



# UNIQUE SOFTWARE CAPABILITIES

CCM has been creating unique design and analysis software solutions for composite structures for more than two decades. The software is continuously upgraded to reflect new research findings as well as to capitalize on advances in computing technology. Software applications such as CDS SMARTree, LIMS and MAT162 are used extensively by researchers at UD-CCM and industrial sponsors to predict material properties and behavior during processing as well as study failure of composites under dynamic loading.

## Composite Design Software: CDS 2026

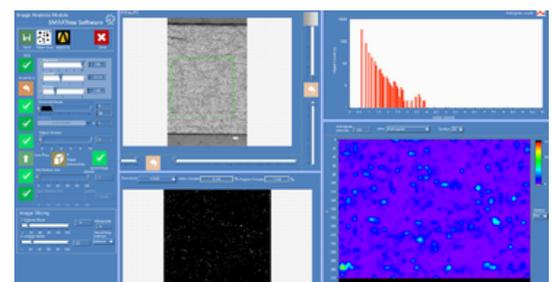
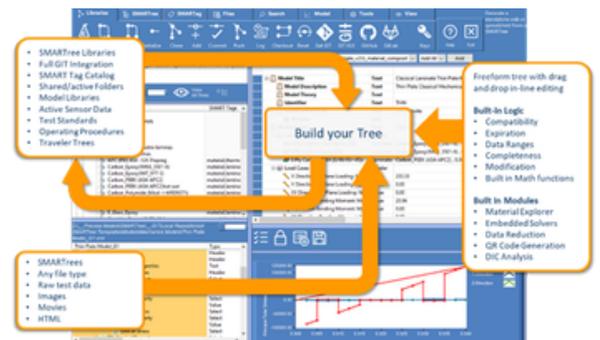
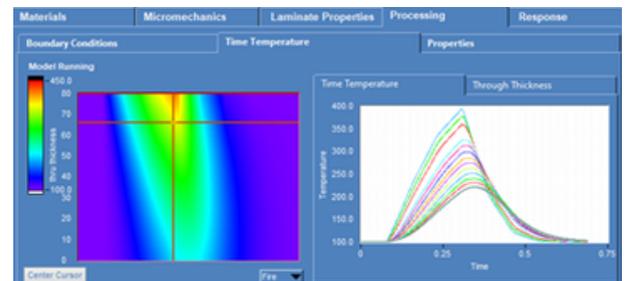
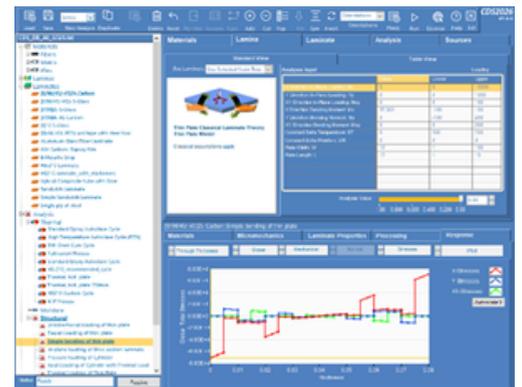
Composite Design Software (CDS) is UD-CCM's integrated structural design and analysis platform for composite materials. The latest release includes real time design and analysis of composites from micromechanics to laminate analysis and process simulation. CDS Accelerates composite design decisions through real-time property prediction, analysis, and ranking. CDS is used by researchers, students and industrial partners at CCM to design, analyze, and optimize composite structures across aerospace, automotive, energy, and other advanced manufacturing sectors.

- Built in materials, micromechanics, laminate and process library
- Real time predictive capabilities for fiber-matrix-filler micromechanics that feed into laminate design
- Thin and thick section laminate analysis including cylinder design.
- Thermal analysis of composites for optimization for autoclave, oven, pultrusion and ATP processes.

## SMARTree Software

SMARTree is an easy-to-use tree-based drag and build GUI with built-in solvers that allows implementation and control of standard protocols to store and share material, process and test data. The client manages creation and storage of XML data with built-in data and logic checking that validates the information while being assembled. The software leverages the power of GitHub to access and store data with version control while utilizing 'SMART Tags' locally to hashtag metadata that reference stored data for embedded modeling and design functionality. The client can also directly import raw test data and images for data reduction.

- Easy to use drag and drop GUI that allows implementation and control of standard protocols to store and share material, process and test data.
- Built-in hierarchical logic and integrity checks so as to ensure valid data with compliance to various material and test standards.
- Embedded solvers for micromechanics, laminate mechanics and process modeling of composites.
- Data reduction methods capable of handling various data sources including images and test data.
- GitHub storage and access for redundancy and version control.



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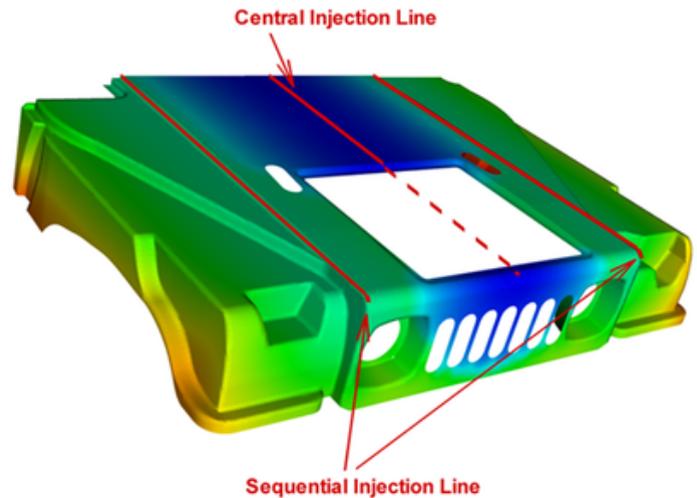
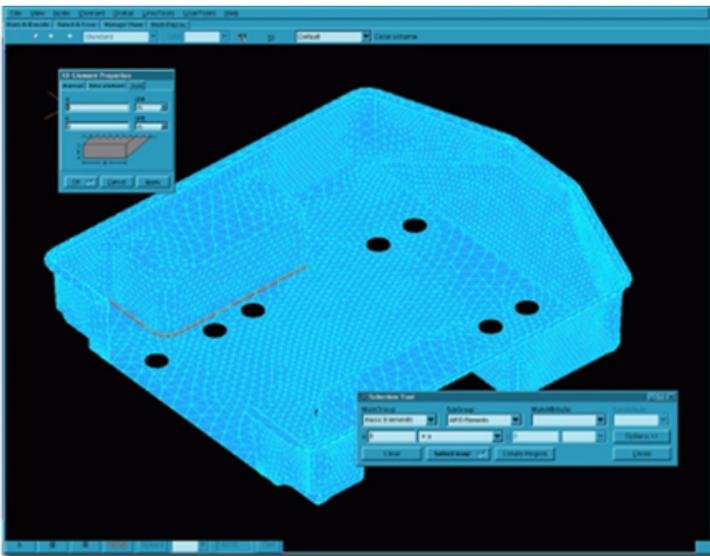


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## Liquid Injection Molding Simulation (LIMS)

Liquid Injection Molding Simulation (LIMS) is a software tool that simulates the mold filling stage of resin transfer molding (RTM) and related processes. LIMS has been successfully used to design and simulate intelligent or adaptive filling process that utilizes sensors mounted on the part and controllable injection hardware, either as a stand-alone program or as a simulation engine for other programs.

- Fast solution algorithm.
- 3D Solids, 2.5D shells, & 1D runners. Any combination of elements to properly simulate distribution media and resin injection hardware.
- Anisotropic permeability and race-track modeling is available.
- Multiple injection gates, vents, and tracking of captured volatiles.
- Fabric deformation can be integrated.
- Fully adaptable and controllable using script language. Active control and sequential injection approach can be simulated using virtual "sensors" available to the script.
- Dry spot prediction, flow rate and pressure tracking are available throughout the simulation.
- MPI based interface is available for (1) controlling the simulation and (2) coupling it with other numerical models.
- Available on Windows and Linux.
- Graphical user interface tailored toward the specific needs of liquid composite molding is included.
- Input files can be prepared in many applications.



[ccm.udel.edu/our-expertise/services/software/](http://ccm.udel.edu/our-expertise/services/software/)

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