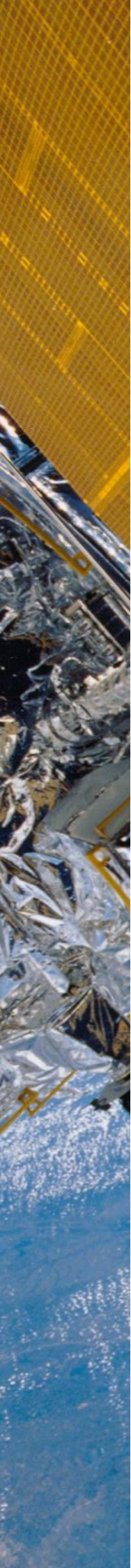




ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

SPACE STRUCTURES AND MATERIALS

Cutting-edge research on space structures and materials is an essential tool to enable space exploration, in particular requiring lightweight and improved thermal properties.



The University of Bologna is involved in research activities dealing with polymer related materials, from functional macromolecules to structural materials such as (nano)-composites and recycling thereof. Furthermore, our research addresses the design of fully optimized structures in order to enable the aerospace products of tomorrow, meeting the increasing performance needs.

The research of the University of Bologna covers a wide range of topics:

- New advanced graphene-based polymer matrices to be used for carbon fiber composites production
- Composites with outstanding properties, such as improved thermal conductivity and toughness
- Novel nanofibrous additives for structural and functional modification of composite structures (i.e. for damping, delamination and toughness improvement)
- Structural analysis of metallic and composite structures
 - Delamination growth analytical and numerical models
 - Experimental test of crash behavior in carbon fiber reinforced plastic (CFRP) components
 - Numerical modeling of progressive damage in CFRP structures
 - Thermo-mechanical, dynamic and vibration analysis of space structures
- Laser Shock Peening (LSP)
 - LSP treatment of aluminum specimens to increase their structural performance
 - Residual stress measurement and prediction through numerical models
- Additive Manufacturing
 - Additive manufacturing technologies for rapid tooling
 - Design of optimized components fabricated through AM technologies

HIGHLIGHTS

Infrastructures:

- **Composite Materials Laboratory** with equipment and expertise to assemble composite structural components using vacuum bagging technology
- **The Metallography Laboratory** for microstructural analysis is equipped with optical microscope, magnification up to 1000x, bright field and polarized light using LUCIA image analysis programme
- **Mechanical Testing Laboratory** allowing tension-compression fatigue tests; 3 point bending tests; torsion fatigue tests; hardness measurements; surface roughness measurements; Friction Stir Welding testing; rotating bending testing machine; Non-destructive testing