Investigating the Crack Growth Behavior of Indented Glass Specimens under Subsequent Loading

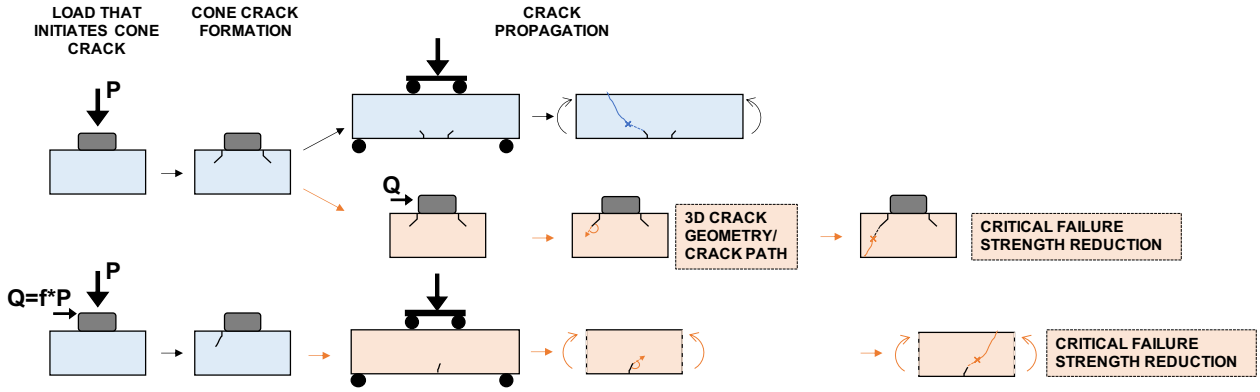
TECHNISCHE UNIVERSITÄT DARMSTADT

ISM+D
Institute of Structural Mechanics and Design
Institut für Statik und Konstruktion

Bachelor-/Masterthesis in the field of glass strength

Glass is a ubiquitous material in modern engineering applications, prized for its transparency, strength, and versatility. However, glass is inherently brittle, and its susceptibility to crack initiation and propagation poses significant challenges in structural and safety-critical contexts. Understanding how cracks propagate in indented glass specimens under subsequent loading is therefore critical for enhancing the safety and reliability of glass-based structures and products.

The outcomes of this thesis are expected to contribute to the knowledge base on glass fracture mechanics and safety assessment. Moreover, the findings may have practical implications for improving the design and performance of glass components in engineering applications, such as architectural glazing, automotive windshields, and electronic displays.



The following topics can be the focus of the thesis:

- Controlled indentation tests of glass specimen to create well-defined cracks and stress concentrations. These indented specimens are then subjected to various subsequent loading conditions, including tensile, compressive, and cyclic loading. Detailed observations are made regarding the crack propagation rate, direction, and patterns, with a focus on understanding the factors influencing crack growth in indented glass.
- Experimental investigations and/or finite element analysis (FEA) simulations can be performed to provide a comprehensive understanding of the stress distribution and fracture mechanics involved in indented glass specimens under different loading scenarios. The FEA models should consider various parameters, including indentation depth, crack length, loading rate, and specimen geometry, to assess their effects on crack growth behavior.

Betreuerin: Isabell Ayvaz (ayvaz@ismd.tu-darmstadt.de) Glass Competence Center (GCC)