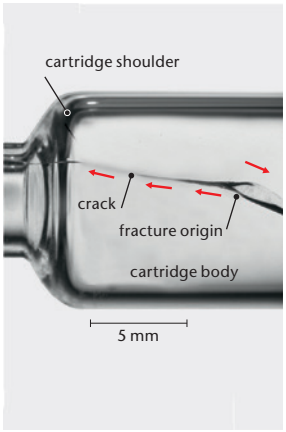
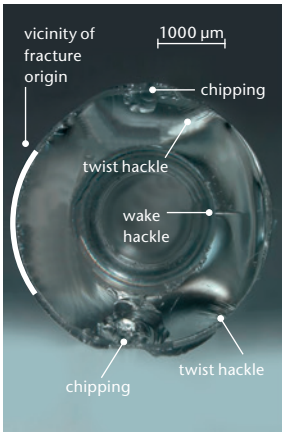
Mechanical Stability Tests

Basis for weak point analyses of production lines or container design



Fracture surface of a cracked cartridge revealing macroscopic fracture patterns

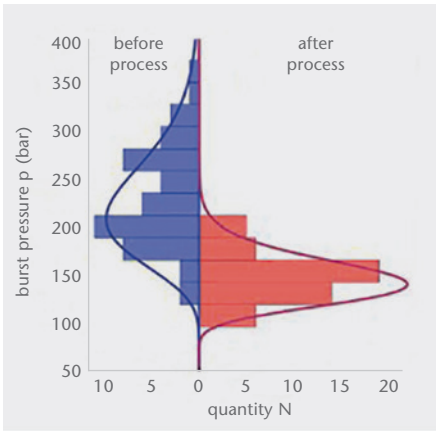


Fracture surface of a broken syringe revealing microscopic fracture markings

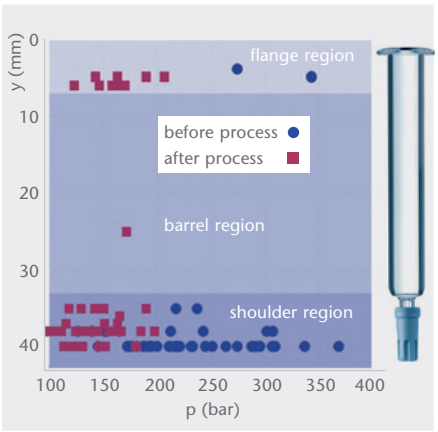
Dye penetration testing concerning glass container integrity

Breakage Analysis – Fractography

- Broken samples and cracks tell stories and leave behind clues. By applying optical and scanning electron microscopy, the fracture origin and propagation of glass breakage can be determined.
- Clear evidence for the root cause can be drawn and the applied force leading to failure can be determined.
- The glass container integrity can be additionally assessed by dye penetration testing.



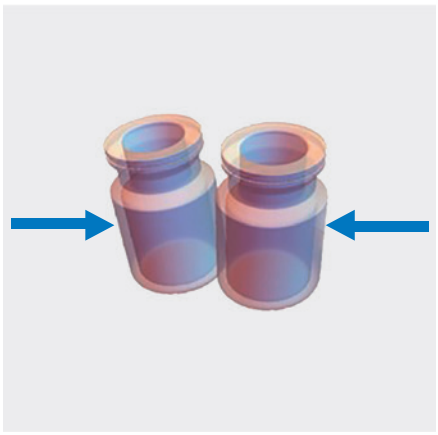
Burst strength distribution, statistical evaluation by hypothesis testing



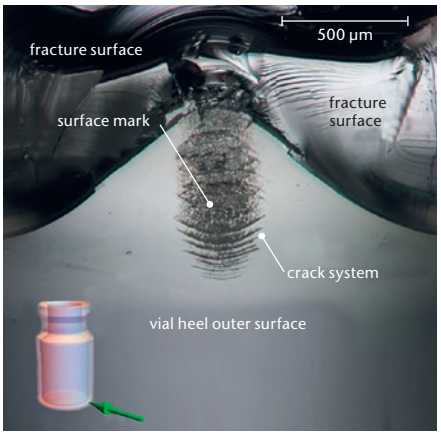
Determination of fracture origin confirms additional damage occurred near flange

Strength Testing

- Strength testing allows the prediction of fracture probabilities of glass containers.
- Samples from different process steps (purpose: process mapping), different lots or different manufacturers can be compared and evaluated.
- Burst pressure testing reveals the weakest spot of a container, while specific tests target critical areas like the flange or cone.



Visualizing the mechanisms associated with glass to glass contact events



Photograph of a typical fracture origin caused by a contact with a blunt object

Training Course for Fractography and Strength

- Two day on-site course focusing on glass production, testing, glass properties, fracture mechanics and statistics, strength testing and Weibull distributions, fracture patterns, fracture surface markings, sample preparation, imaging techniques, and detailed hands-on learning.

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