

Hard Glass Project



GLASSMAN AMERICA September 11th, 2013



Outline of Presentation

Introduction to Hard Glass Process

What is Hardglass?

How is it done industrially

Test results

Applications

Implementation and Commercialization



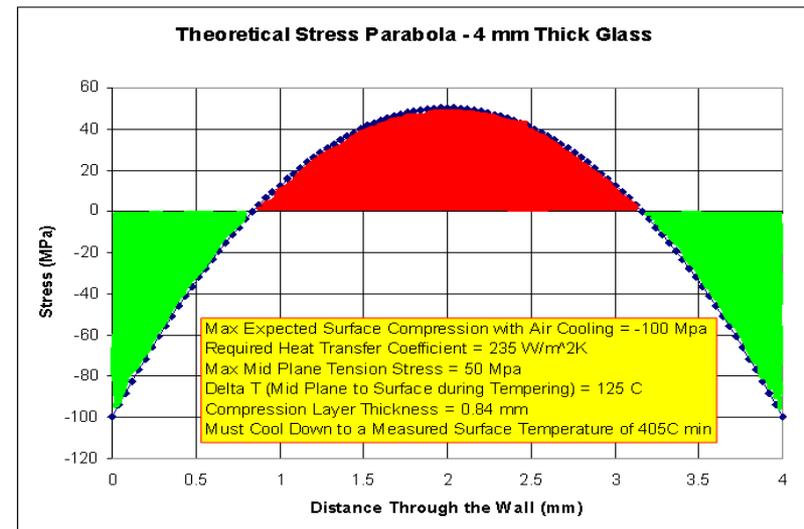
1. What is Hardglass?

- Hard Glass is the application of the typical tempering process in use in the flat glass industry to a Glass container.
- It encompass the use of a proprietary technology developed by Emhart in its R&D center in Windsor CT, USA



An engineered stress profile

- Hardglass container is heated to 530 – 550 °C followed by rapid cooling to 200 – 220 °C
- This results in a compression-tension-compression sandwich
- Breaking resistance is increased
- Compression layer thickness is theoretically 21 % of the overall wall thickness. So 42 % of the glass is in compression and 58 % is in tension





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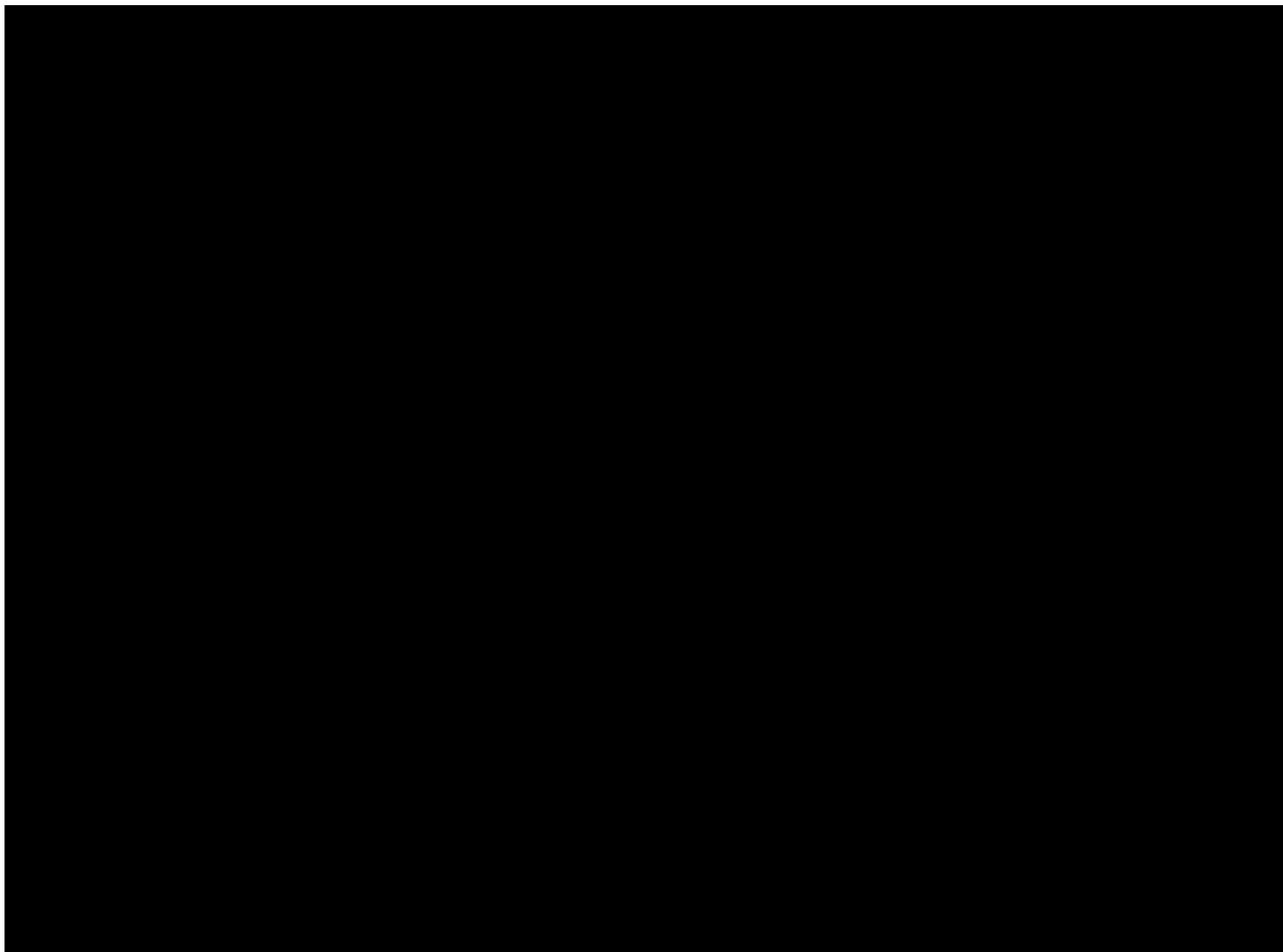
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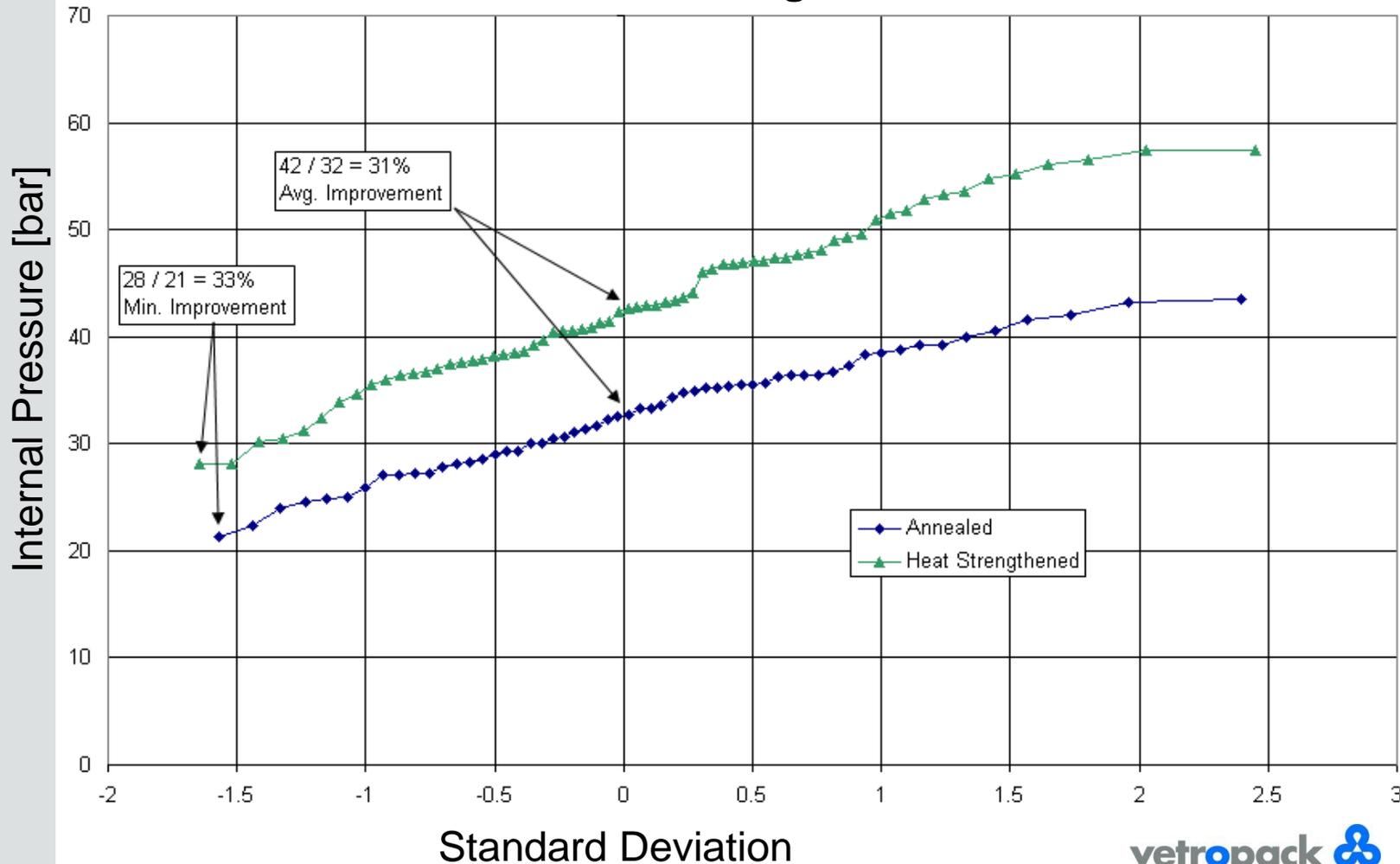
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30% Increase of Average Internal Pressure

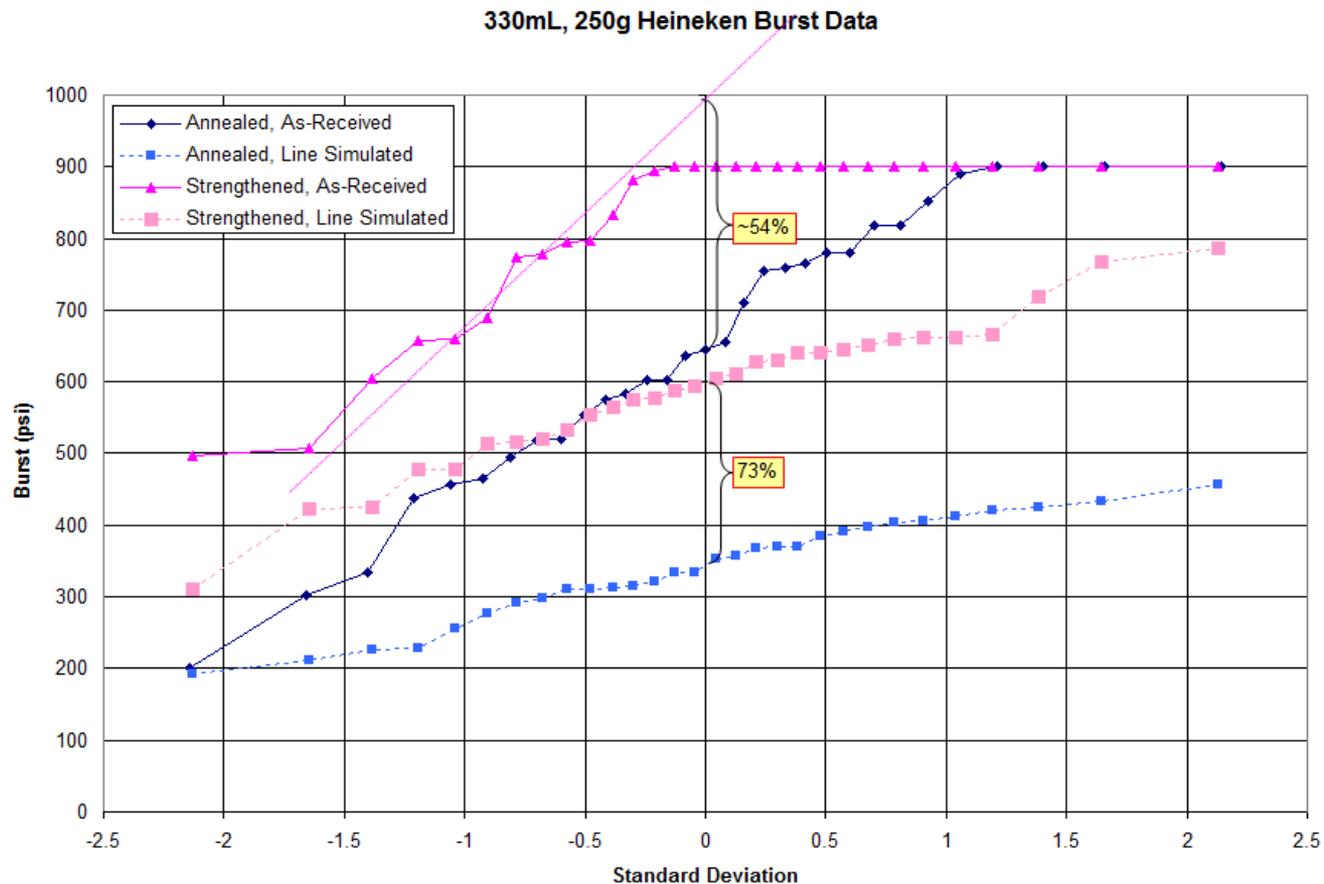
200ml / 130g Bottle





330 ml beer – Burst test (250 g)

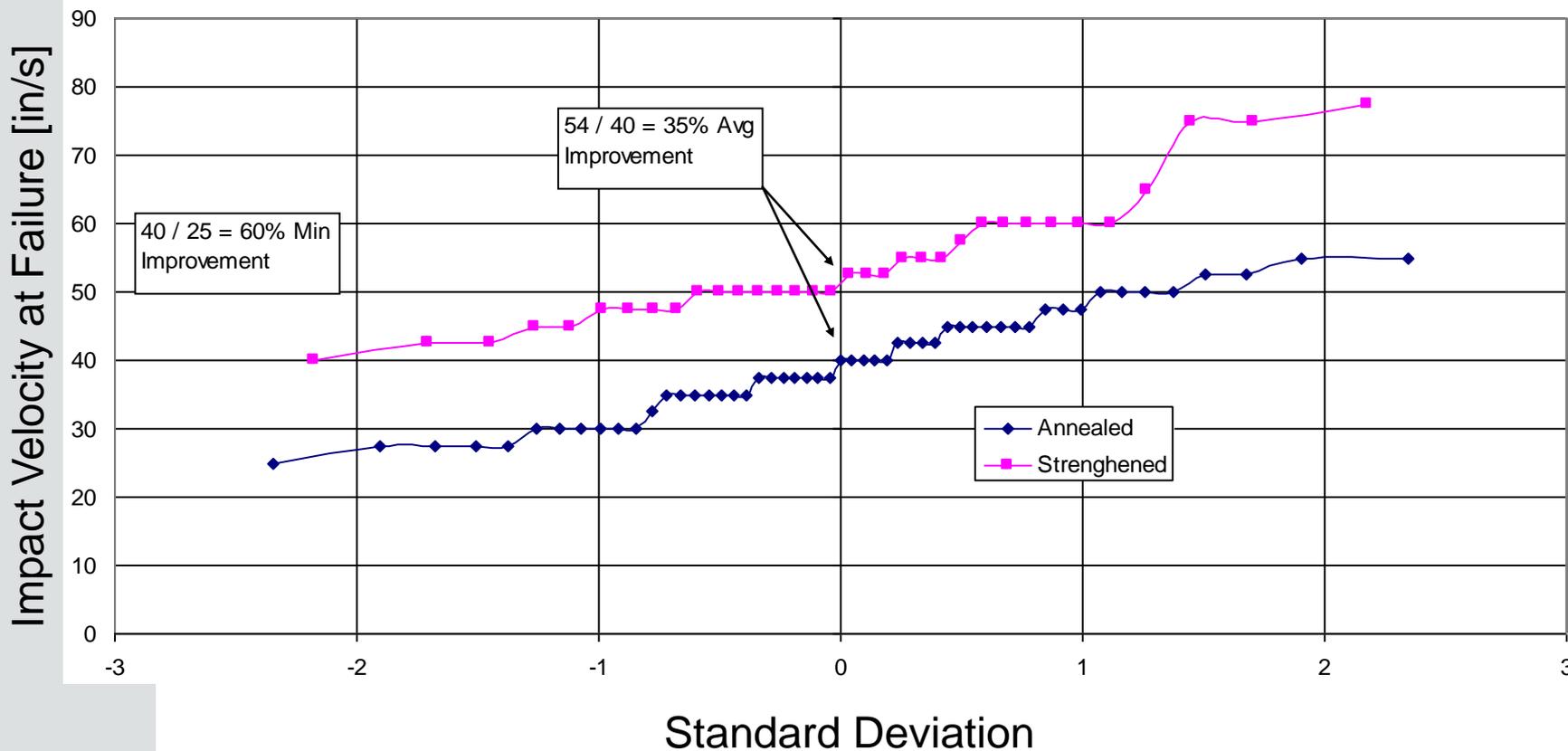
Before and after line simulation. Returnable use bottle





35% Increase of Average Impact Results

200ml / 130g Bottle





Glass Containers improvement potential

Annealed Nutella Jars

- Annealed is a standard jar from shelf
- HG is same jars after hardening and refilling



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Advantage for Fillers and End Users

- Weight Reduction
 - Lighter returnable (1-way container as returnable?)
 - Lighter 1-way containers
 - Reduction of carbon footprint
- Increased Strength
 - New marketing possibilities
 - Optimization of packaging, e.g. no cardboard box dividers
 - Enhanced filling line performance
 - One step towards unbreakable glass



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Implementation and Commercialization

- Market launch as joint project between Emhart Glass and Vetropack
- 50 bpm line installed at VETROPACK Pöchlarn plant in Austria
- Pilot Production started July of 2013
- Strong interest from Vetropack's key customers
- After successful introduction, implementation of in-process line

A close-up photograph of a green, textured surface, possibly a leaf or a piece of paper, with several water droplets. One large, teardrop-shaped droplet is prominent in the upper right, and a smaller one is to its left. Below them, a larger, more complex droplet has formed a three-lobed, clover-like shape. The background is dark, making the green surface and the clear droplets stand out.

For any additional
information please contact.

Dr. Marcello Montisci at:

marcello.montisci@vetropack.ch