

AGC European R&D Center



Marc Van Den Neste
Vice-President, CTO



AGC Glass Europe

A close-up photograph of a hand resting on a globe. The globe has a unique color palette, with shades of light blue, teal, and pale yellow-green. The hand is positioned on the right side of the frame, with fingers slightly curled. The background is a solid, light blue color. A dark blue horizontal band with a fine grid pattern is overlaid across the middle of the image, containing white text.

AGC

a global reach

AGC, a global company under a single brand

- ▶ Sales: more than EUR 11 billion
- ▶ 54,000 employees
- ▶ More than 200 companies in over 20 countries
- ▶ Headquarters and stock exchange listing: Tokyo



Munich football stadium, covered with ETFE plastic film.



Note: figures for 2006.

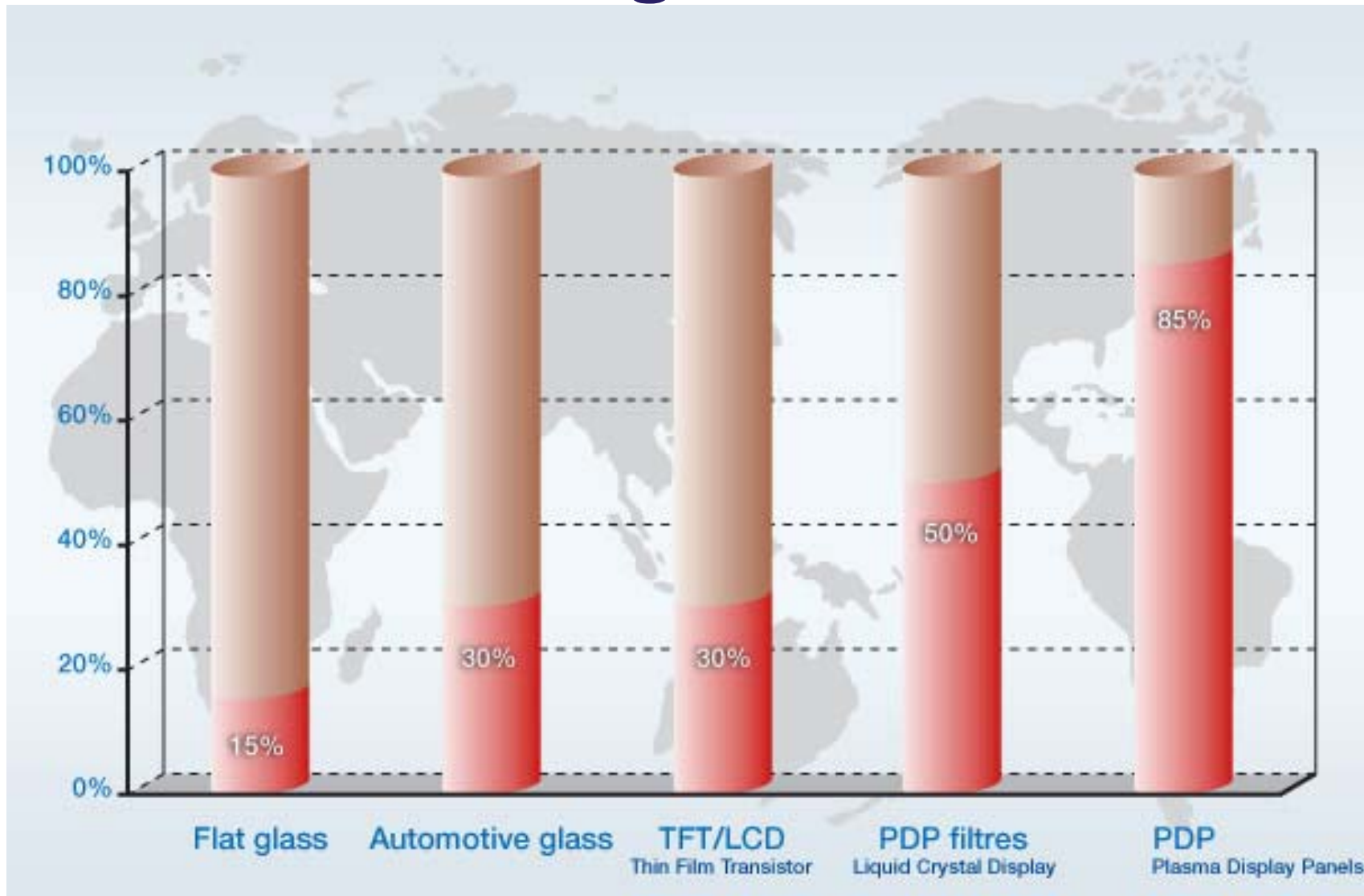
AGC, a global company under a single brand

World's leading glass manufacturer

	North America	Europe	Asia
	GLASS	GLASS	GLASS
AGC Glass (Brussels)	<u>Flat Glass</u> • 7 floats • R&D Centre • 4,500 employees	<u>Flat + Auto Glass</u> • 18 floats • 7 Auto Glass plants • R&D Centre • 15000 employees	<u>Flat</u> • 15 floats • R&D Centre • 11,300 employees
	<u>Automotive Glass</u>		<u>Automotive Glass</u>
	ELECTRONICS	ELECTRONICS	ELECTRONICS AND DISPLAYS
	CHEMISTRY	CHEMISTRY	CHEMISTRY
			OTHER: Refractories, engineering, etc.

Note: figures for 2006.

AGC, leader in glass





AGC Glass Europe

a major European glass producer

Flat Glass... from Spain to Russia

Flat Glass:

- ▶ No. 1 in Russia, Central Europe, Italy and the Benelux countries
- ▶ 18 floats
- ▶ ± 100 production sites
- ▶ Leader in high-tech & value-added glass products
- ▶ Worldwide sales network
- ▶ 10,000 employees

AGC Eu R&D Centre

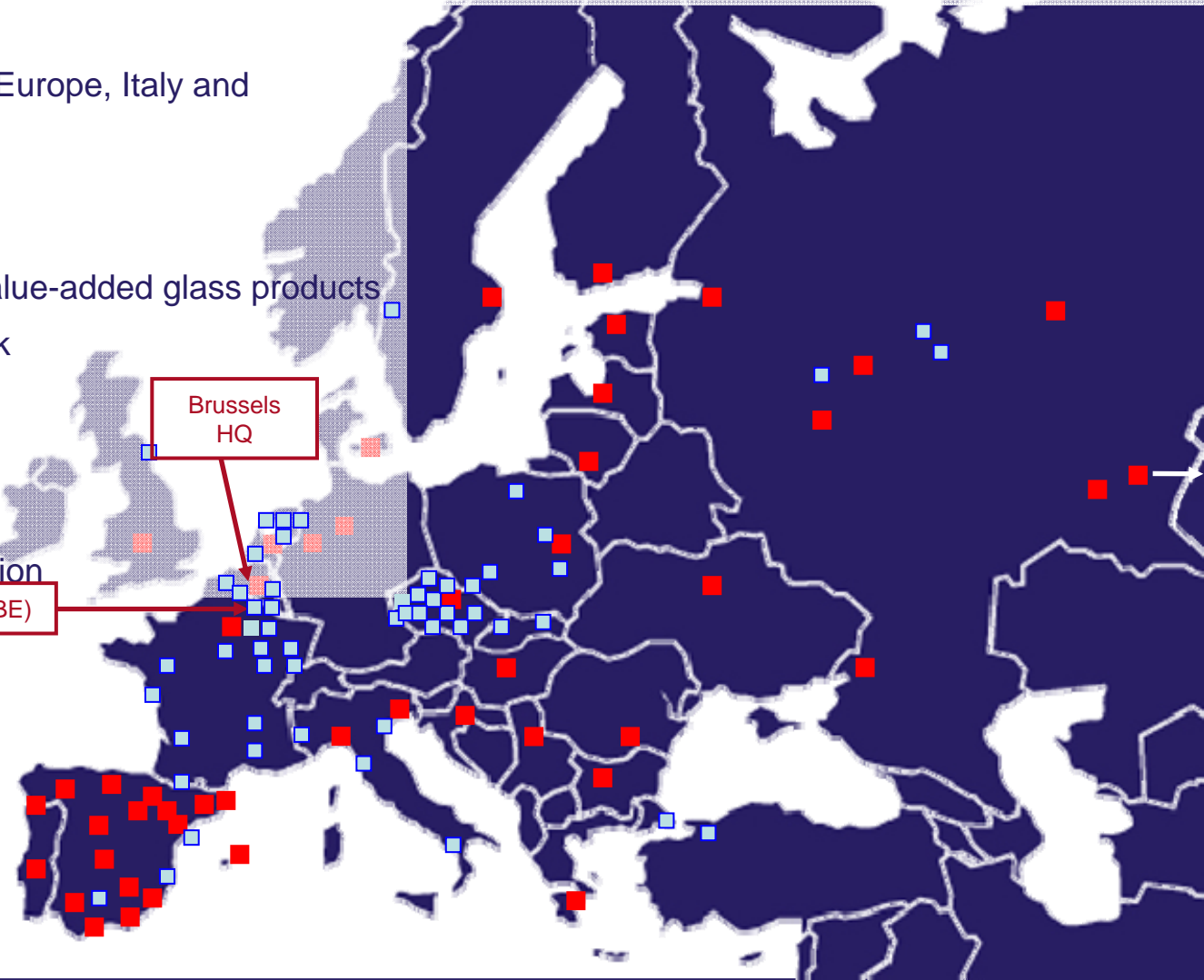
▶ Sales: approximately EUR 2 billion

R&D Centre (BE)

Brussels
HQ

■ Production

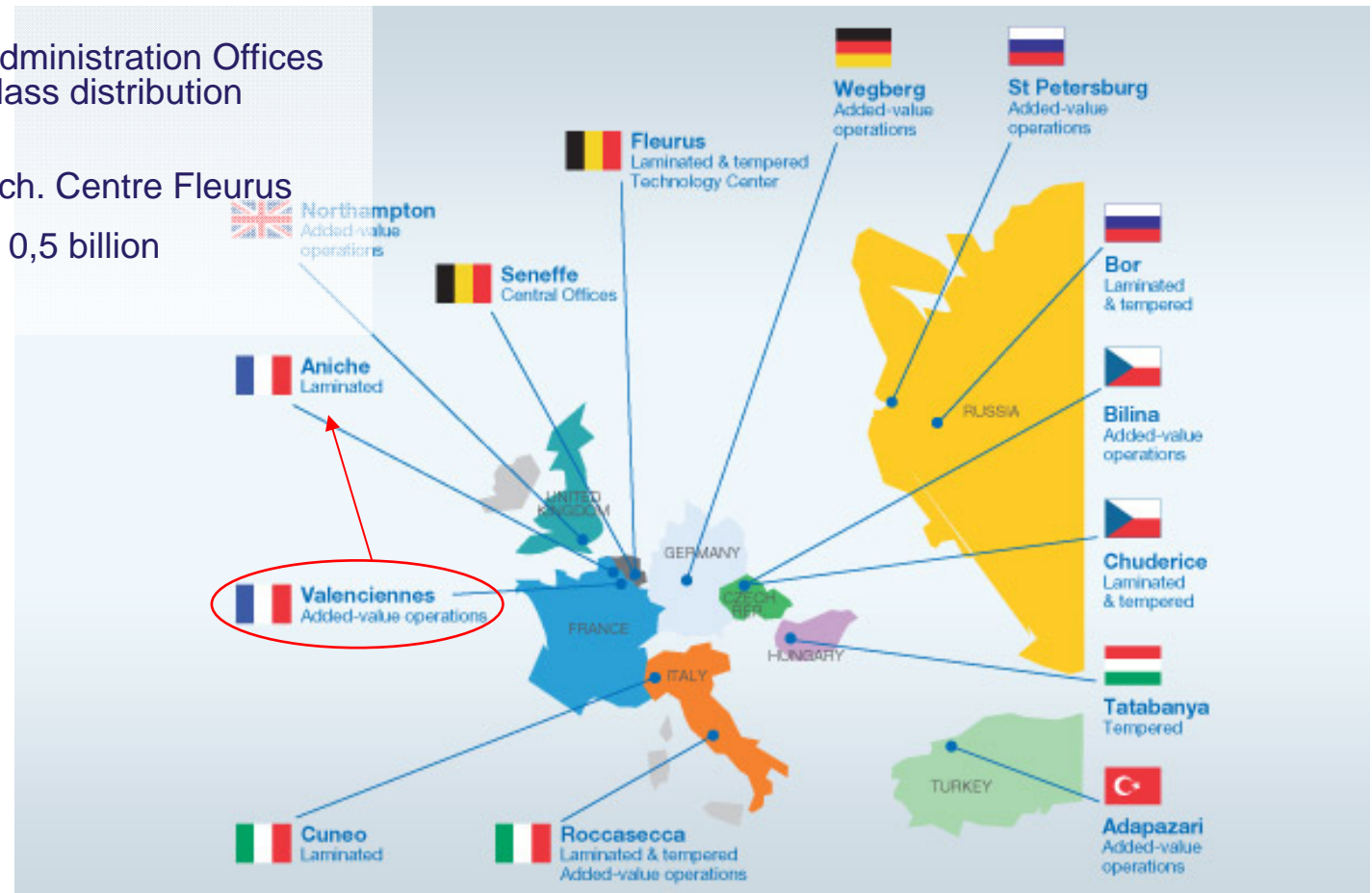
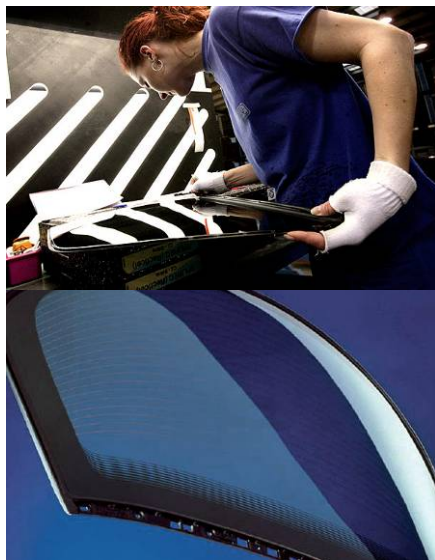
■ Sales



...Focus on Automotive Glass

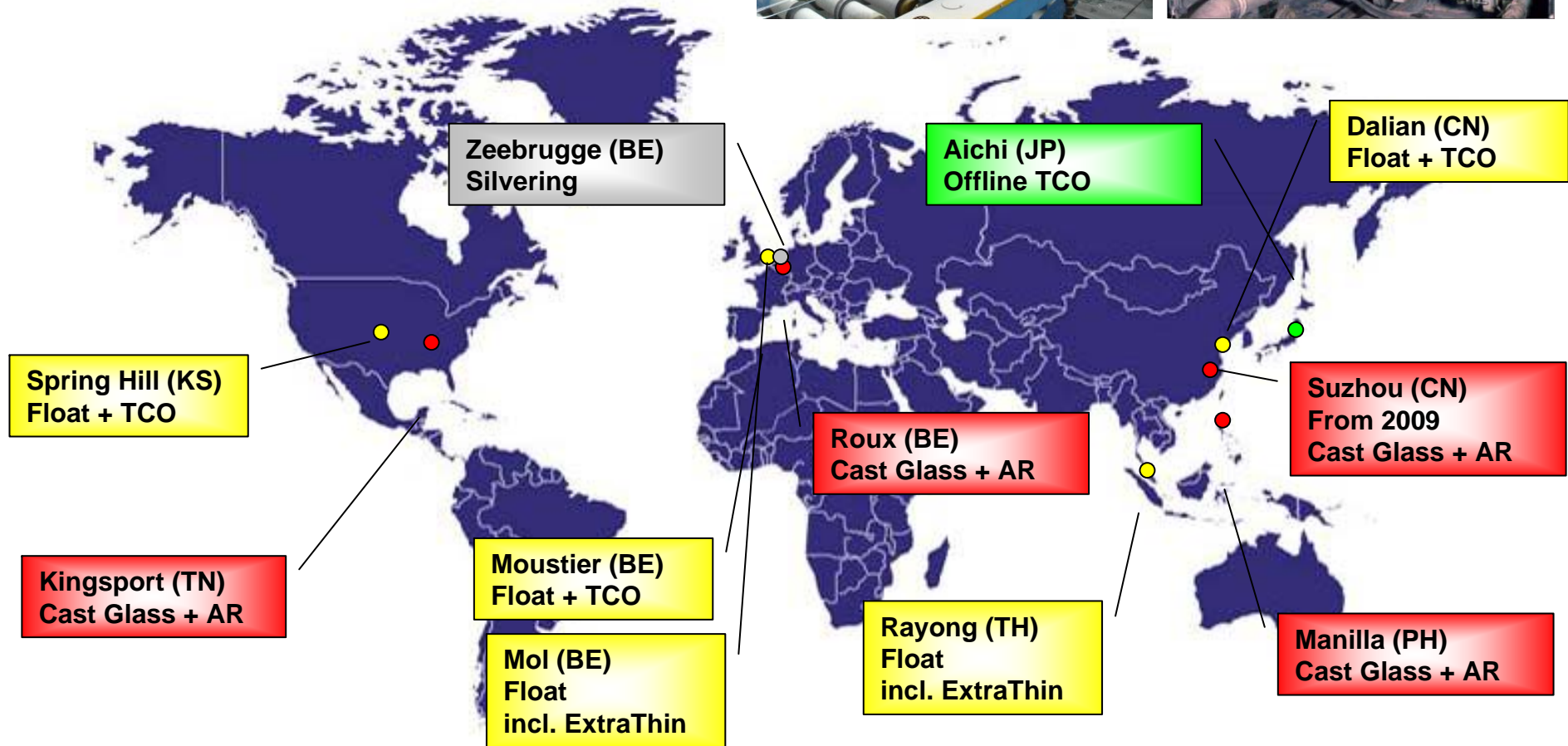
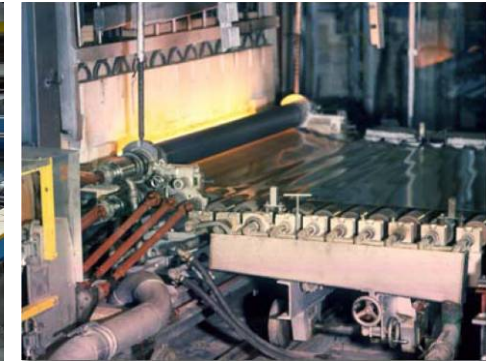
Automotive

- 7 Glass Plants
- 7 "AVO" Plants (Added Value Operations),
- +/- 30 Customers Administration Offices and replacement glass distribution centers
- AGC Eu R&D Centre + Tech. Centre Fleurus
- Sales: approximately EUR 0,5 billion



AGC Solar

Production capacities





AGC Glass Europe

innovationunlimited

Applications – range – construction – decoration

focusing on clients



Glass applications: constant progression

“50 % of the products that will be marketed in 10 years do not exist today.”

Comfort and energy control

- Coated glass, reinforced protection from cold and/or heat
- Glass for solar energy applications

Aesthetics

- Glass for facades and interiors: transparent, coloured, reflecting, mirror, varnished, patterned, screen-printed, matt, electroluminescent, etc.

Health and safety

- Safety glass – tempered and laminated – protection of people and goods.
- Fire-resistant glass
- AntiBacterial glass

Well-being

- Sound insulation glass

Multipurpose: a combination of various uses



An unparalleled product range to satisfy both needs and desires

- ▶ Float
- ▶ Architectural glass
 - ▶ Coated glass
 - ▶ Laminated glass
- ▶ Decorative and interior glass
 - ▶ Patterned glass
 - ▶ Mirrors – varnished glass
 - ▶ Fire-resistant glass
- ▶ Glass for solar energy applications
- ▶ Glass for specialised industries
 - ▶ Glass for trains, trams, boats, household electrical appliances, high-tech applications, etc.



Architectural solutions

- ▶ **Aesthetic, technical and energy-efficient properties;
a source of inspiration for architects**



Interior design

- ▶ A collection of coloured, translucent or opaque glass in a stylish, trendy environment



Glass Solution for the Solar industry

Solar Photovoltaics			Solar Thermal	Concentrating Solar Power (CSP)
Crystalline	CIGS	Si / CdTe		



AR	(AR)	AR	
Low Iron	Clear and Low Iron		Low Iron
Float and Patterned	Float	Float and Patterned	Float (incl. ExtraThin)
	TCO	AR	Silvering

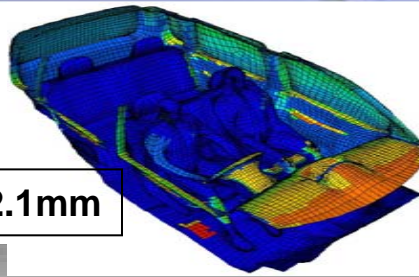


Automotive solutions



SDARS On-Glass
Antenna

IRIS WS 2.1+2.1mm



Normal



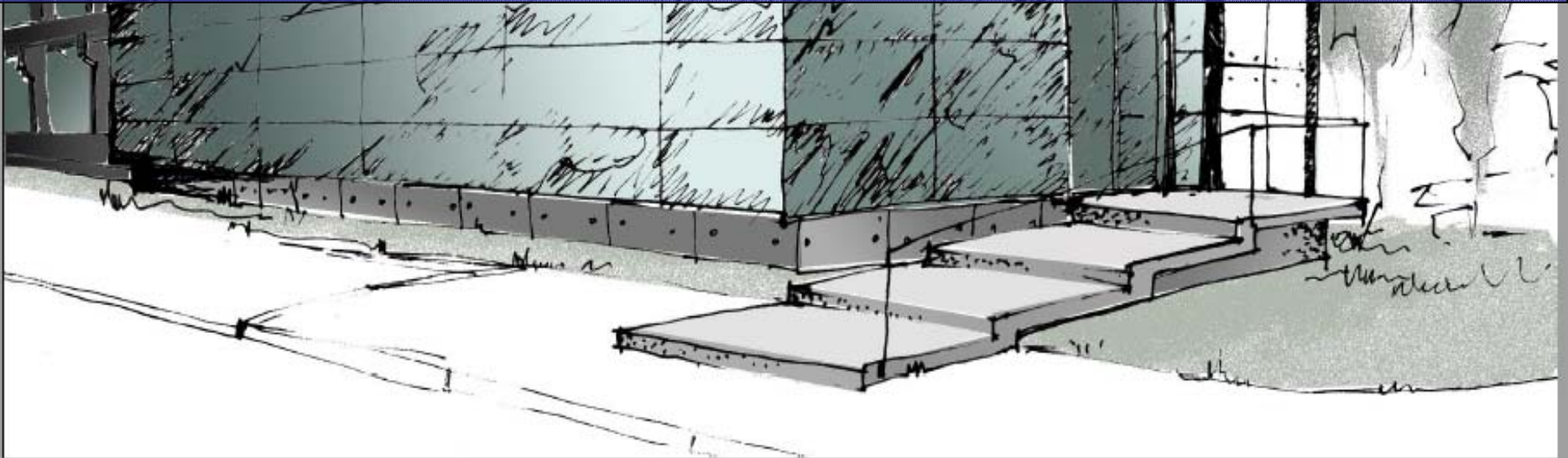
Water repellent

- A wide range of advanced solutions and services, anticipating customers demands for energy savings, specific design and improved comfort...

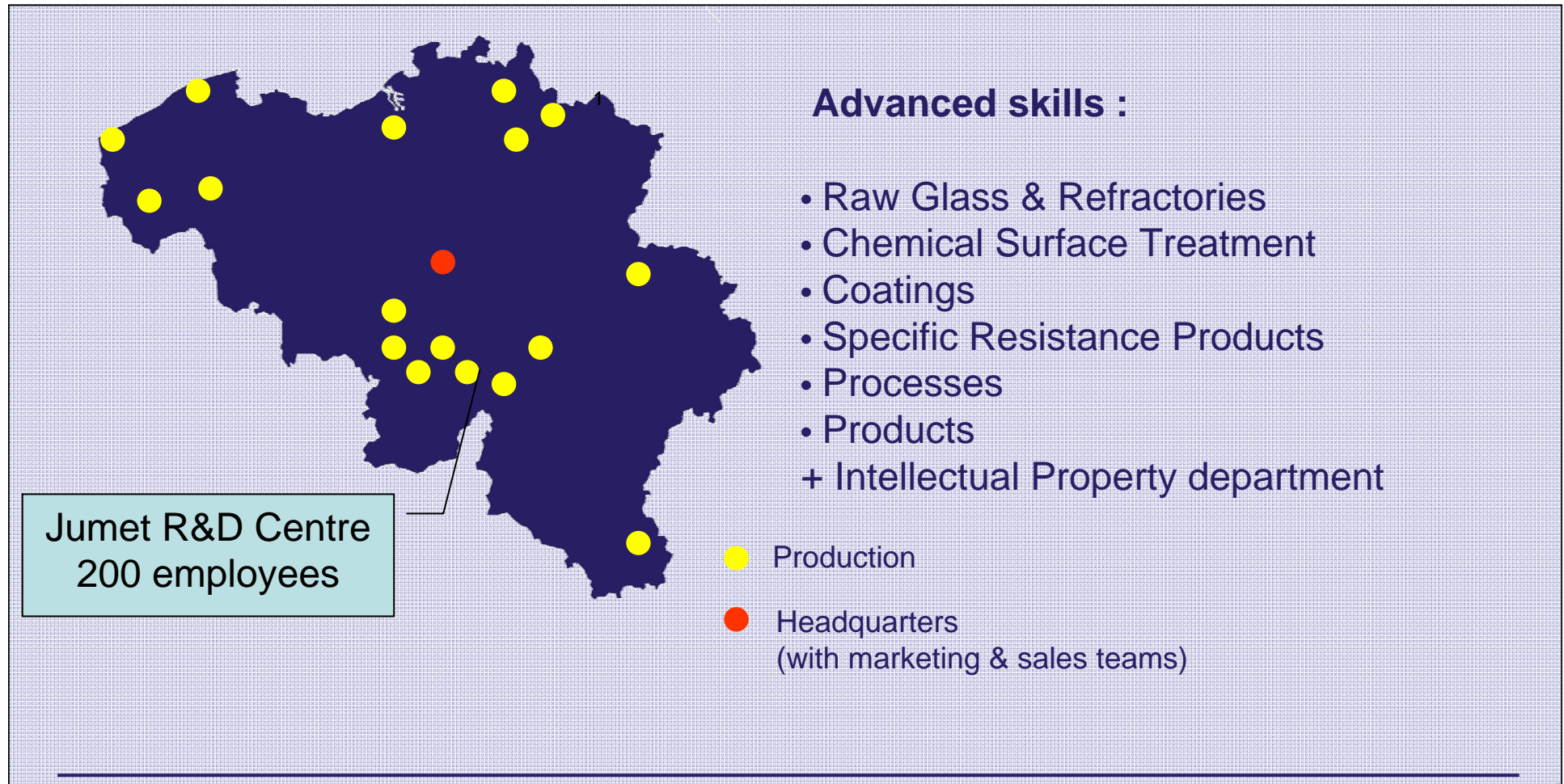


AGC Flat Glass Europe R&Dunlimited

European R&D Centre



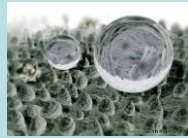
R&D Centre in close touch with market and industrial developments





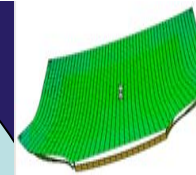
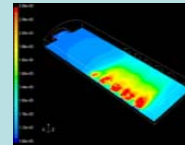
Chemical Surface Treatment

- Surface cleaning and protection
- Decoration (Organic/inorganic coating, acid treatment, digital printing...)
- Surface functionalization
 - Mirrors
- Extra-thin glasses



Processes & Glasstronics

- Physical and mathematical simulation (melting, forming, tempering, structure)
- Glasstronics (defect detection, opto-electronics, Glassiled...)



Analysis

- Chemical analysis
- XRF, XRD, SEM-EDX
- Optical microscopy,
 - IR-analysis
- Mechanical tests
- ...

Glass and Refractories

- Glass composition
- Refractory materials



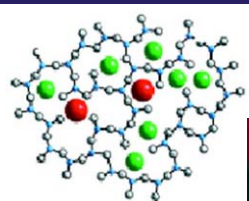
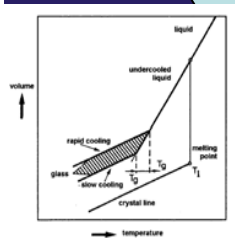
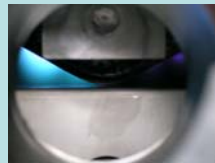
Archi & Auto

- Architectural glazing
- Laminated glazing
- Toughened glazing
- Fire resistant glass
- Automotive glazing



Coatings

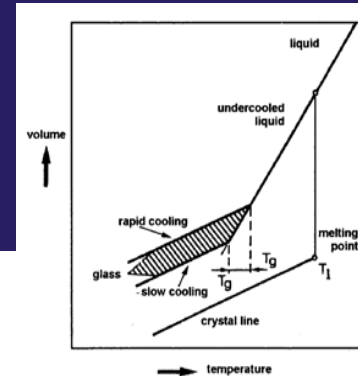
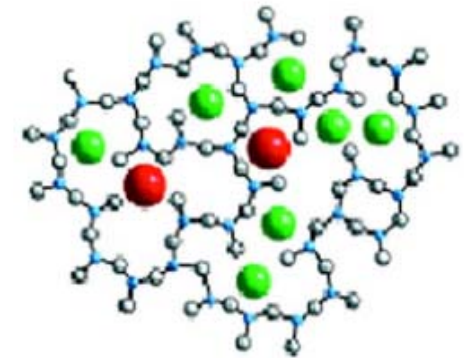
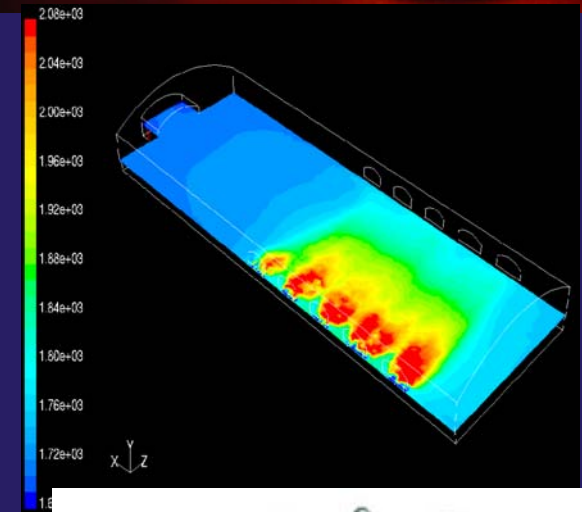
- Vacuum coatings
- Pyrolytic coatings



Leading R&D projects

Flat Glass : Melting & Processes

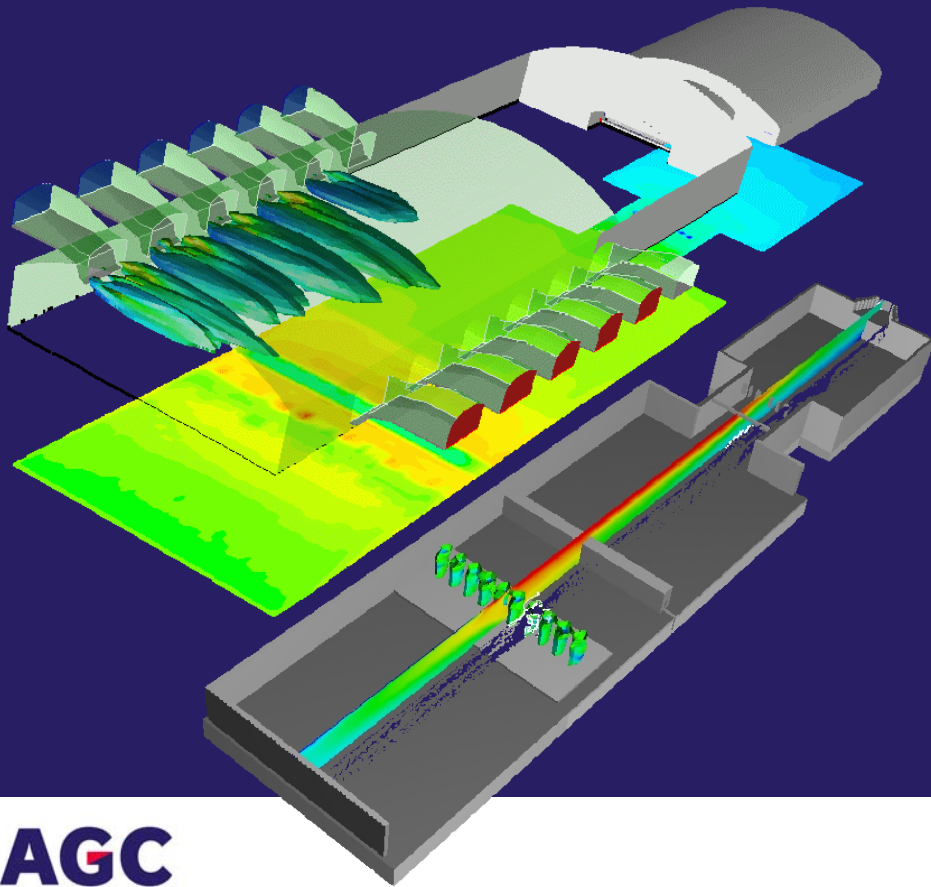
- **Reduction of energy consumption**
 - Modify composition and or raw materials
 - Improved setting and design through numerical simulation
 - up to 1000 T/day
 - New Combustion technology
- **Float Process**
 - Optical quality
- **Process analysis**
 - Flow
 - Thermic
 - Chemical reactions
- **Design of new lines**
- **Development of new type of glasses**



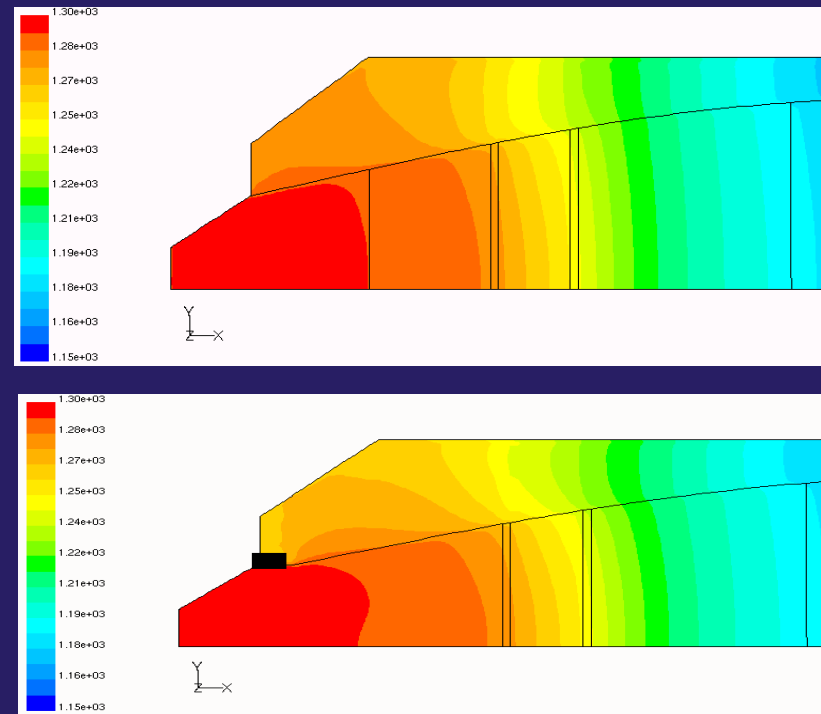
Leading R&D projects

Flat Glass : Processes

Glass Bath, Combustion Space Numerical Simulation



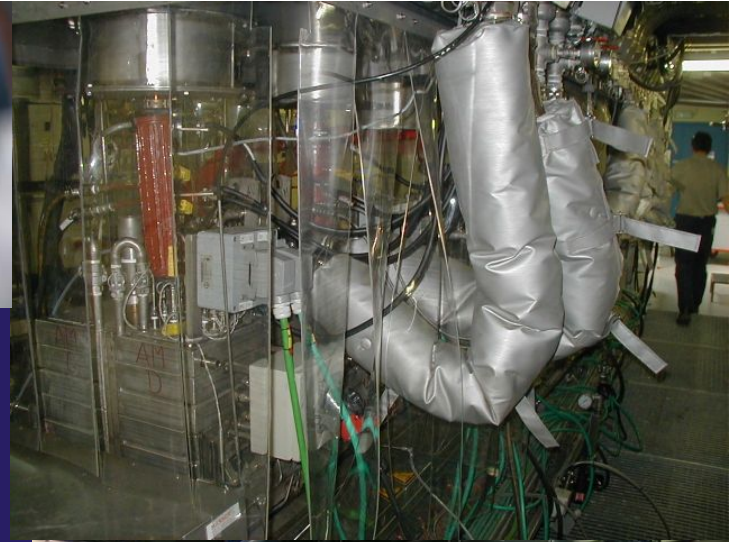
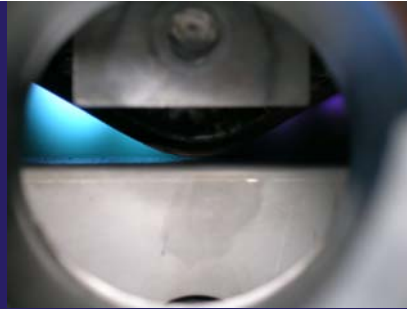
Float (Tin) Bath Numerical Simulation



Leading R&D projects

Flat Glass : Coating

- **Hard coatings for :**
 - Solar control
 - Low E
 - TCO
- **Soft coatings**
 - Solar control and Low E sputtered coating
 - with high selectivity (~ 2)
 - Low E
 - TopN+
 - Temperable coating
 - TopN+T
 - Energy NT
 - Vision 50T
 - Vision 60T



Leading R&D projects

Flat Glass : Mirrors and functionalized glass

Mirror:

- Copper free mirror → Mirox New Generation
- Copper and lead free mirror (<0.5%) → Mirox New Generation E
- Copper and Zero lead mirror for automotive application (0%)
- ROHS mirror & formaldehyde free → 3G Mirox



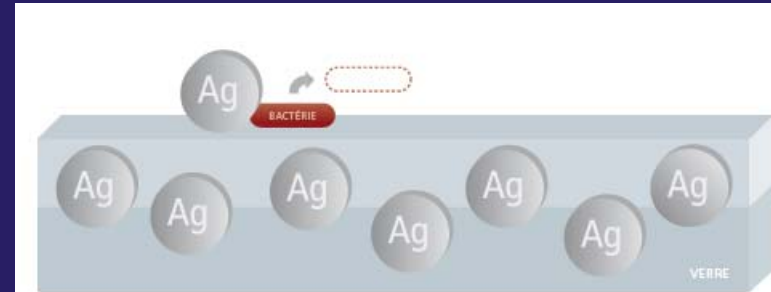
Acid treated glass

- Anti-slip (floor applications)
- Anti-reflective
- Anti sparkling glass for touch panel
- Decoration (matelux)

Leading R&D projects

Flat Glass : Mirrors and functionalized glass

- **Hydrophobic, hydrophilic, self cleaning,...**
- Anti-bacterial
- Easy or self-cleaning glass
- ...
- **Decorative glass**
- Lacobel wall cladding
- Matelac



2008 commercialization

Example of a big success

Matelux Anti-slip

Open-air dancing floor in Pilsen,
Czech Republic



2008 Commercialization Examples of VERY SERIOUS successes

AB Glass



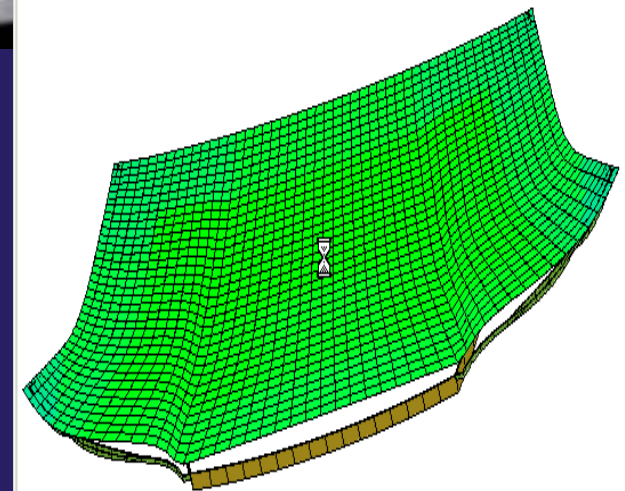
Leading R&D projects Automotive Glass

Colored glass

- Green glass Atherplus
- Blue glass Azurplus
- Blue glass Atherblue
- Dark grey glass

Integration of function (up to the vision)

- Safety & Security (laminated SL, HUD,...)
- Acoustical comfort
- Thermal comfort (Iris, privacy glass,...)
- Defrosting and Anti-raining (HCWS)
- Complex shapes
- Recycling of glazing



AGC

Leading R&D projects Fire-resistant Glass

Improved fire resistance

- No flames
- Low radiation
- Surface temperature $< 140^{\circ}\text{C}$
- During up to 2 hours !

Increased tested dimensions

- Up to 1,4 x 2.9 m



Leading R&D projects Architectural

Structural glazing with improved thermal efficiency

Innovation → Ar filling + warm edge spacer

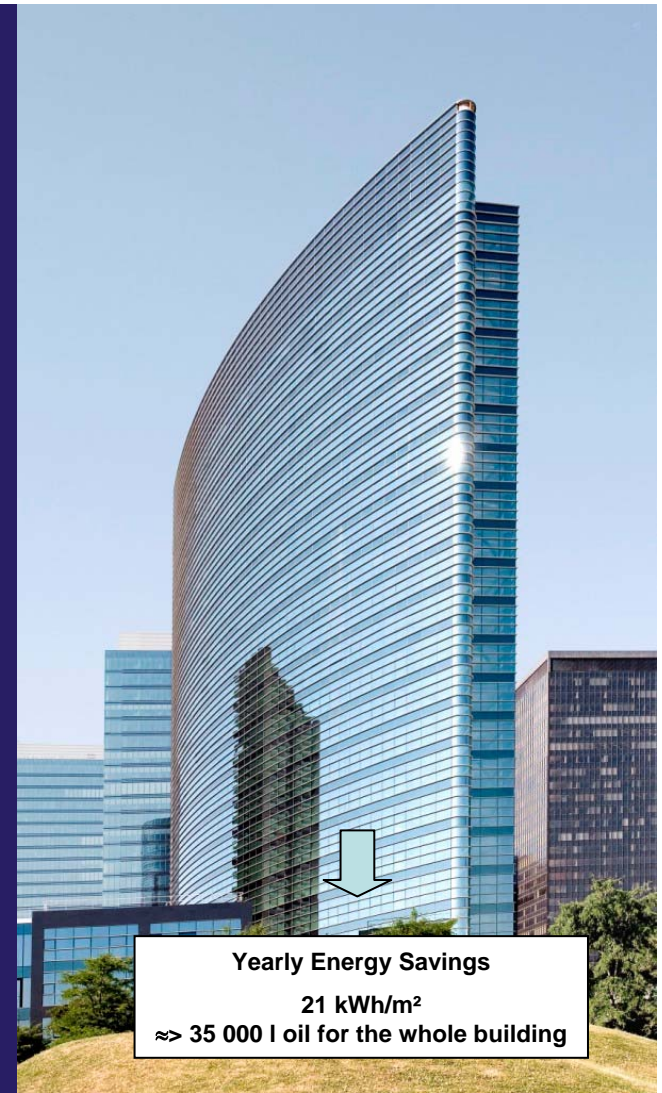
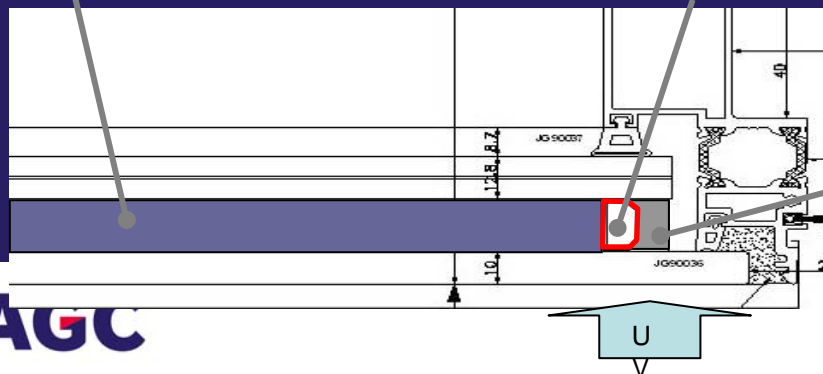
Through the understanding of

- materials behaviour
- components selection
- design definition of peripheral joint

Gas filling : Argon

Spacer : Warm-edge

Sealant : silicone



Yearly Energy Savings
21 kWh/m²
≈ 35 000 l oil for the whole building

First building :
ILOT 65/Brussels

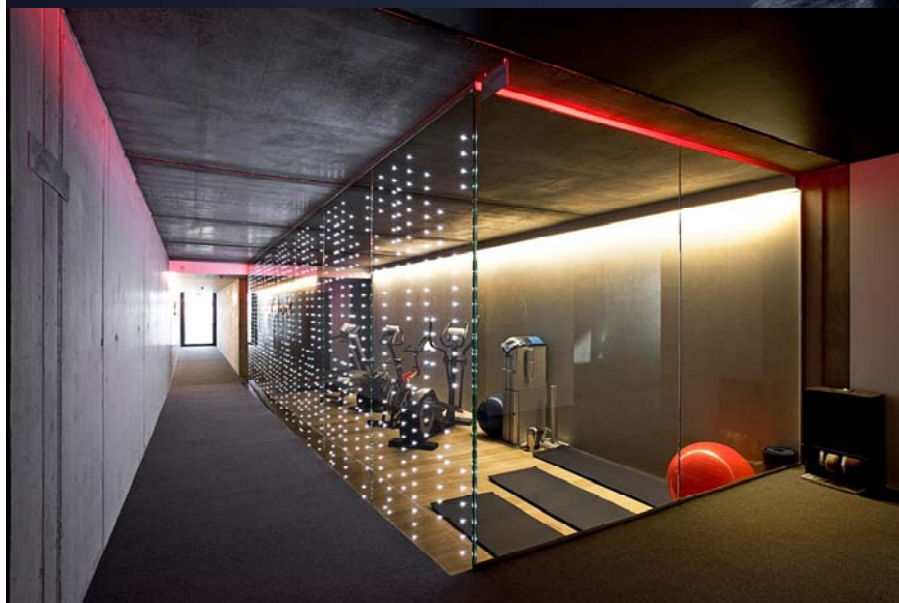
Leading R&D projects Glasstronics

Glassiled

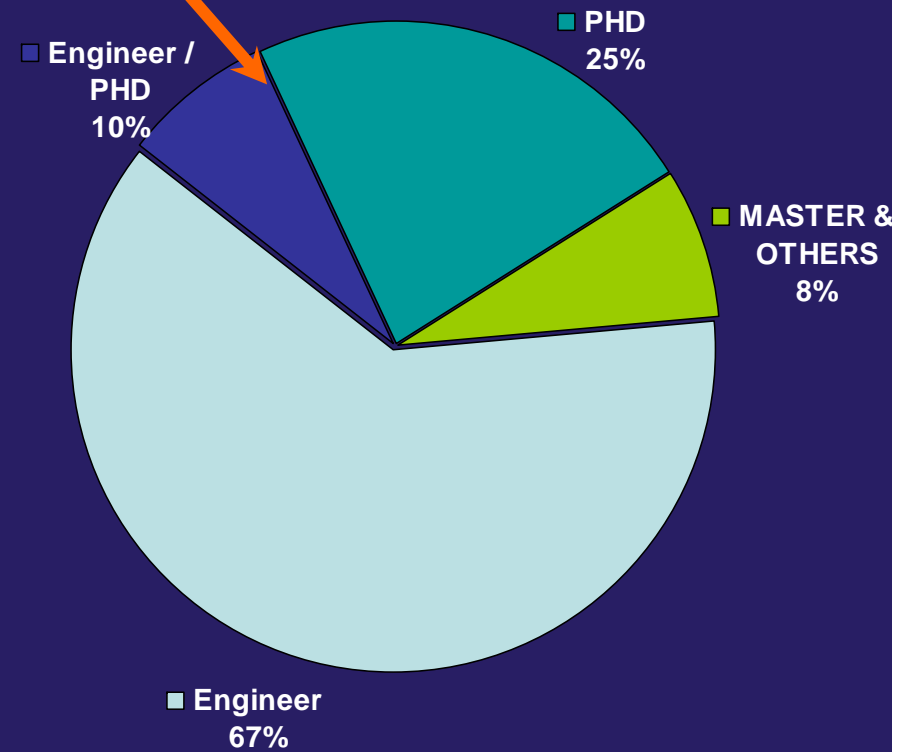
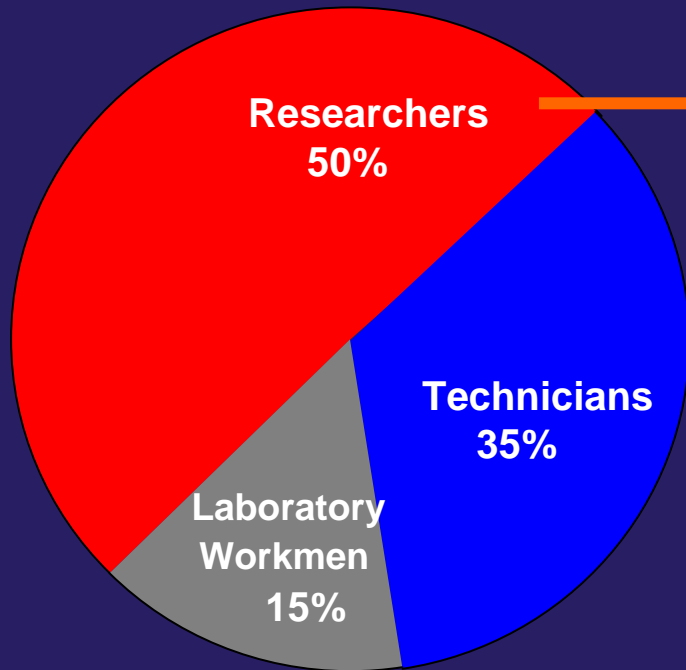
- Shelves
- Partition wall
- Façade & conservatories

Glasstronics

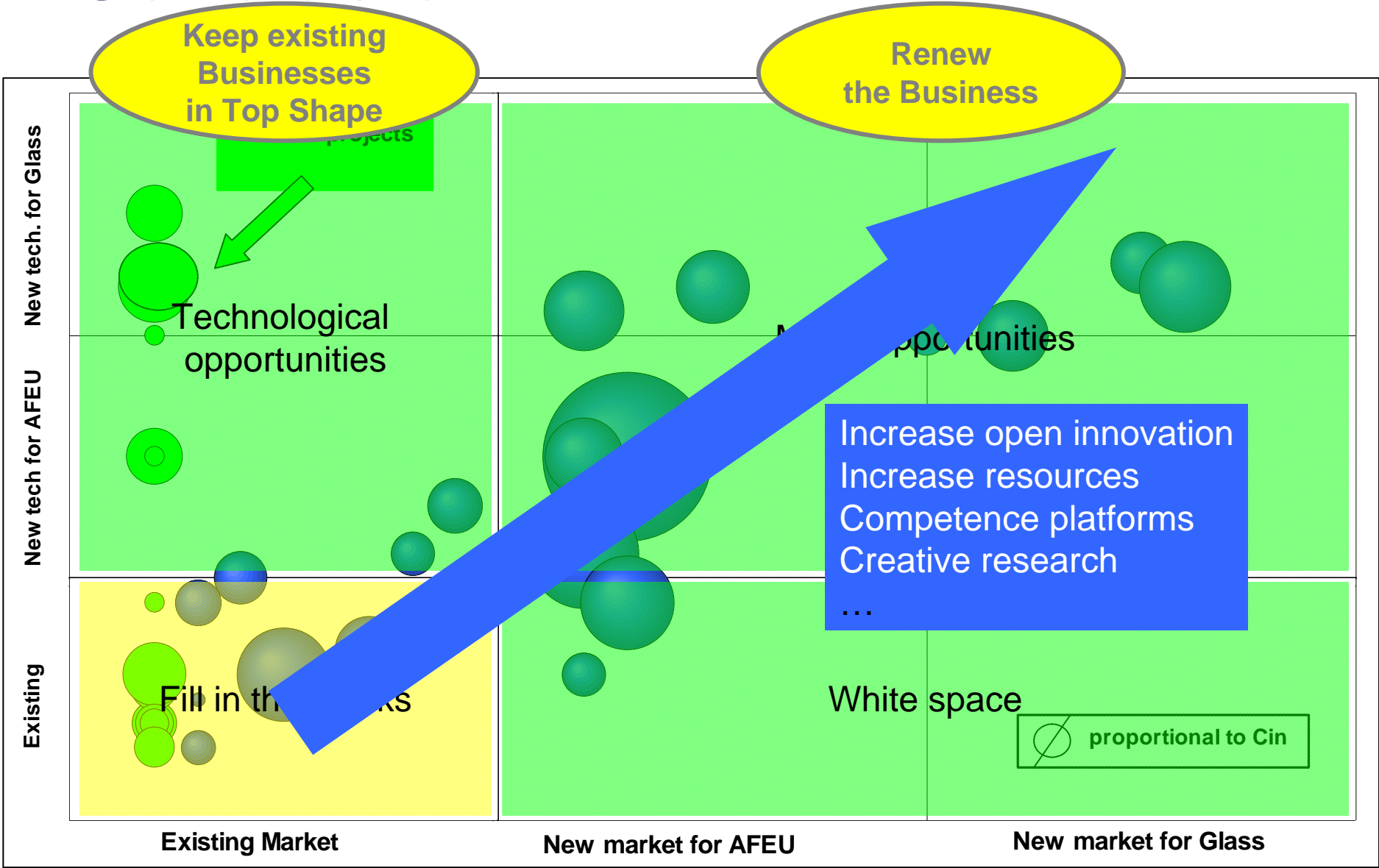
- OLED
- Soundglass



... thanks to 200 skilled people



Conclusion



GLASS UNLIMITED

- Thanks to responsible people listening to clients in an ever-changing world.

