

*Design and Analysis  
of Composite Structures*

*Damage Modeling*

*Design Optimization for  
Additive Manufacturing*

*Material Characterization  
and Structural Testing*

*Prototype Manufacturing*

*Compression Molding*

*Injection Molding*

*Specialty Textile*

*Engineering and Production*

*Non-Destructive Evaluation,  
Quality Assurance  
and Metrology*



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## COMPANY CAPABILITIES



*Horsham, PA*

Engineering the Future of Materials



*Greenville, SC*

50 years serving major  
corporate and government clients



*Huntsville, AL*

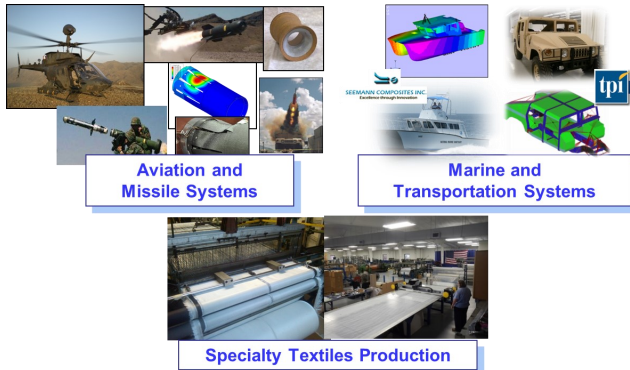
[www.materials-sciences.com](http://www.materials-sciences.com)

## COMPANY PROFILE

Materials Sciences LLC (MSC), headquartered in southeastern Pennsylvania, is a small business that has provided engineering services to the composites industry since 1970. A recognized leader in the design, analysis and testing of composite materials and structures, MSC is committed to excellence in all stages of the engineering development cycle: research, design, analysis, prototype manufacturing and testing. MSC's core capabilities include composite material development, product design, analysis, prototype manufacturing and testing. MSC also operates a textile and composite manufacturing facility in Greenville, South Carolina and engineering offices in Huntsville, Alabama.

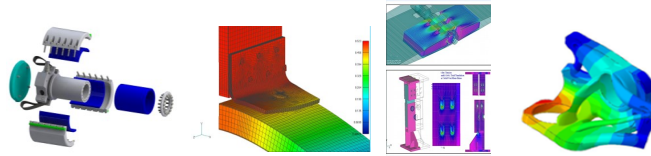
## PRODUCT DEVELOPMENT AREAS

MSC has led design, analysis, manufacturing and testing of advanced composite materials and structures for a broad range of product applications for both government and corporate clients. These have included marine and transportation systems, aviation and missile systems, ground vehicles, and unmanned systems.



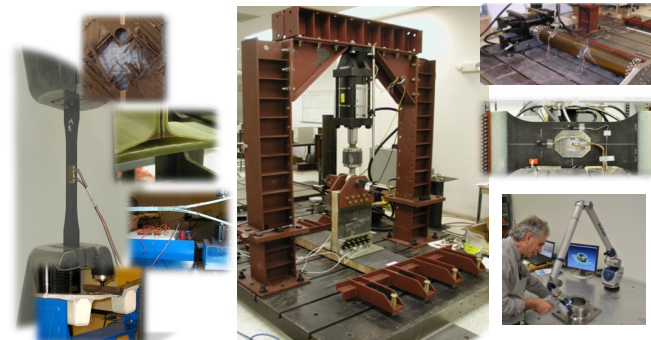
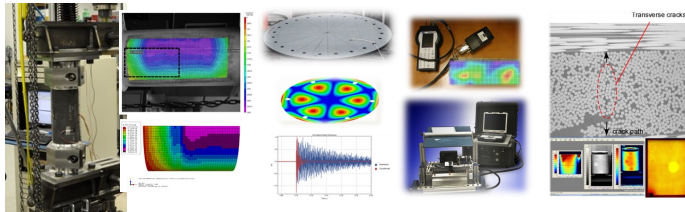
## DESIGN AND ANALYSIS

- ◆ State of the art workstations
- ◆ Computer aided design and solid modeling software (Autocad, SolidWorks)
- ◆ Commercial and in-house finite element programs (ABAQUS, LS-DYNA, ANSYS, FEMAP)
- ◆ Proprietary materials analysis and design software
- ◆ Design optimization for additive manufacturing



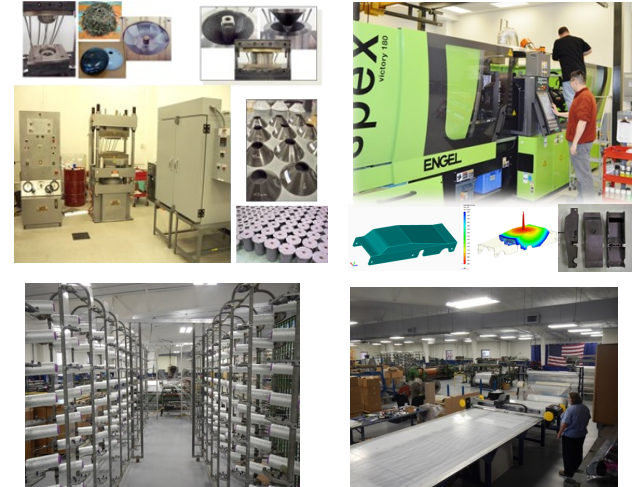
## MATERIAL CHARACTERIZATION AND STRUCTURAL TESTING

- ◆ Test planning, specimen design, data reduction and analysis, material qualification
- ◆ Standard coupon (e.g., ASTM, SACMA) and large-scale specialty element/component testing
- ◆ Static and Fatigue Testing -Servohydraulic and electro-mechanical
- ◆ Dynamic— modal analysis, DMA, creep, random vibration, shock, system identification
- ◆ Environmental conditioning —moisture, temperature, UV, etc.
- ◆ Dimensional analysis/3D inspection
- ◆ Non-destructive Testing (Ultrasonic Transmission, Thermography, Acoustic Emission)



## PROTOTYPE MANUFACTURING AND PRODUCTION

- ◆ Fabrication of fiber reinforced (continuous and discontinuous) thermoset and thermoplastic composite parts
- ◆ Out-of-Autoclave (OoA) manufacturing via resin transfer molding (RTM), resin film infusion (RFI)
- ◆ Compression molding
- ◆ Injection molding



## MODELS FOR EVOLVING MATERIAL RESPONSES

- ◆ **MAT 161/162-** Progressive failure model for LS-DYNA and ANSYS
- ◆ **NDBILIN**—Stress based failure modeling for ABAQUS
- ◆ **DDSHM**—Fracture-based failure modeling for ABAQUS

