How to handle light weight bottles, still and sparkling.

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Date and Location: Winery Engineering Association Conference

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Differences in the Manufacturing Process

Light weight bottles – methods of manufacture

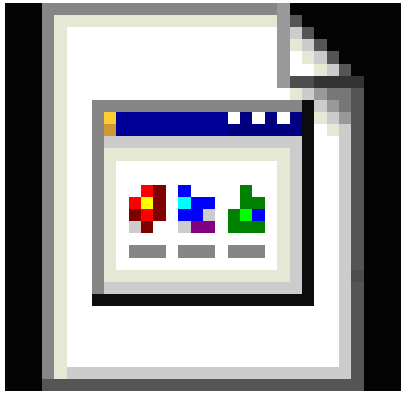
Blow & Blow (BB)

vs.

Narrow Neck Press & Blow (NNPB)

Information contained herein is strictly confidential.

Blow n Blow Process



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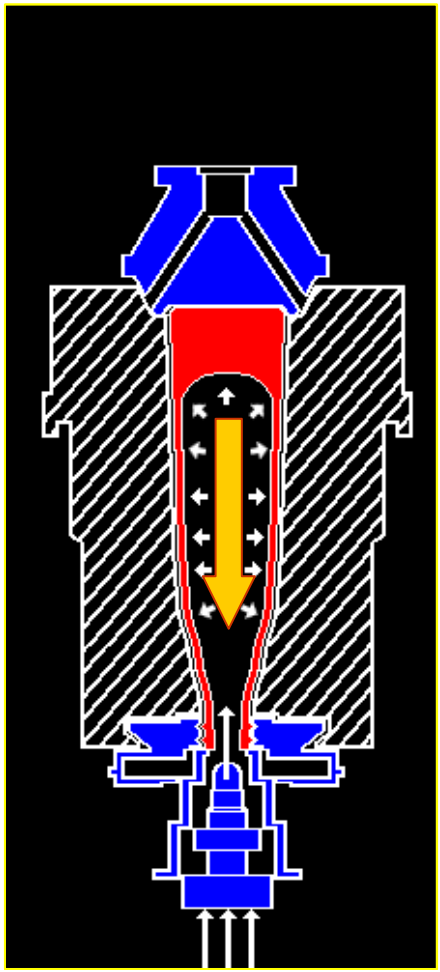
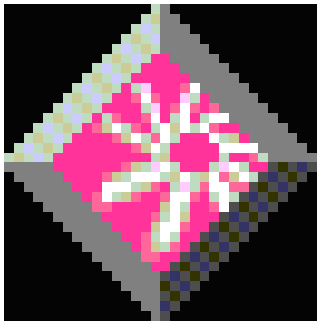
Blow and Blow Process

- Gob entry
- Settle blow
- Counterblow



Press n Blow Process



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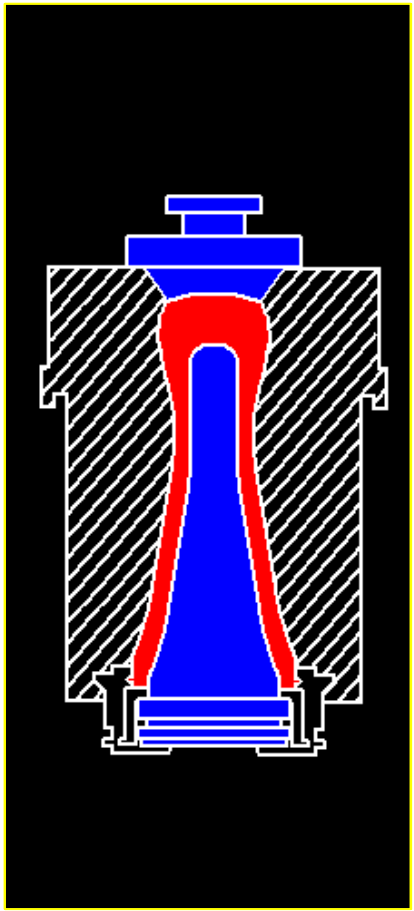
NNPB Process

- Gob entry
- Start Press
- Full Press



Differences in the Bottle

Glass Weight

Design	Current	New	Difference
§750ml Claret BVS 30566-WS	400g	330g	70g (-18%)
§750ml Burg BVS 30567-WS	416g	330g	86g (-21%)
§750ml Pt Burg BVS 30571-WS	495g	360g	135g (-27%)
§750ml Pt Claret BVS 30570-WS	500g	360g	140g (-28%)

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Differences in the Bottle

Visual Appearance

No settle-wave in NNPB.

Vacuum vent pips will be evident.

Colour will appear lighter.

Differences in the Bottle

Glass Distribution

NNPB process gives consistent, even, controlled placement.

Less glass in the neck/shoulder area increases stability.

Less glass in the punt and heel region, and reduced diameter reduces stability.

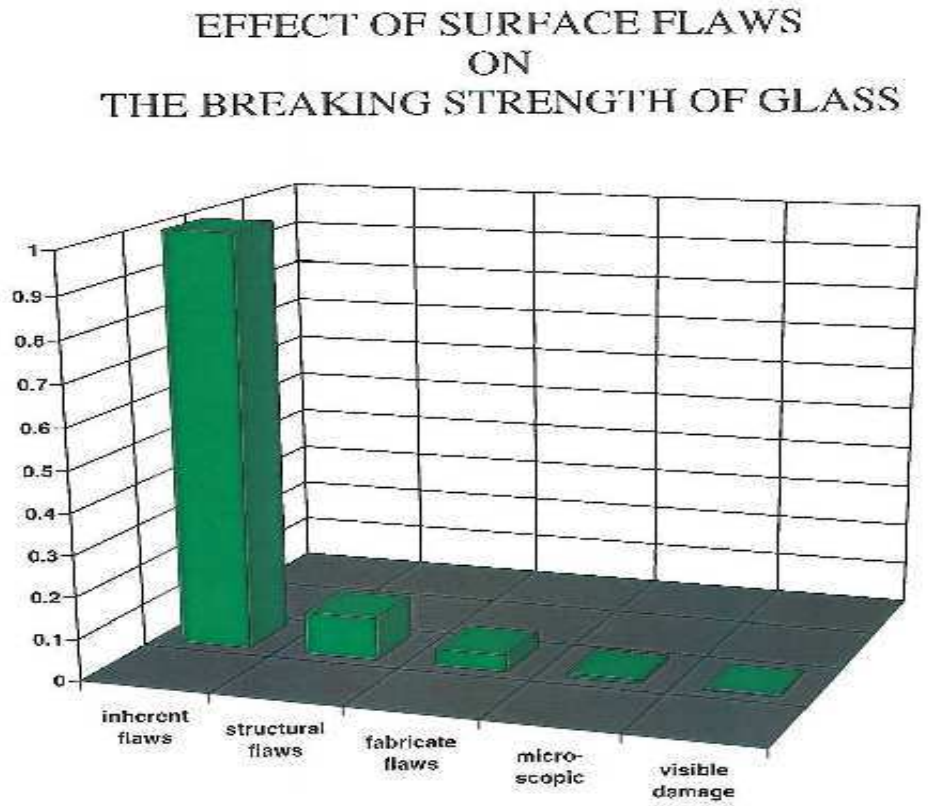
Information contained herein is strictly confidential.

New title – Why does glass break? – how does line handling help?

- Glass – composition consists of 73% Silica, 13% Soda, 12% Lime
- Mix and melt at 1650 C to give clear Soda-Lime-Silica glass
- Glass is amorphous, with no crystalline structure
- As a material, glass has a high tensile strength when pristine. The subsequent handling lowers the strength by damaging the glass surface.
- The most important key to glass strength is to protect the glass surface.
- This talk will be on the treatment of glass containers to maintain this strength

Glass Strength

- Inherently glass is a very strong material
- Sensitive to surface flaws



Types of damage to glass containers

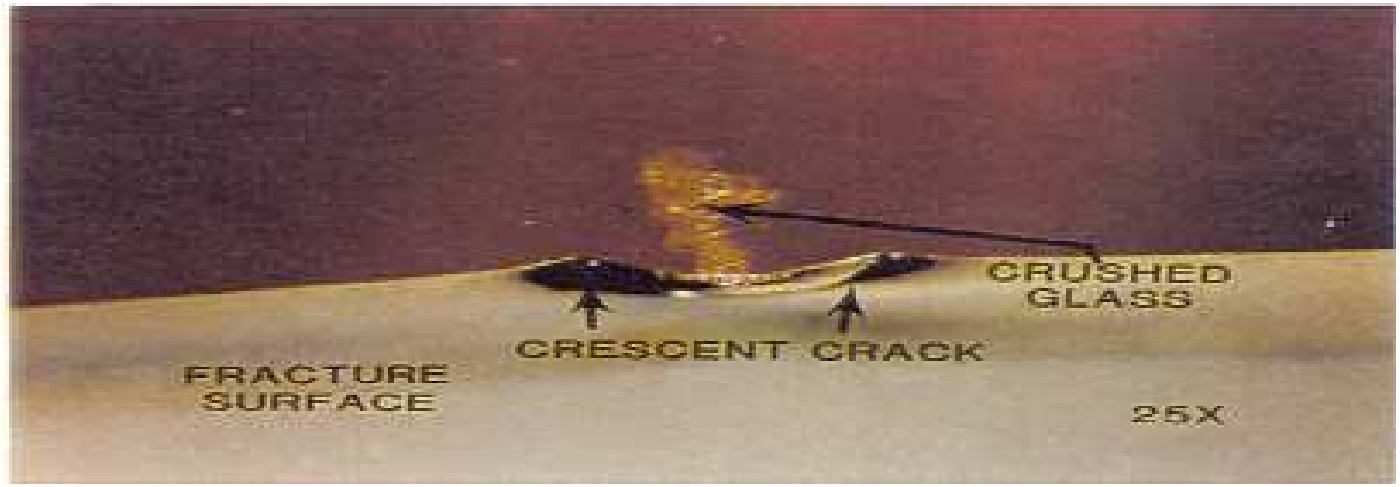
- 1. Frictive damage – caused by blunt object pressing or pushing into the glass surface. Examples are uncovered guide rails, or other glass, as seen in the scuffed rings around returnable Beer and Milk bottles.

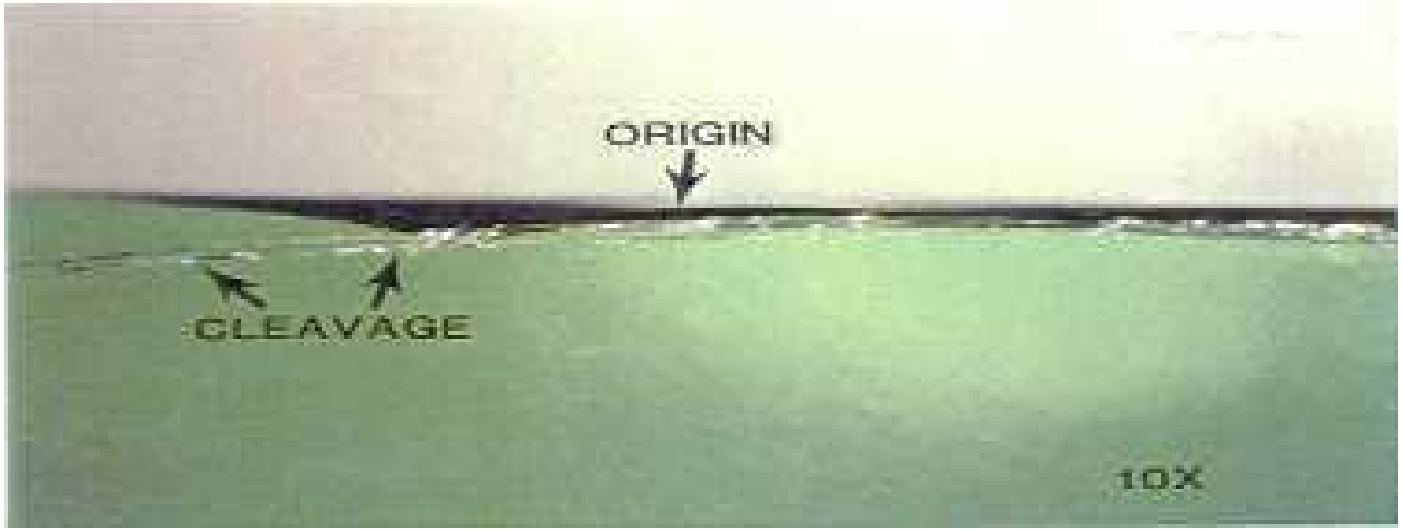
- 2. Cleavage damage – caused by sharp, hard object pressing into the glass surface. Examples are knife scores while opening boxes, and metal and terra cotta wine racks.

- 3. Impact damage – caused by points of high impact by a hard object. Can be seen in filling lines. Generally after the filler, the mass of the bottles at high speed in a stop/start situation can cause high impact stresses on the bottles.

- These will all show different fracture origins in a broken bottle. All can cause fracture origins which may fail at a later time.

Examples of Frictive, Cleavage damage





Impact

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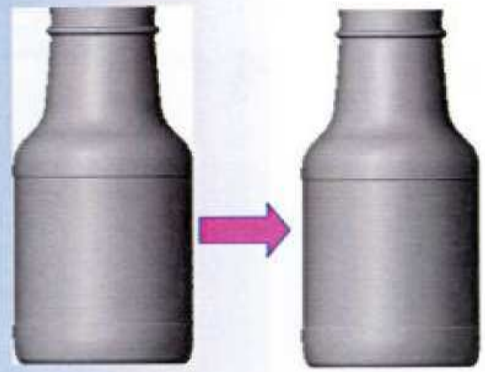

American Glass Research

Tensile Stresses Produced by Impacting the Sidewall of Round Glass Bottle

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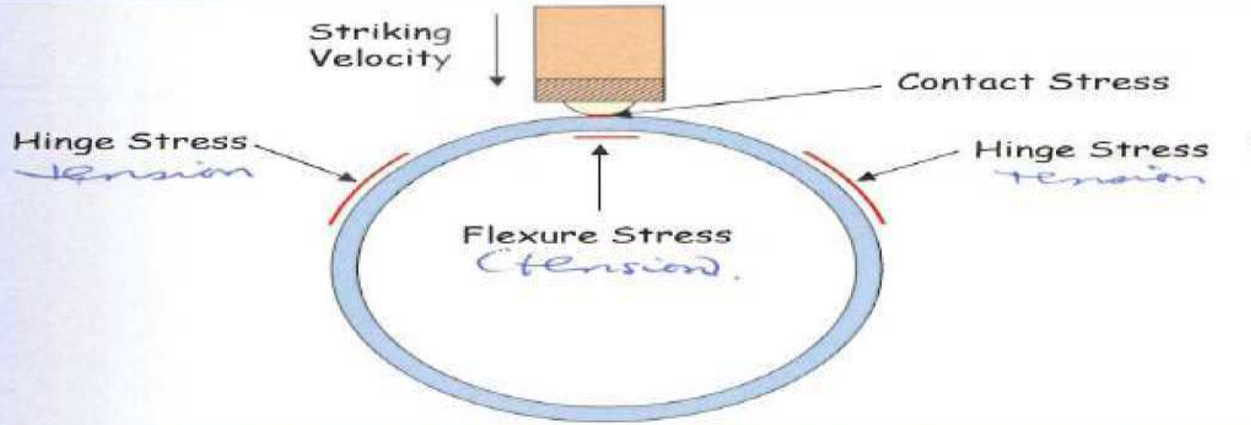


American Glass Research

Protection of glass surfaces

- To maintain the glass strength, we need to protect the glass surface.

- To minimise frictive damage, the glass industry developed surface treatments to increase lubricity between bottles. Starting with a temporary coating of stearate (soap) to the now standard coating of tin + polyethylene.

- These coatings enabled bottles to slide around each other down production and filling lines, and be transported large distances on pallets without scuffing.

Glass Breakage

For glass to break, we need both a stress and a fracture origin. One of these alone will not cause a bottle to break.

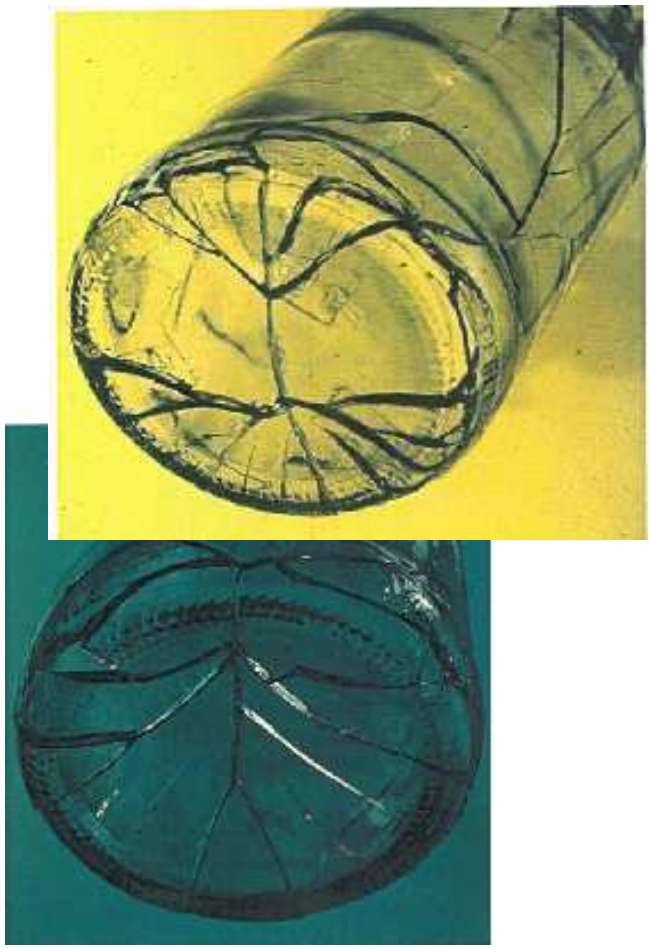
Typical stresses in a filling process

- Pressure
- Impact
- Vertical load

Handling: Analysis of glass breakage

- When glass breaks due to a stress acting on a flaw, the bottle will break in a characteristic pattern, depending on the stress which caused the break.
- Gathering all the broken pieces can show us which stress broke the bottle.
- Fracture analysis is an important part of trouble-shooting to find the cause of breakage – manufacturing fault or handling?
- Fracture patterns are very distinctive

Pressure



Impact breakage

Vertical load

Ideal glass handling should:

- Good glass handling is important to all filling lines. Lightweight bottles will flex more when impacted, and the shock wave will look for weaknesses in the glass more than a less flexible heavy weight bottle.
- We try to remove weaknesses in the bottles, but you as engineers need to look at handling.

Areas where damage to glass can occur:

De-palletiser

- Removing shrink-wrap – sharp knives
- Divider grippers not properly aligned
- Alignment of sweep with dead plates
- Sweep bars and side guides unprotected

Rinser

- Generally not a problem
- Metal tubes entering bottles.

Filler

- Fill heights – can cause problems with temperature changes.

Closure Application

Champagne Cork

- Vertical pressure on the top of the finish – corker jaws open when on top of the finish.
- The stainless jaws can damage the finish, which may then fail later as the wine changes temperature.

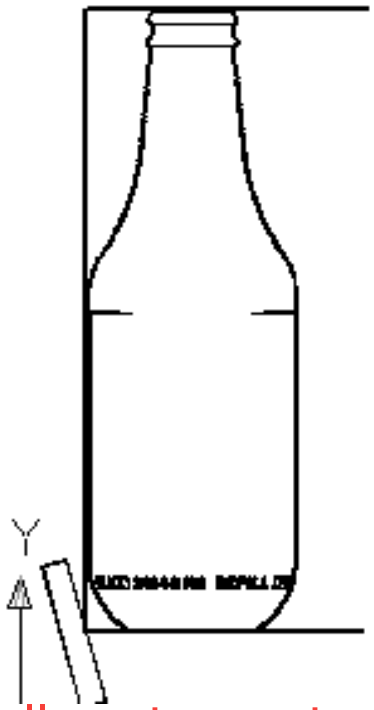
Packers

- Pick'n'place – bottles passing through fixed metal grids.
- Packers – stop – start. Major source of impact stress

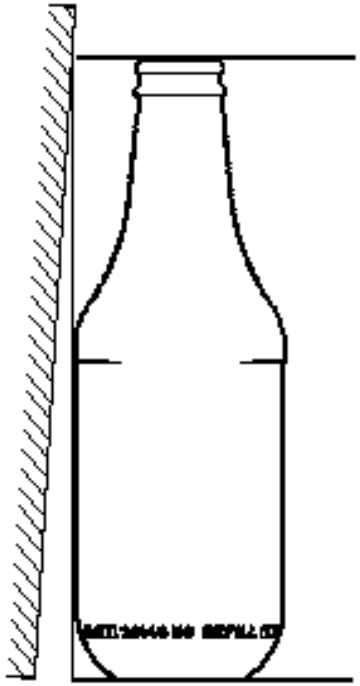
Conveying

- All guide rails should be non-metallic coated. Metal guide rails will damage containers.
- Excessive conveying speeds will cause higher than necessary impacts on containers. This will mainly occur where there is accumulation, and higher speed conveyors running into slow moving bottles
- Machine sudden stop/starting will also result in impacts.
- Noise level will identify high impact areas.

Palletiser – carton stop



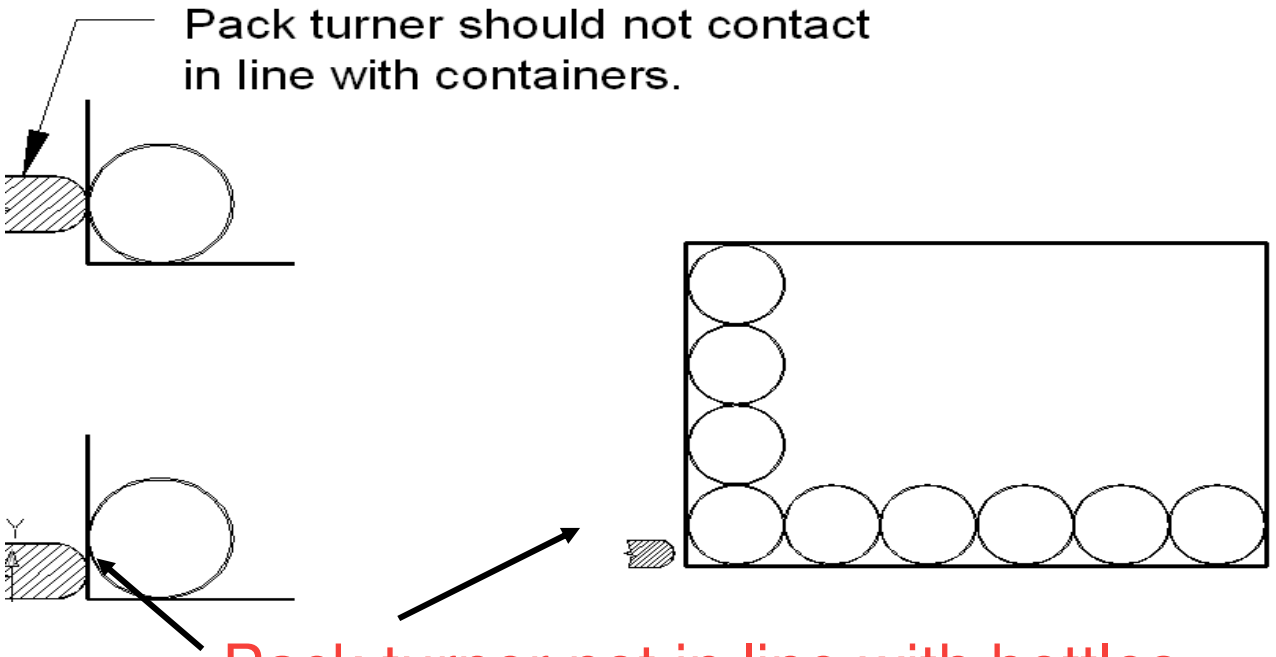
Under roller stop set at an angle. Should not extend to heel contact.



Sidewall/Dead stop should be set at a slight angle. Preferably impacting at the top of the carton.

Palletiser - carton turner

- Location of pack turner



Questions?