239

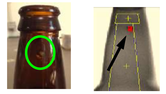
WORLD BREWING CONGRESS 2016

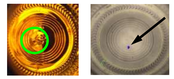
DETECTION OF GLASS BOTTLE DEFECTS PRIOR TO FILLING

Jeff DeVoy, HEUFT USA, Inc.

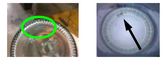
World Brewing Congress
August 13-17, 2016
Sheraton Downtown Denver
Denver, CO 80202, U.S.A.

COMMON GLASS DEFECTS


Stone in Neck


Stone in Base

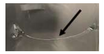

Blister Under Sealing Surface


Mold Grease

- Chipped Finish
- Bulged Finish
- Blisters
- Stones
- Crizzled Finish
- Seeds
- Split Finish
- Line Over
- Tears
- Overpress
- Choked Neck
- Fused Glass
- Bump Check
- Bird Swing
- Swung Baffle
- Drag Marks
- Sunken Shoulder
- Baffle Marks
- Letter Checks
- Brush Marks
- Body Dimensions
- Oil/Grease Marks
- Bent Neck
- Rocker Bottom
- Unfilled Finish
- Offset Finish
- Blank Seam
- Lap Mark
- Loose Glass
- Mold Seam


Blister


Spike


Birdswing


Split Finish


Bump Check

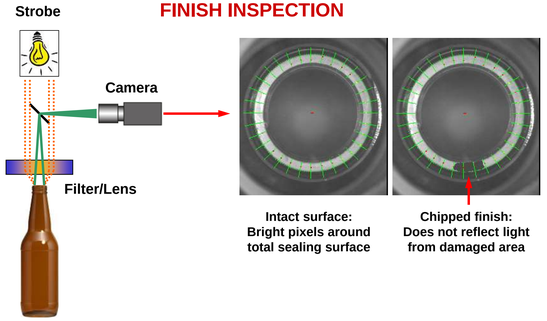
DETERMINING YOUR NEEDS

- Areas requiring inspection
- Defect types to be detected
- Classify the defects for your application
- Minimum defect size
- Guaranteed probability of detection
- Maximum false reject rate allowable

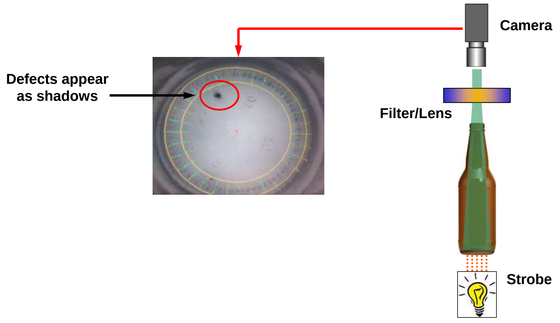
	Defect	Classification	Minimum Defect Size	Inspection Reliability
Finish	Chip	Critical	2mm x 2mm	99%
Base	Glass (Loose)	Foreign Body	4mm x 3mm x 1mm	99%
	Clear Film	Foreign Body	3mm x 3mm	99%
	Blister / Bubble	Critical	3mm x 3mm	99%
	Bird Swing / Spike	Critical	2mm x 2mm	99%
	Stone (Periphery)	Functional	3mm dia	98%
	Stone (Center)	Functional	2mm dia	97%
Sidewall	Blister / Bubble	Critical	3mm x 3mm	99%
	Stone (Shoulder)	Functional	3mm dia	98%
	Stone (Center)	Functional	3mm dia	98%
False Reject Rate (per inspection)				< 0.1%

PRINCIPLES OF DEFECT DETECTION AND EVALUATION

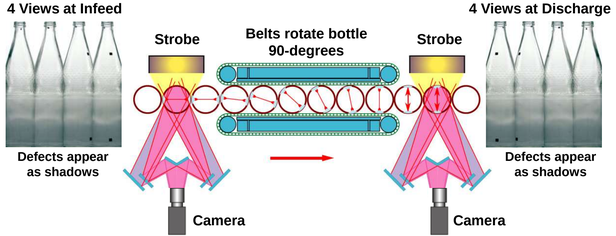
FINISH INSPECTION



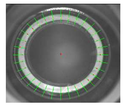
BASE INSPECTION



SIDEWALL INSPECTION



DETECTING DEFECTS BELOW THE SEALING SURFACE

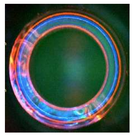


Traditional finish inspection methods rely on lighting from directly above. This yields a strong reflection ring on an intact sealing surface.

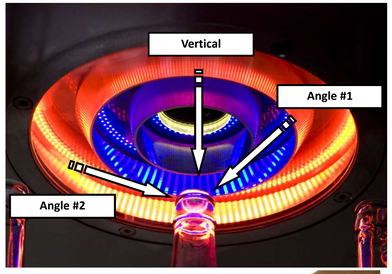
Defects below sealing surface can be potentially hidden by the bright reflection ring.

Illuminating the finish area from multiple angles, and using colored lighting, allows the system to detect glass defects BELOW the surface that would otherwise be difficult to detect.


Damaged glass below the surface

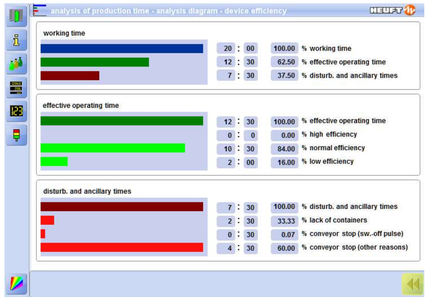

Angled lighting reflects off edges below surface, into camera above

Processed picture shows defects below sealing surface




Multi-Angle finish inspection helps prevent bottle break on pry-off

PRODUCTION ANALYSIS TOOLS IDENTIFY LOSSES



VERIFYING and AUDITING

- Challenge samples
- Test bottle analysis
- Prompt to run test bottles
- Document test bottle results

Base Inspection – Opaque Faults


2 mm x 2 mm

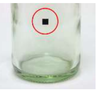

3 mm x 3 mm

Base Inspection – Transparent Faults


3 mm x 3 mm

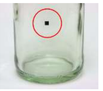

4 mm x 4 mm

Sidewall Inspection
2 Sidewall Modules (infeed + discharge)


6 mm x 6 mm

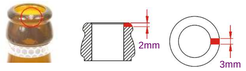

10 mm x 10 mm

Sidewall Inspection
4 Sidewall Modules (2 infeed + 2 discharge)

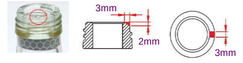

4 mm x 4 mm


6 mm x 6 mm

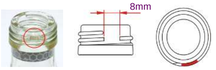
Crown: Milled Reference Notch



Screw Closure: Milled Reference Notch



Thread Inspection:
Milled Reference Break in Thread



MACHINE CONSTRUCTION - "CLEAN DESIGN"

- Easily cleanable
- Stainless steel, polished
- Free of cracks or crevices
- Sloped surfaces for self-drainage
- Welds ground smooth
- No exposed threads
- Drive sealed from product contact