



Fraunhofer
IBP

Fraunhofer Institute for Building
Physics IBP

Because real problems don't conform to norms

Interdisciplinary damage analysis for building experts

www.ibp.fraunhofer.de/failure-analysis

Interdisciplinary root cause analysis and solutions

The number of legal disputes in connection with structural damage is not only rising significantly, but the legal proceedings are also becoming increasingly complicated. Lengthy lawsuits result in rising construction costs, higher rental charges, and lower returns. To minimize these consequences, it is essential to identify the root causes and find ways to repair the damage quickly and cost-effectively.

In modern architecture, different materials such as glass, steel, wood, concrete, natural stone or plastic are combined. The resulting physical and chemical interactions of these materials with each other and with the environment are extremely complex. This, in turn, gives rise to a large number of structural defects, with poor workmanship often not being the only cause.

Examining these defects with standardized test methods under standardized boundary conditions is rarely sufficient. Rather, the cooperation of experts and scientists from different disciplines is needed in order to identify causes quickly and efficiently and find appropriate solutions.



For 90 years, we at the Fraunhofer Institute for Building Physics IBP have been pooling the knowledge of physicists, chemists, mineralogists, biologists and civil engineers. Benefit from a professional exchange with our experts at eye level!



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Advice on damage analysis issues

As a building expert, you are dealing with a damage case and need scientific help or advice:

- to define the specific problem as regards the possible cause of damage
- to select appropriate instrumental or analytical procedures
- to identify the damage mechanism
- to iteratively develop test scenarios for an on-site inspection

At Fraunhofer IBP, you can rely on our scientists from various fields of classical building physics, such as building and room acoustics, thermal engineering, lighting engineering and hygrothermics / moisture protection. Proven experts in the fields of microbiology, chemistry, materials science and mineralogy help you analyze your damage case.

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Testing assured material properties

You have a material sample of the damage and would like to have it examined professionally and reliably.

Our services:

- We determine the actual physical, chemical and microbiological values of the sample in the laboratory and compare them with the target values.
- We conduct comparative tests on damaged samples and intact reference samples.
- We replicate a damage case using realistic stress scenarios in the field and in the laboratory.
- We document damage by means of imaging techniques

In addition to an outdoor testing facility approximately 45,000 square meters in size, our branches in Holzkirchen and Stuttgart have a wide range of laboratories and test rooms. These include a laboratory for determining thermal and hygrothermal material parameters, light and spectral laboratories, sound and acoustic chambers, and a chemical-analytical, microbiological and thermal laboratory.

Verifying planning and execution

You have doubts about whether the planning and/or construction is correct and would like to check this. Here, too, our experts can give you advice:

- Hygrothermal simulations (WUFI®) and calculations under varying boundary conditions
- Design of components/buildings for different climatic zones and uses
- Sensory and olfactory inspections
- Checks for harmful emissions
- Simulation and design of lighting and solar systems
- Acoustic calculations and simulations

Besides analytical methods, we also offer a wide range of simulation and calculation programs as well as planning tools to localize potential weaknesses and recommend countermeasures before any damage occurs.



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Developing solutions

For you, identifying the cause is only the first step towards repairing damage in a successful and lasting manner. We develop solutions iteratively in order to avoid or remedy design-related, structural, physical, chemical or biological damage:

- Development of moisture-optimized or cost-efficient renovation measures in line with customer specifications
- Calculation of thermal bridges
- Determination of material incompatibilities
- Recommendations regarding the use of building materials which are more resistant to microbes
- Measures for optimizing acoustic and lighting conditions in rooms
- Effective ventilation concepts to ensure hygienic air quality while avoiding drafts and thermal asymmetries
- Computational verification of the function of envisaged solutions and installations

If you have any questions, need advice or would like to receive a non-binding quotation, please do not hesitate to contact us.

Your benefits at a glance

Take advantage of our know-how:

- We give you scientific, unbiased, competent support and advice, but do not act as experts ourselves.
- Together with you, we develop a service package tailored to your particular needs - from planning and analysis to interpretation of the results.
- We offer computational studies as well as measurements in the laboratory and in the field.
- We give you the opportunity to accompany, experience and help shape on-site investigations.

You benefit from our interdisciplinary network:

- You receive recommendations for action that are based on real-world damage and go beyond the specifications of relevant standards. Because real problems rarely correspond to standard specifications.
- We offer dependable "Fraunhofer" quality and do not outsource any of our testing services.
- We guarantee scientifically validated results by optimally combining simulation with laboratory and field tests.

Contact

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