

DAMAGE TOLERANCE BEHAVIOR OF STRUCTURAL ADHESIVES: INTRODUCING A NOVEL CONCEPT FOR ASSESSING BONDING SAFETY

ABSTRACT:

In numerous fields of technology, such as construction, vehicle and aircraft engineering, structural adhesives are a key enabling technology for bonding various types of materials ensuring their structural performance and safety. The selection of the optimal adhesive is crucial for the bonding success in operation, in terms of safety, quality and performance. However, it is a very sophisticated and challenging issue for decision-makers to finally choose the most suitable product relying on information mainly provided by technical datasheets. Since the said information is compiled by adhesive-manufacturing companies, it often fails to offer insights into significant safety benchmarks and comparative data. To overcome these limitations, an in-depth study was

conducted to generate significant evaluation parameters for supporting the decision-making process. The parameters obtained are based on fracture analysis and were generated by an innovative test setup. A new safety factor was created, and risk-adjusted price metrics were derived to assess potential candidates economically. The results provide new and surprising insights, enriching conventional test- and analysis methods available.

Keywords:

damage tolerance, structural adhesives, safety factor, fail-safe behavior, adhesive selection, bonding safety, decision-making support, safety premium