
UNIVERSITÀ DELLA CALABRIA



DIPARTIMENTO DI
**INGEGNERIA MECCANICA,
ENERGETICA E GESTIONALE**
DIMEG



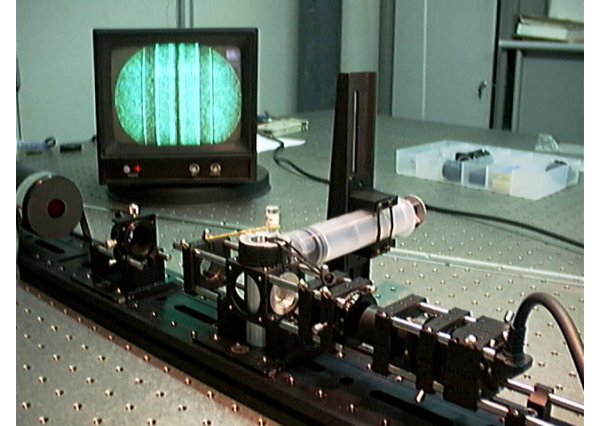
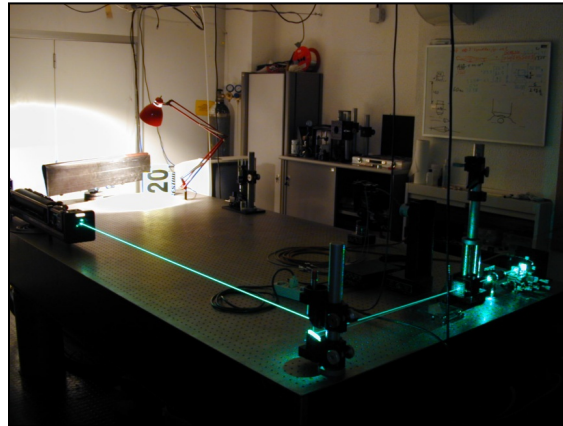
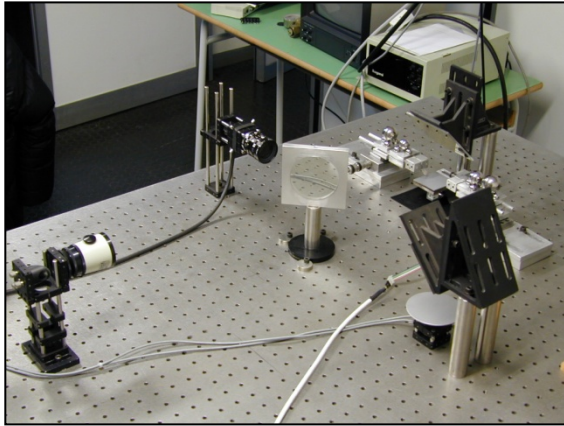
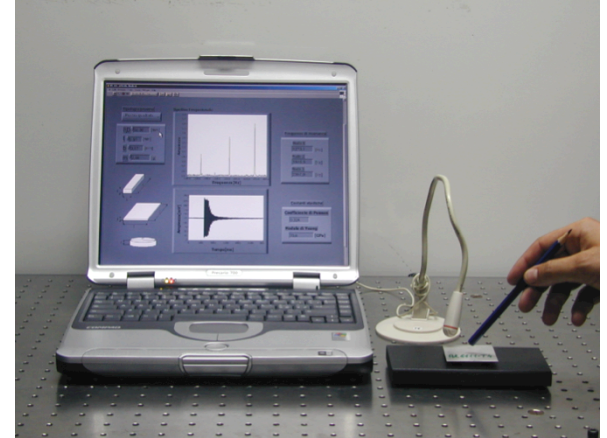
Machine shop laboratory

- ✓ Mazak Nexus 410 CNC 4/5 axis vertical machining centre
- ✓ Mazak Integrex milling/turning centre
- ✓ AEG Elotherm electro discharge machining centre
- ✓ Coord 3D Universal CMM system
- ✓ Traditional milling and turning machines



Experimental mechanics laboratory

- ✓ Optical anti-vibrating benches
- ✓ Laser *COHERENT VERDI 2W*
- ✓ Laser *COHERENT INNOVA 90 2W*
- ✓ *He-Ne* lasers



Mechanics of materials laboratory

- ✓ **Servo-hydraulic testing machines**
 - ✓ Static and fatigue tests (up to 50 hz)
 - ✓ Maximum load 2MN
 - ✓ Temperature range: -130°C/+760°C
- ✓ **Electro dynamic bi-axial (axial+torsion) machine**
 - ✓ Fatigue tests (up to 100 hz)
 - ✓ Temperature range: -130°C/+760°C
- ✓ **Drop tower**
 - ✓ Impact tests up to 1800 J
 - ✓ Temperature range: -130°C/+350°C
- ✓ **Micro-nano indentation and scratch platform**
 - ✓ Indentation loads: 0.1 mN-10 N
- ✓ **Tribometer**
 - ✓ Wear and friction tests

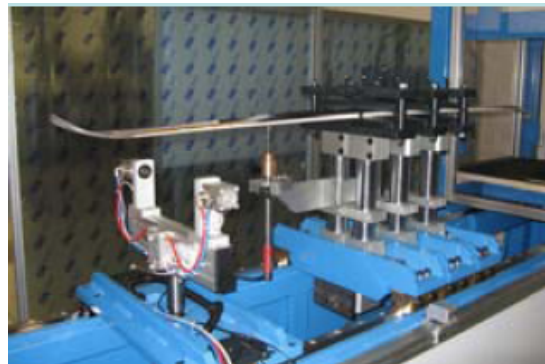


Research topics

Standard mechanical tests

Carried out by using servo-hydraulic testing machines and/or special loading systems/frames

- **Static characterization of standard specimens**
 - Strength properties
 - Elastic properties (Instrumented with ER strain gauges)
- **Fatigue characterization of standard specimens**
- **Static and fatigue testing of complex shaped components** by using *ad-hoc* loading systems/frames

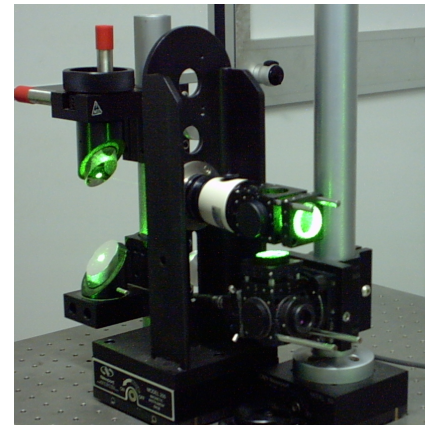
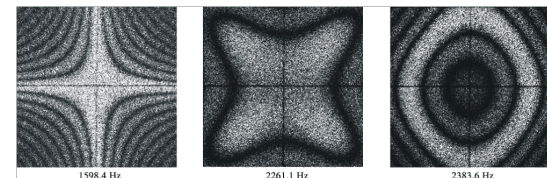
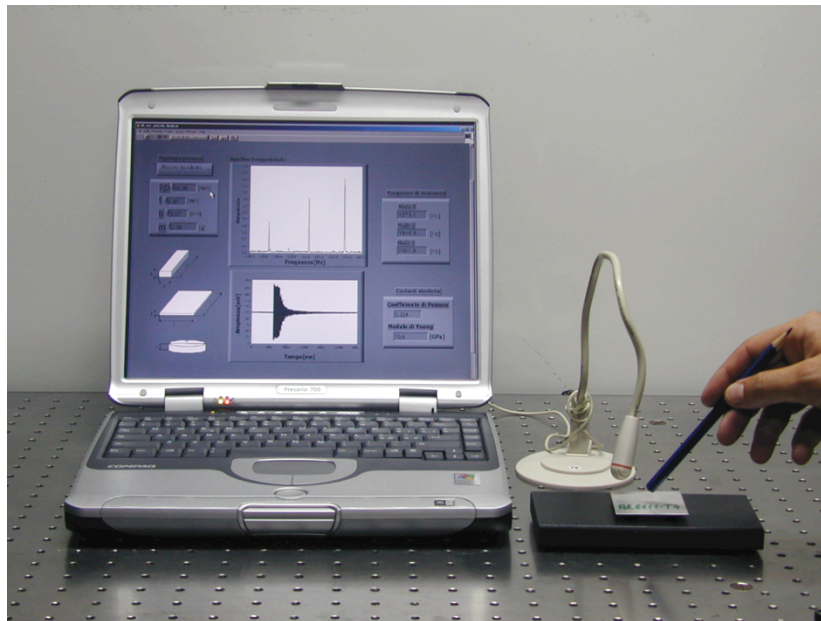


Research topics

Elastic characterization

Based on vibration data and full field displacement measurement

- Isotropic and anisotropic materials;
- Bulk specimens and coatings;
- Plates of any shape, if used in combination with optimization procedures;

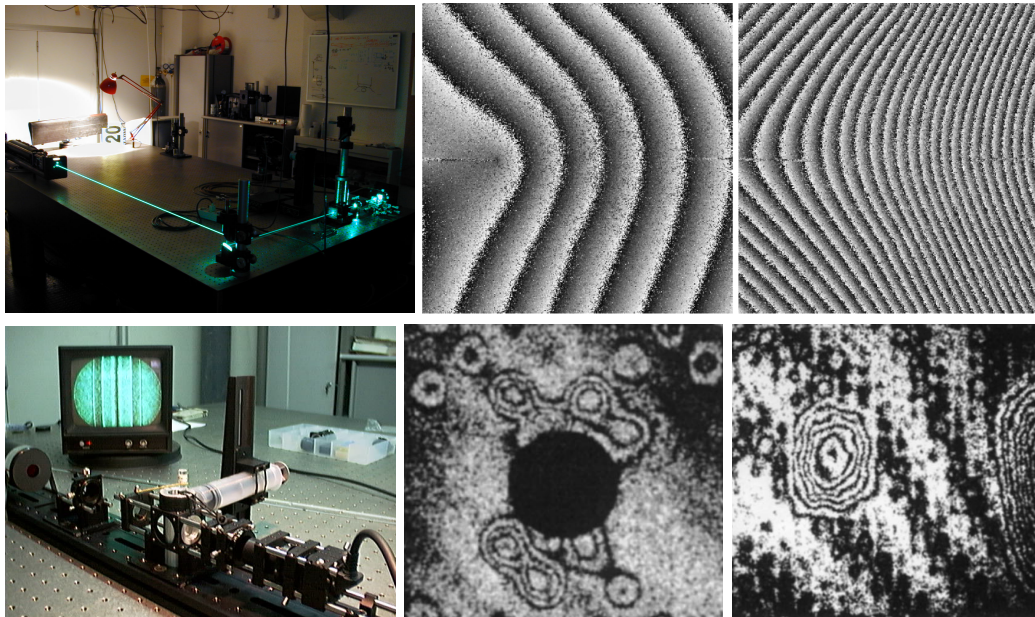


Research topics

Full field techniques

Carried out by the laser speckle interferometry

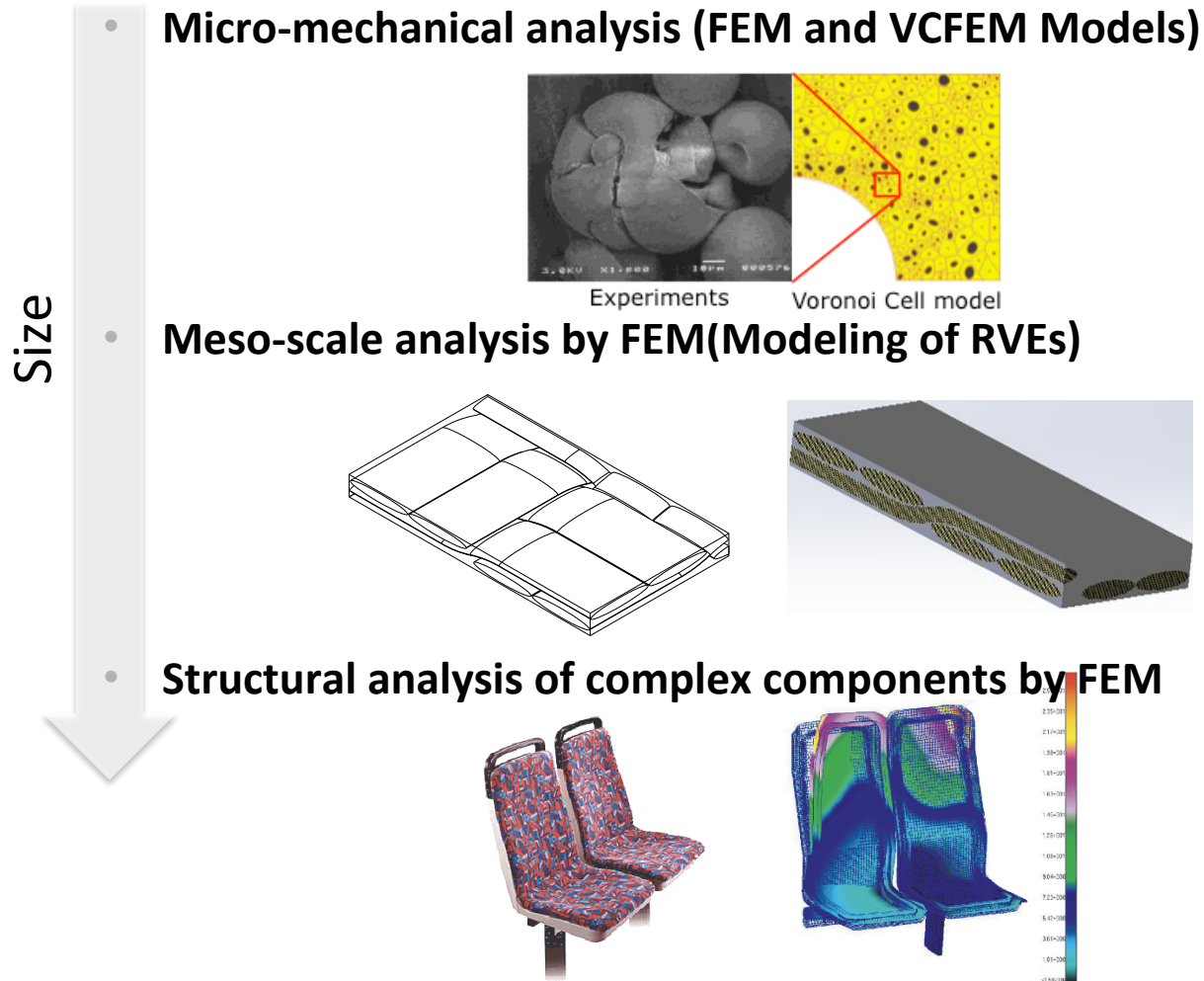
- Elastic characterization of isotropic and anisotropic plates
- NDTE – damage detection in composite panels and components
- Strain and displacement measurements of complex shaped components



Research topics

Numerical simulations

Carried out by using commercial Finite Element (FE) software codes and/or special hybrid formulations



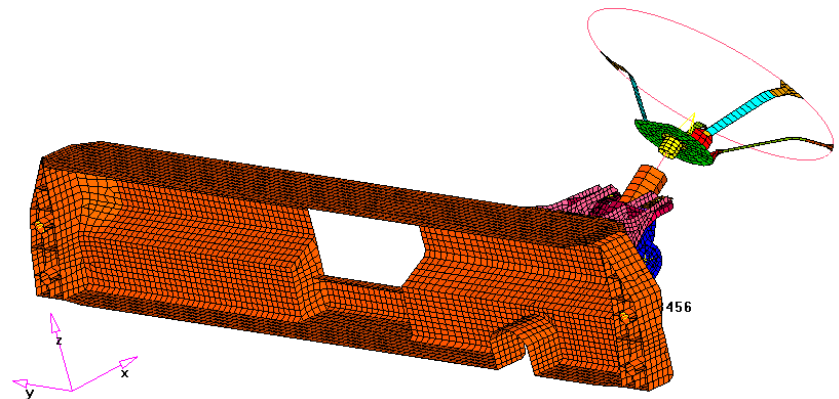
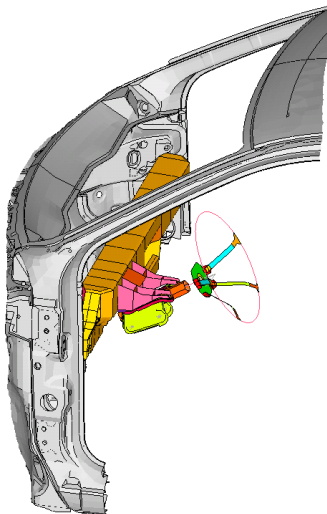
Research topics

Optimization procedures

Identification of mechanical properties using FEM-updating

Activities & applications

- Identification of cohesive fracture properties using full-field displacements and evolutionary algorithms
- Identification of mechanical properties of plate-like samples using vibration data
- Structural optimization of mechanical components



Optimization of dynamic behavior

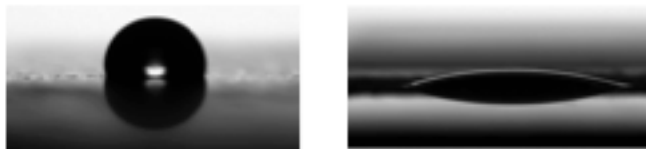
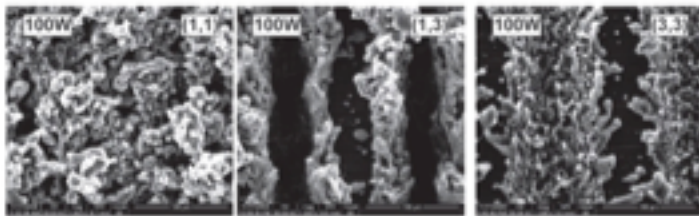
Research topics

Non linear fracture mechanics

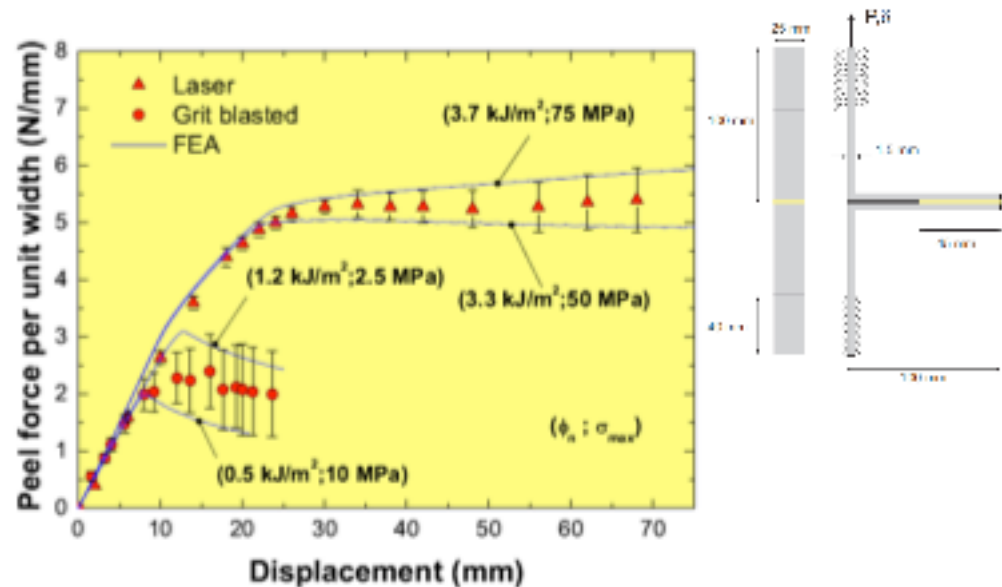
Experimental test and FE simulation by user defined procedures

Activities & applications

- Analysis of Al-Al joints and Mg-Al joints with laser irradiated substrates;
- Fracture and crack propagation using the cohesive zone model (CZM);



Laser surface irradiation/wetting interaction



Enhancement of bond toughness using the CZM

Research topics

Shape memory alloys

Experimental test and numerical simulations

Activities & applications

- Experiments and modeling of shape memory properties;
- Fatigue and fracture behavior;
- Application of SMAs as tightening systems in ultra high vacuum applications.

