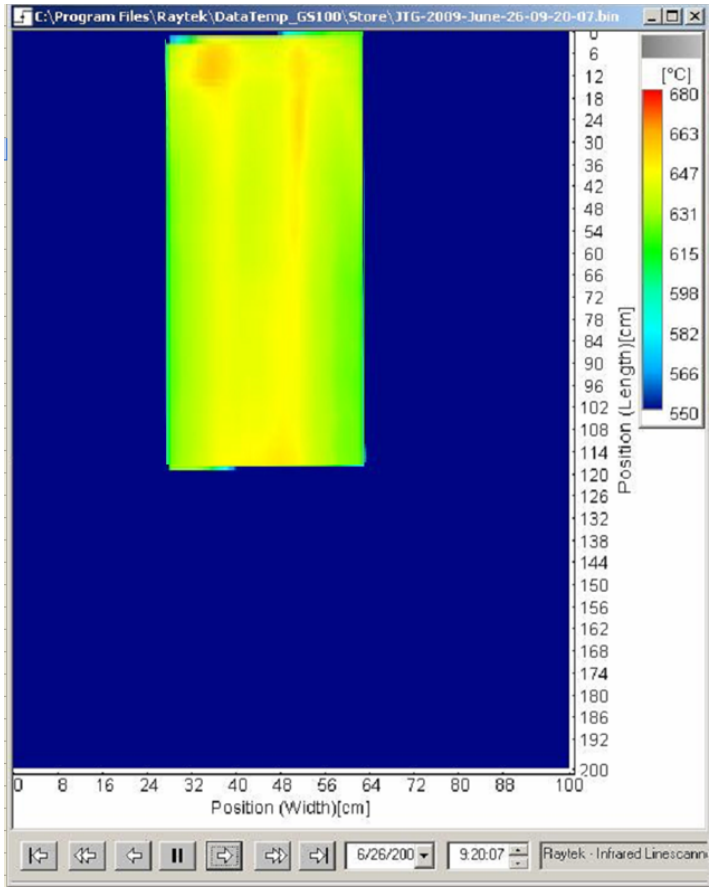
OIL LUBRICANT



Thermal Stripes

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ACC: Thermal Scans

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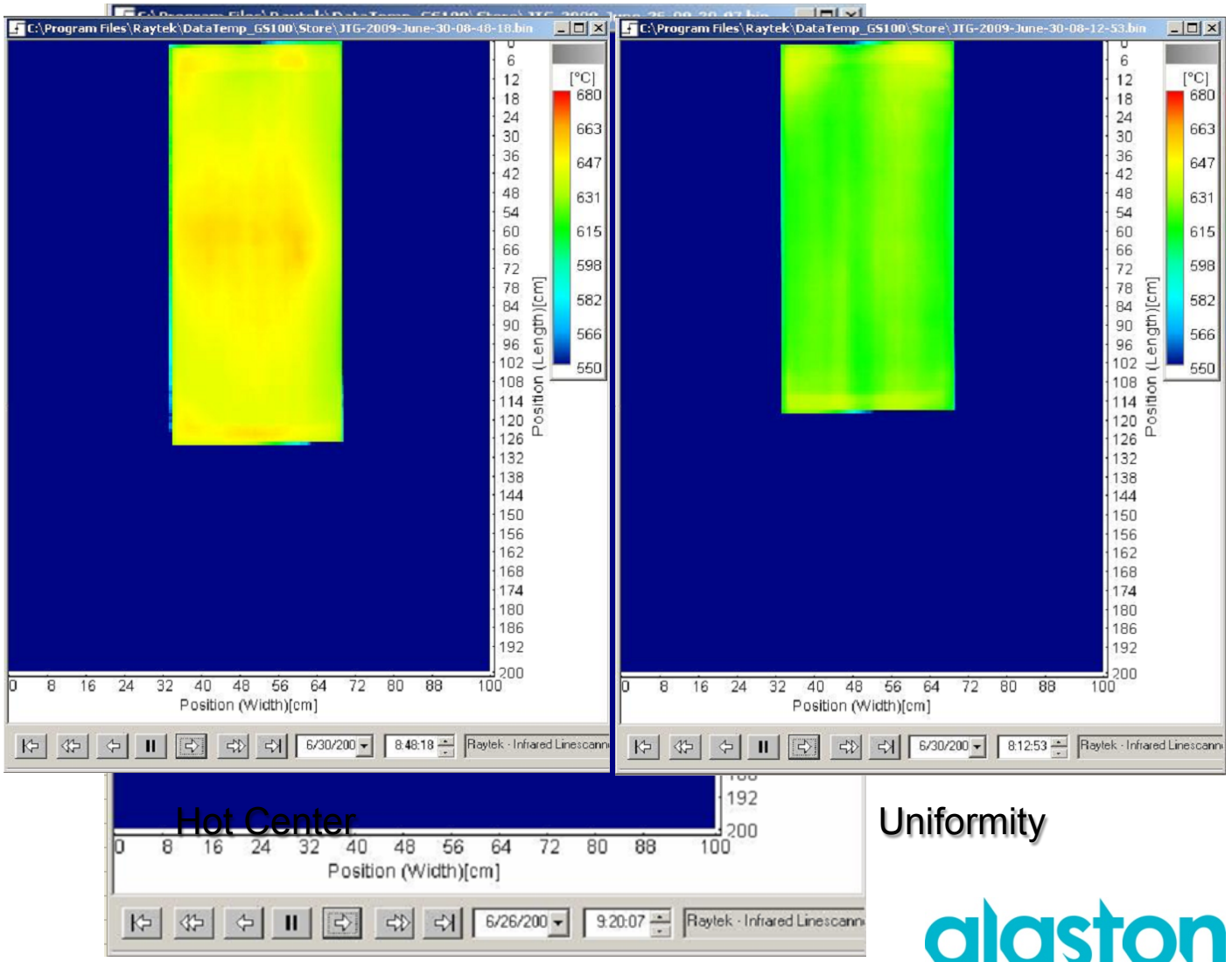

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Cooling Curves

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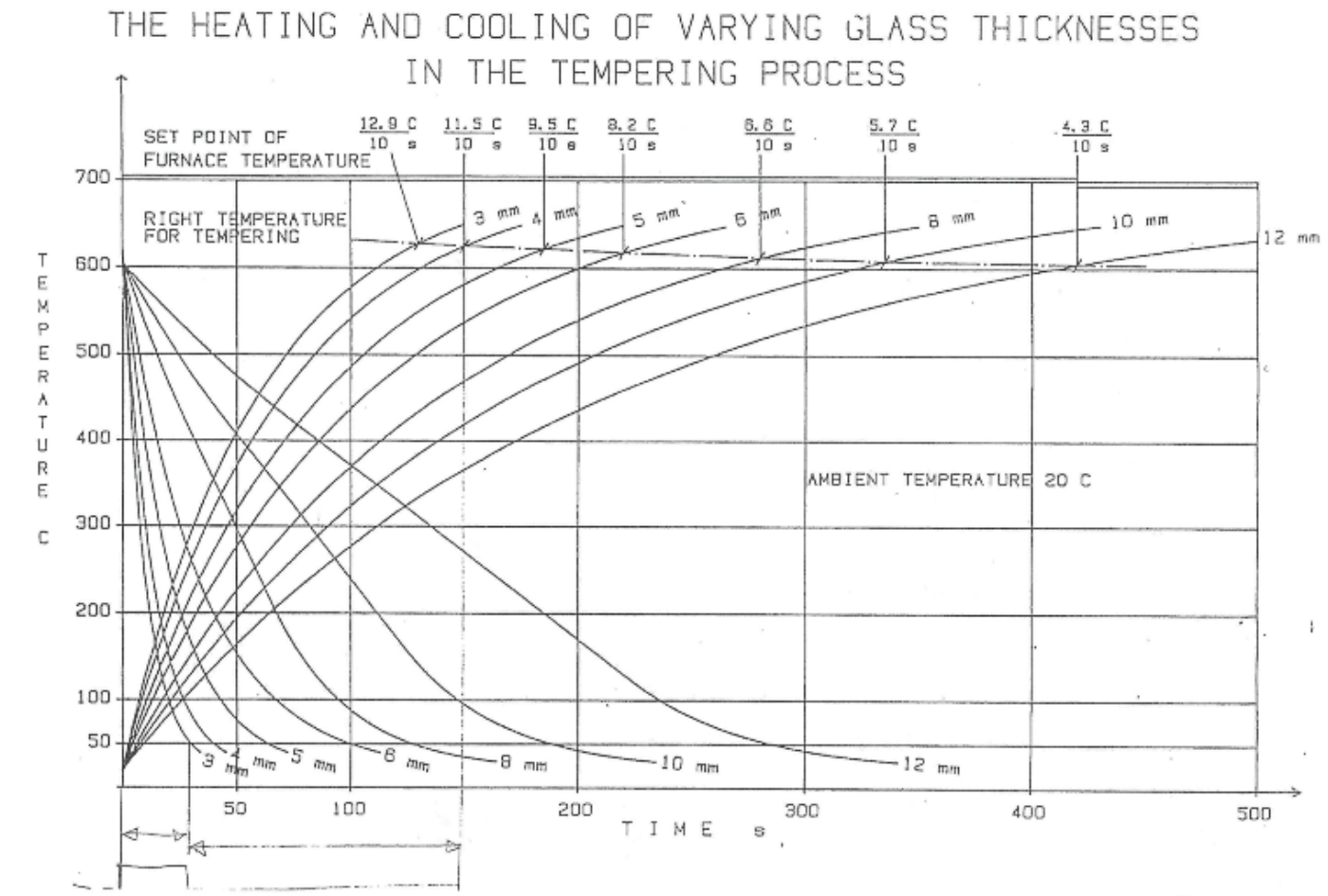

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3.2mm

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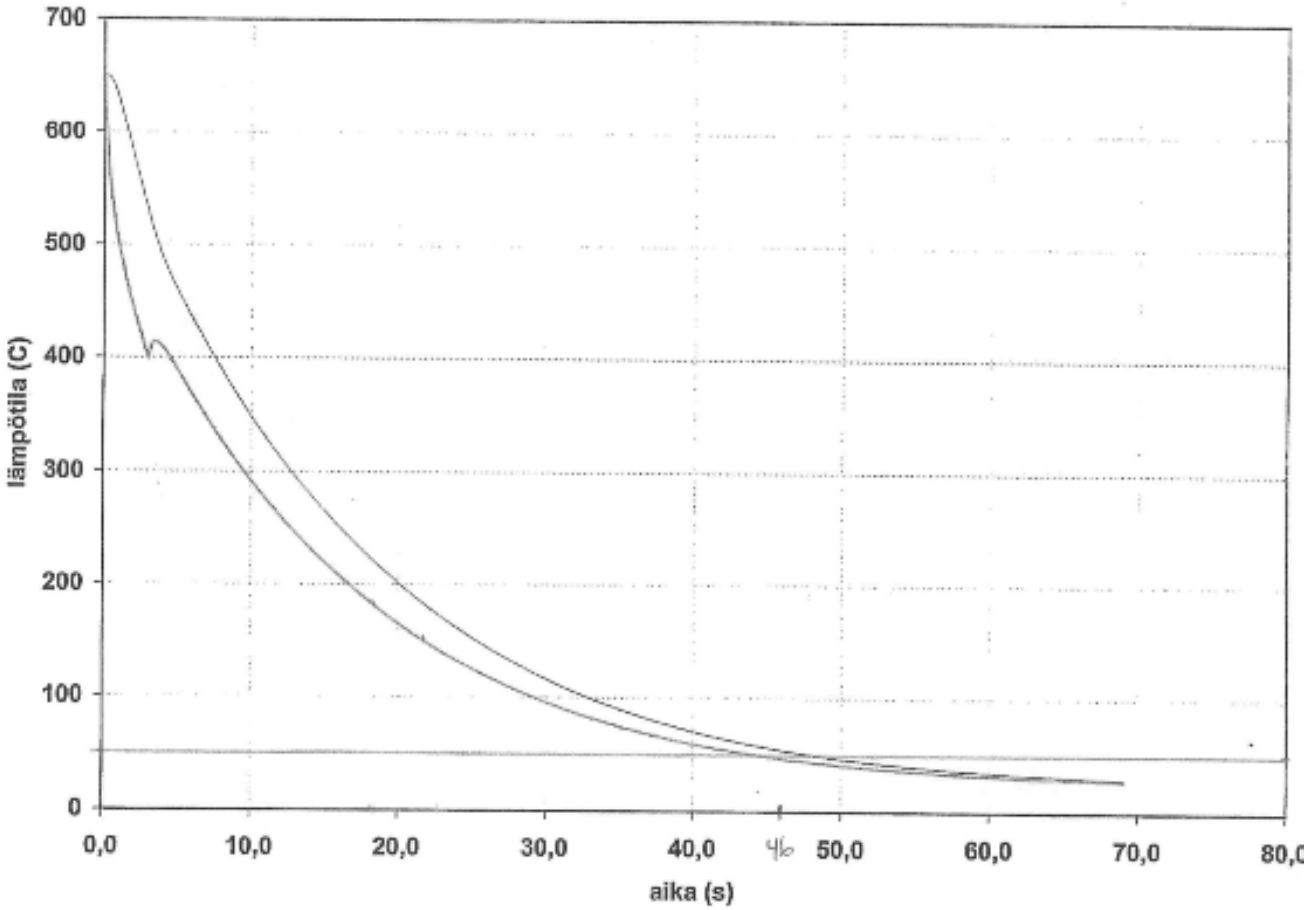

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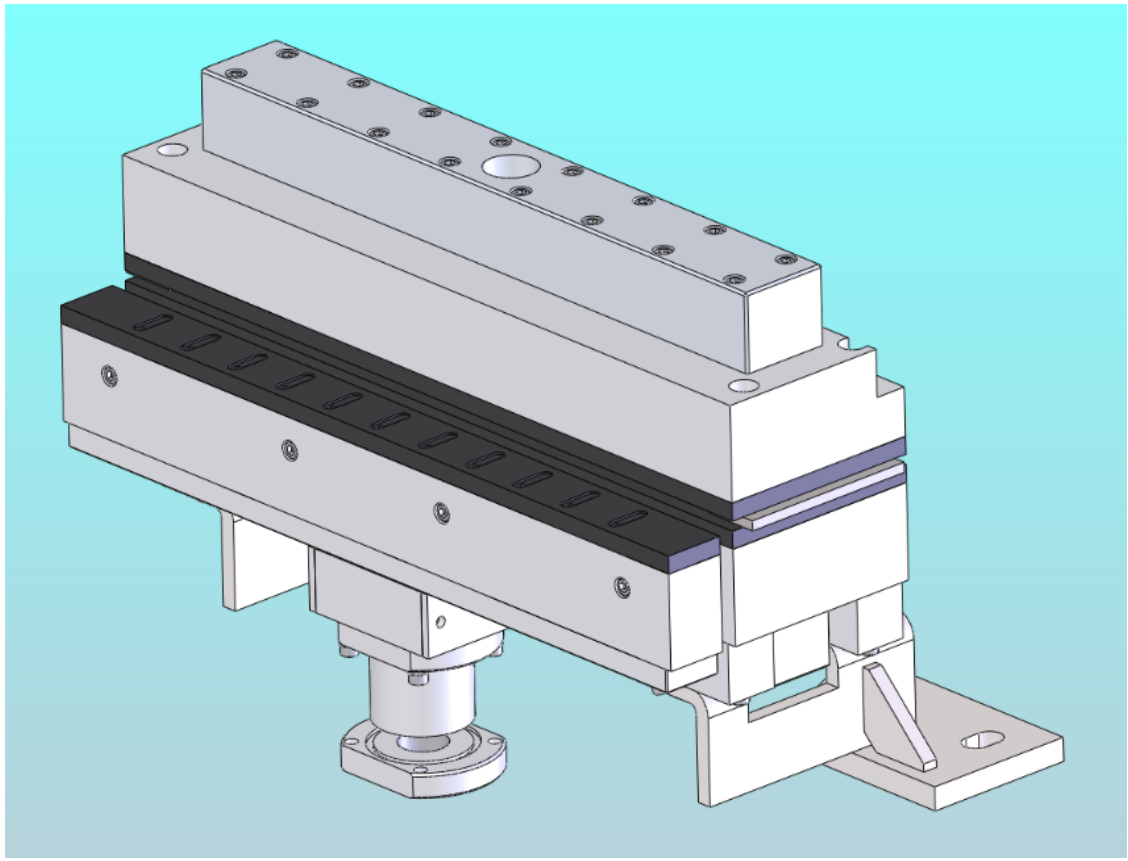

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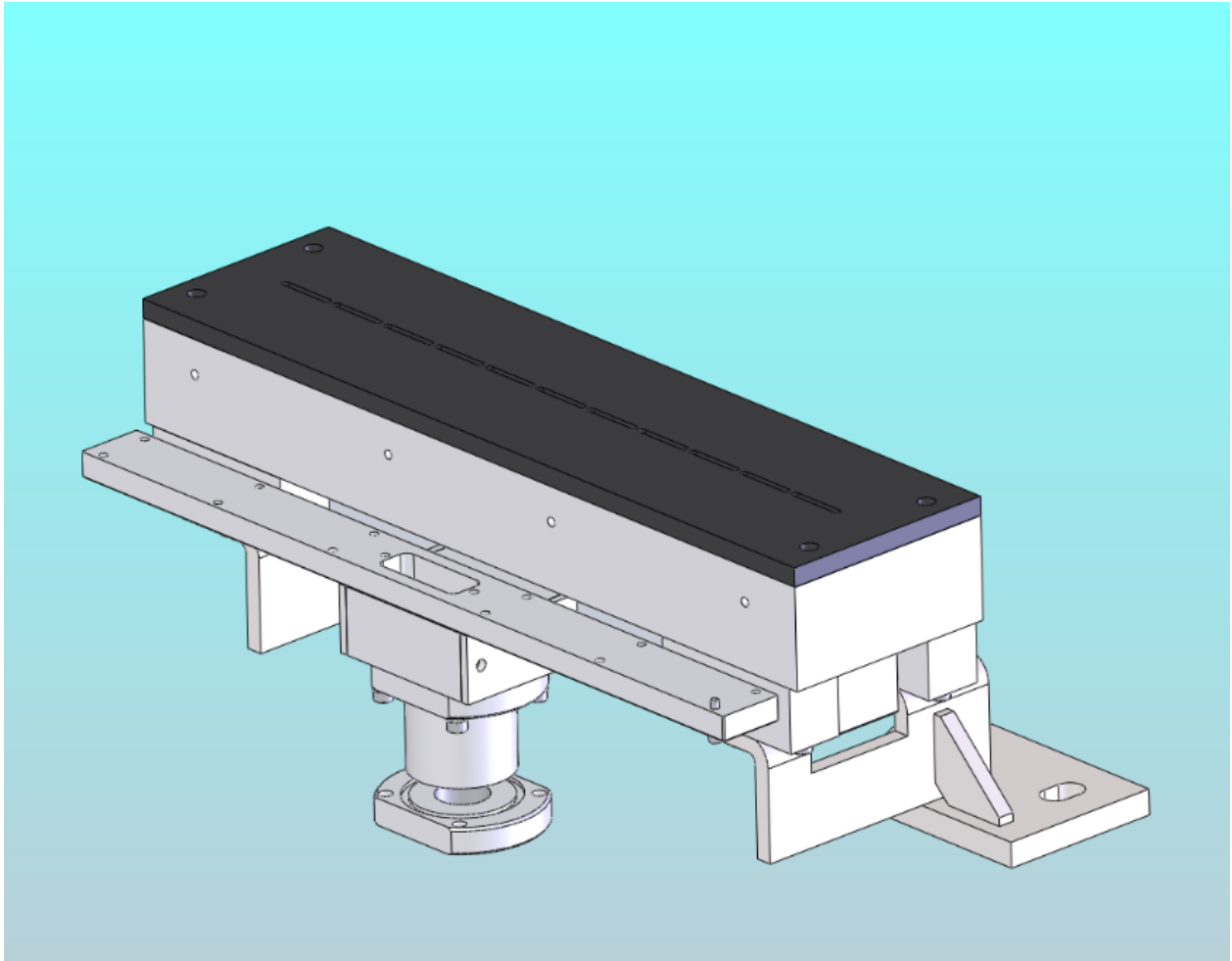

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Air Cooling

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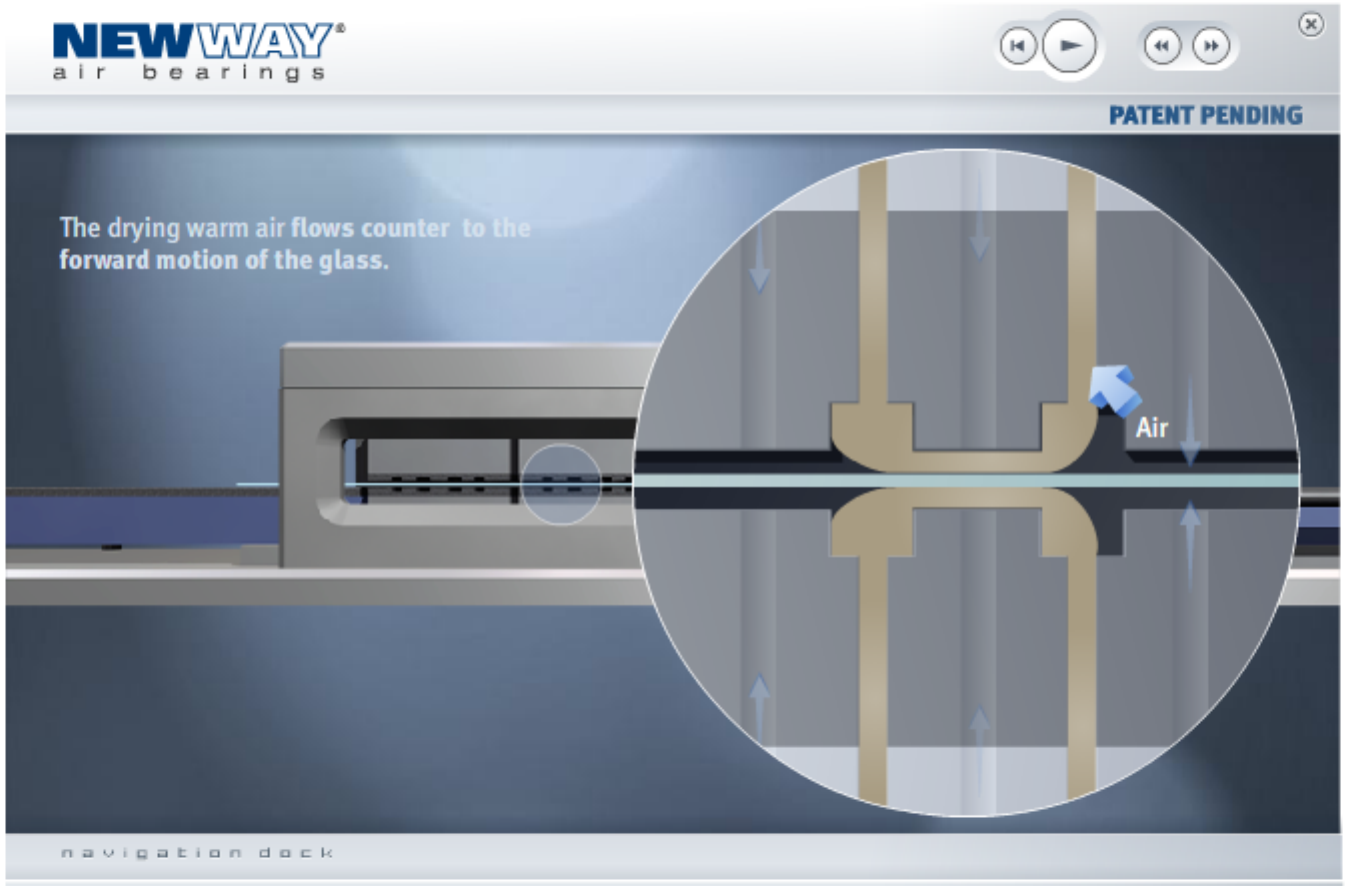

Typical Air Bar Specs

Frictionless Motion™

SPECIFICATIONS: 500mm Transition Zone Air Bar	#S22100C500
Fly Height Example microns (in)	80 (0.0032)
Input Pressure kPa (psi)	145 (21.0)
Input Pressure Flow SLPM (SCFM)	12.20 (0.43)
Input Vacuum mm H_20 (in H_20)	50.8 (2.0)
Input Vacuum Flow SLPM (SCFM)	8.2 (0.29)
Substrate Fly Height Range microns (in)	20 - 120 (0.0008 - 0.0047)
Fly Height Control microns (µ in)	±5 (197)
Air Film Stiffness N/micron (lbs/µ in)	0.04 (0.21)
Stability nanometers (µ in)	±5 (0.2)
Transition Zone Air Bar Size - Length mm (in)	505 (19.88)
Transition Zone Air Bar Size - Width mm (in)	100 (3.94)
Transition Zone Air Bar Size - Height mm (in)	42.85 (1.69)
Transition Zone Air Bar Weight kg (lbs)	2.15 (4.70)
Housing Material/Finish	aluminum/anodized
Porous Media Material	carbon
Bearing Face Surface Size - Carbon mm (in)	100 x 500 (3.94 x 19.69)
Bearing Face Surface Flatness mm (in)	0.025 (0.001)
Air Supply	bottom mounted manifold
Vacuum Supply	bottom mounted
Viable Pressure Range kPa (psi)	3.48 - 275.79 (0.5 - 40.0)
Maximum Allowable Pressure Supply kPa (psi)	275.79 (40.0)
Substrate Size	up through Gen 10 and beyond
Substrate Thickness mm (in)	0.3 and up (0.0118 and up)
Maximum Substrate Speed m/sec (ft/sec)	2.5 (8.2)

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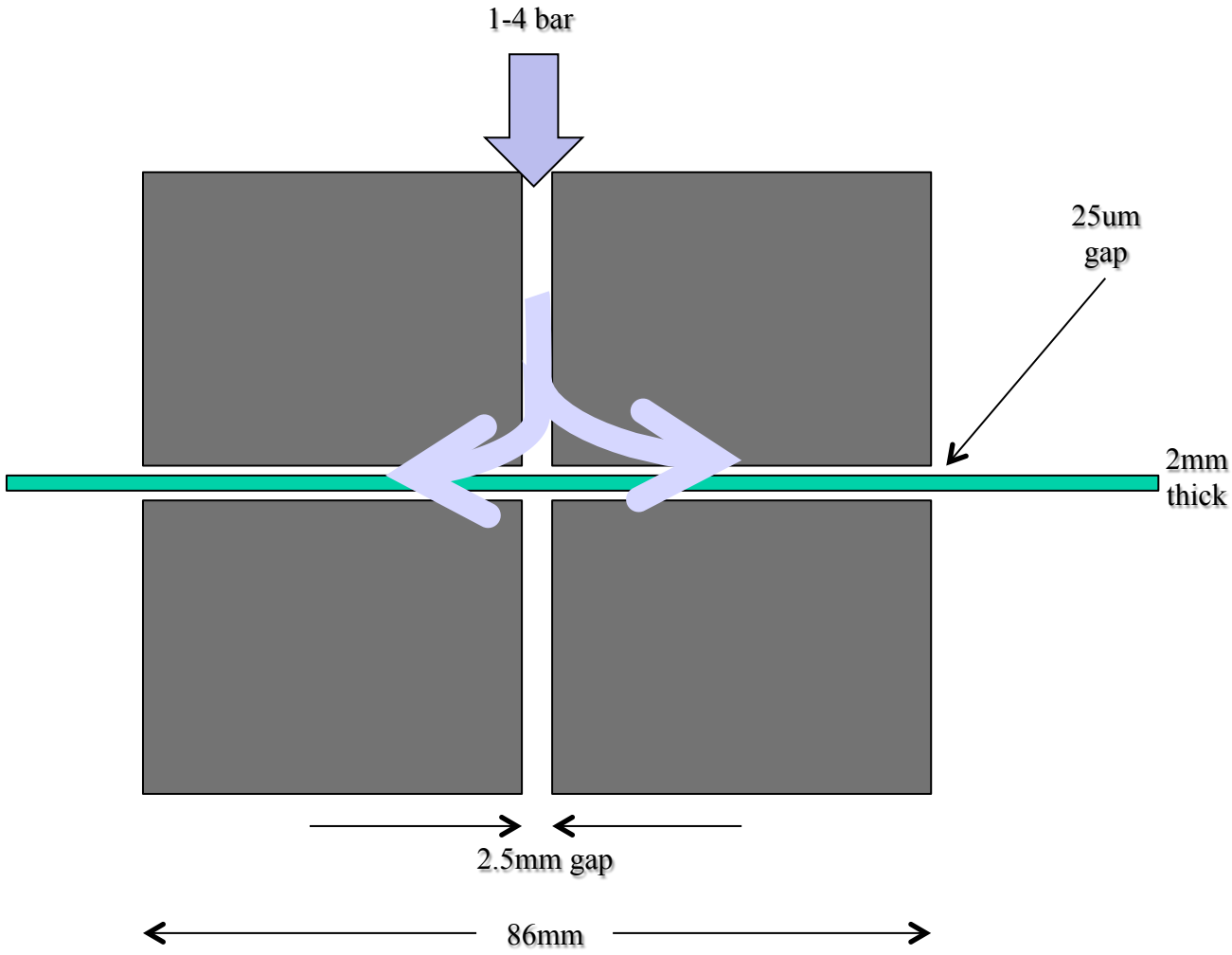
Basic Geometry



Questions

- What is the Cooling Thermal Convective Coefficient for various glass thicknesses in the Existing Quench Design?
- What is the predicted Cooling Thermal Convective Coefficient to temper 2 mm glass?
- What air pressure would we need to reach this value with the current design?
- What is the predicted coefficient at various pressures in the Air Bearing design?
- What is the input pressure and the air flow conditions (velocity, pressure) in the gap for optimal forced convection cooling to achieve tempering of 3 mm glass?
- What would be needed for 2 mm glass?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