



FRACTURE ANALYTICS WHITEPAPER | 2022 | Issue 1 |

# WHY FAÇADE ADHESIVES FAIL



## AND HOW TO AVOID IT

# WHITEPAPER

### HOW & WHY DO BONDED FAÇADE PANELS FAIL?

The failure principle of adhesively bonded façade panels is composed of a superposition of mode I (crack opening) and mode II (planar longitudinal shear). Figure 1 schematically illustrates this principle in detail.

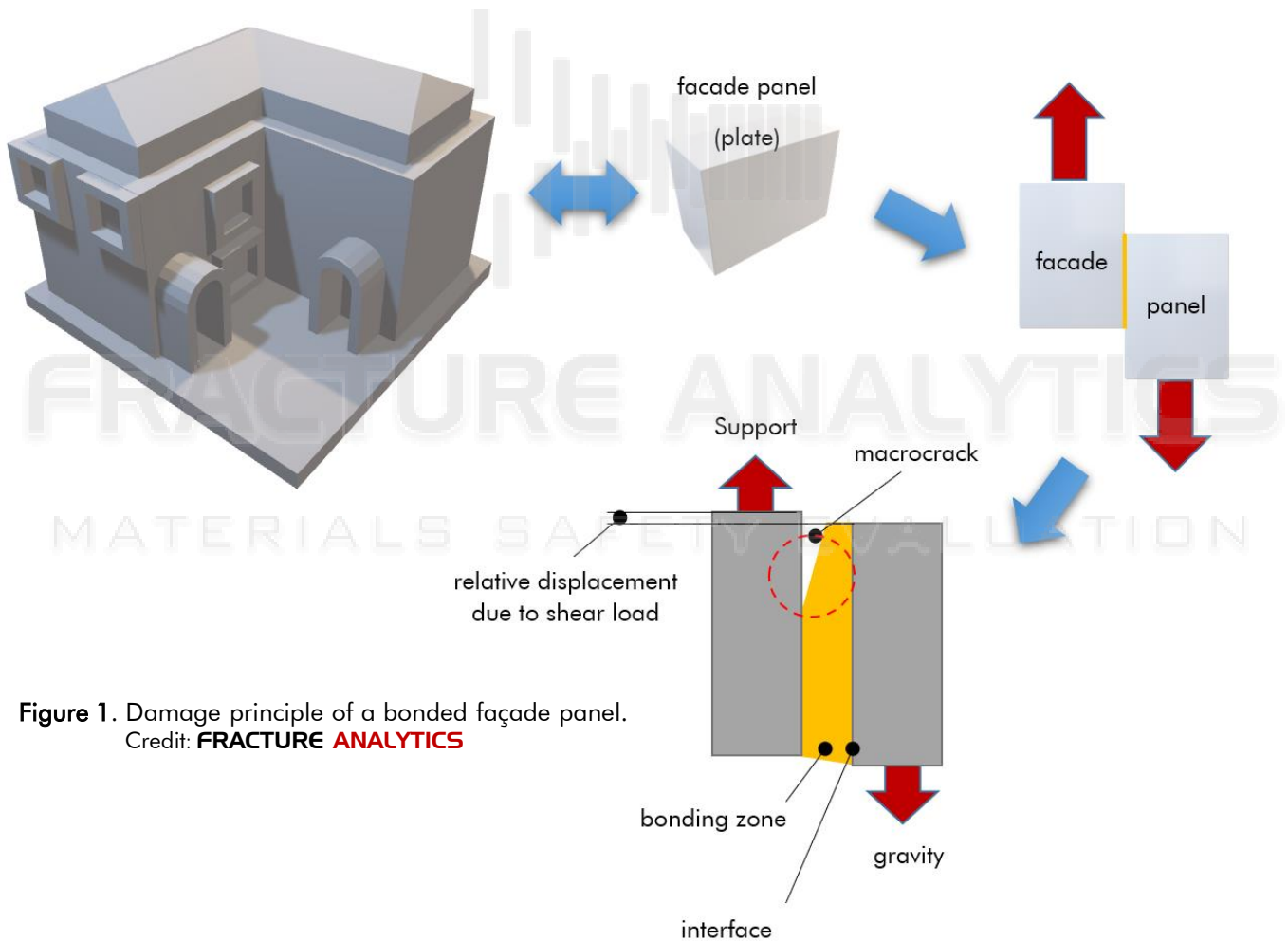


Figure 1. Damage principle of a bonded façade panel.  
Credit: **FRACTURE ANALYTICS**

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## WHY FAÇADE ADHESIVES FAIL – AND HOW TO AVOID IT

### What test methods are available and how effective are they?

For façade adhesives, standard test methods based on continuum mechanics apply technical stresses (strength) as failure criterion. They provide very limited information of the material behavior, and the results cannot be transferred into reality. Fracture analytical methods in turn are technically capable for an authentic analysis of failure processes of façade adhesives. This is because they provide empirically-valid test metrics and so-called *material laws (cohesive laws)*, which scientifically describe the softening behavior in the interface during failure.

### Mechanical Bonding Tests versus FRACTURE ANALYSIS

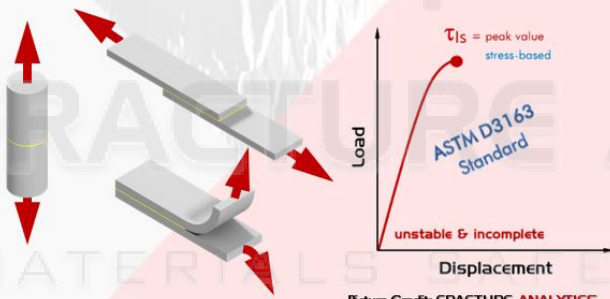
#### DIN · EN · ISO · ASTM<sup>+)</sup>

#### MCT Standard<sup>\*)</sup>

TESTING

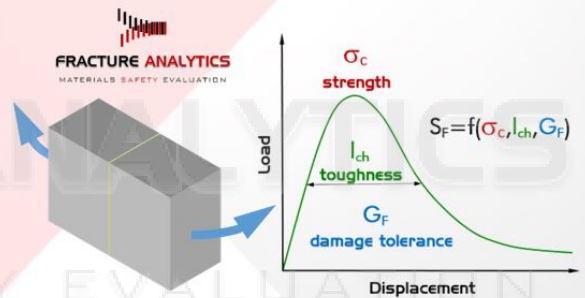
RESULTS

EVALUATION



Picture Credit: FRACTURE ANALYTICS

Unstable Course - Limited Information  
1 Metric - No Safety Parameter



Picture Credit: FRACTURE ANALYTICS

Stable Course - Full Information  
3 Metrics - One Safety Parameter

#### FRACTOGRAPHY via ISO 10365



Picture: Getty Images



MRT ≠ CT



Picture: Getty Images

+) Note: Tensile Test via DIN EN 1465/ISO 4587/ASTM D3163, Peel-Off Test via ISO 11339/ASTM D1876 and Pull-Out Test via ISO 37/ISO 527/ASTM D638. \*) Note: MCT via FRACTURE ANALYTICS



## THE FINAL STATEMENT

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“Standardized testing  
cannot explain failure  
in practice!

Thus, it is highly important  
to **apply a method** that produces  
**empirically-valid results.**

With **MCT** a safety-oriented  
adhesive selection is realized.”

# MATERIALS SAFETY EVALUATION