TOGETHER WE'LL FIND A CUSTOMIZED SOLUTION FOR THE CHALLENGES YOU FACE

First Contact
Cooperation with the Fraunhofer Institute for Mechanics of Materials IWM starts with a non-binding consultation. Here we explore which goals can be achieved and potentials for the financial aspects and time frame of your project. Regardless of size, we ensure the highest professionality in handling all projects.

The Fraunhofer IWM works with the most modern equipment available. This enables unexpected insights into the behavior of materials and components, thus enabling innovative solutions.

Our customers' information is strictly confidential. Mutual confidentiality agreements may be signed before the first meeting. Confidentiality agreements may also be part of the cooperation contract.

Quality Management
Hundreds of successful research and development projects every year as well as a certified quality management system demonstrates our reliability regarding the execution of projects within the framework of industry. High customer satisfaction (as confirmed by surveys) shows that the Fraunhofer IWM enjoys a very good reputation.

FRAUNHOFER INSTITUTE FOR MECHANICS OF MATERIALS IWM

Using Materials Intelligently
The Fraunhofer IWM is a research and development partner for industrial as well as public clients in the areas of reliability, safety, durability, and functionality of components and systems. We work out solutions to ensure operational safety of components under high operational strain, develop functional materials and resource efficient production processes.

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Cover image: Simultaneous measurement of infrared and DIC fields.

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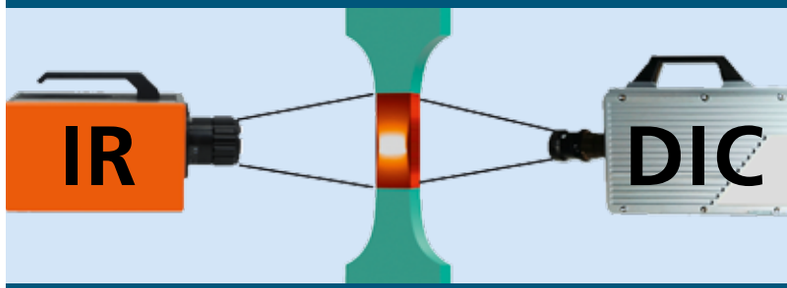
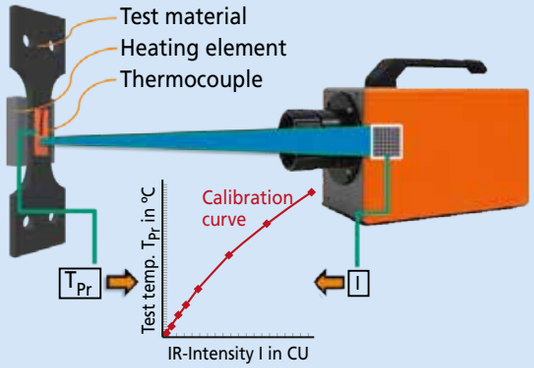
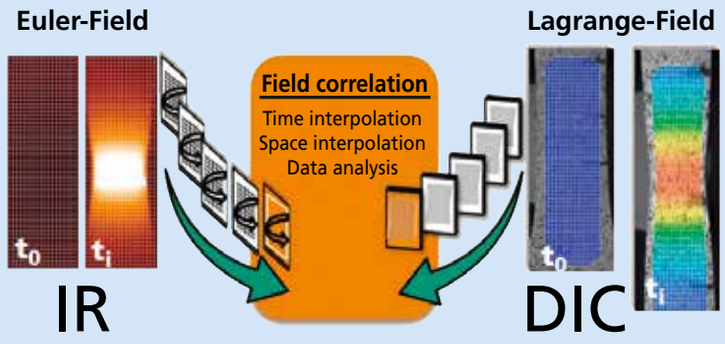
COMBINED TEMPERATURE AND DEFORMATION FIELD MEASUREMENT

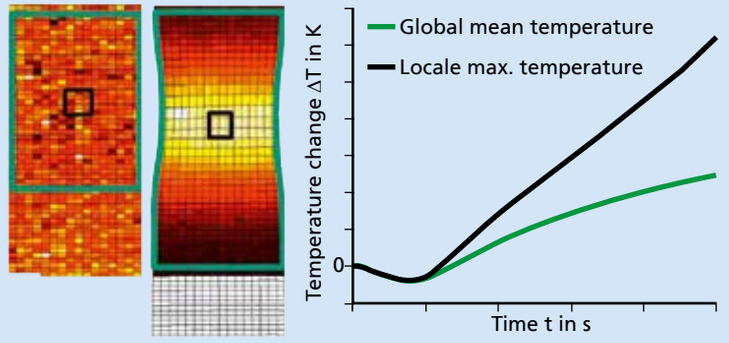




In-situ calibration method for precise temperature measurements.



Correlation of field data with thermomechanical data analysis.



Global and local temperature measurement by field correlation.

Combined temperature and deformation field measurement

With many years of know-how, we develop experimental measurement techniques in the field of crash dynamics. We characterize different materials in short-term experiments and under quasi-static load, among many other possibilities.

Deformation field measurements by means of high-speed cameras and digital image correlation analysis are part of the standard repertoire of our material evaluation. We offer high-quality and quantitative temperature measurements for almost all materials, which can also be carried out in short-term tests.

Precise temperature measurements with high speed infrared cameras are based on two methods.

- material specific calibration and
- field correlation with field analysis.

This makes it possible for us to thermomechanically assess materials even under crash-like loads, in order to locate damage as well as to quantify adiabatic processes.

Our services

Test preparation and execution

- Sample production of different sizes and shapes as well as extraction from almost all materials and components
- Strain rate dependent test up to a maximum of 10 000 s^{-1} depending on specimen size and material, on micro and macro test rigs including force measurement
- Material specific calibration of the IR detector
- Compensation of strain-dependent emissivity changes
- Measurements of deformation and temperature fields for test times > 1 ms

Data correlation from field measurements

- Interpolation of metrologically induced differences in the time and location resolution on a uniform basis according to customer requirement
- Correlation of the temperature fields (IR) with the deformation fields (DIC)
- Measurement of time-dependent strain and temperature information per points of the test range
- Controlling the depth of information as required

Data analysis

- Point tracking of local temperature development
- Analysis of maximum and minimum temperatures
- Global mean temperature evaluation of a defined, deforming range
- Evaluation of temperature and strain distributions at any place and at any time
- Detection of local and short-term temperature hotspots for damage assessment

Provision of data

- Provision of time-synchronous data records of the stress, strain and temperature development in client-specified formats
- Provision of the correlated thermomechanical field information
- Preparation of sample videos with client-specified level of detail
- Presentation of the methods and results in individually prepared PowerPoint presentations