The University of Alabama at Birmingham (UAB) has a host of software and professionally trained personnel in computer based design & analysis, static & dynamic finite element analysis, process modeling and simulation of advanced materials including composites. The software listed are being used in number of federal, industry and education programs by UAB and collaborating researchers.

**Pro/ENGINEER**
- Design for manufacturing
- Solid modeling & drawing generation
- Tooling design
- Assembly drawings
- Several modules including Pro/NC, Pro/Sheet metal,
- Plastics Advisor, Pro/Hull & Pro/Mechanica
- Pro/E classes and workshops offered

**ALTAIR HYPERMESH**
- Altair HyperMesh is a high-performance finite element pre- and post-processor for major finite element solvers, supports the direct use of CAD geometry and existing finite element models, providing robust interoperability and efficiency.
- Mesh optimization from a set of quality criteria
- Modification of existing meshes through morphing
- Generation of mid-surfaces from models of varying thickness

**ANSYS 8.0**
- The ANSYS Multiphysics solution provides the analysis industry’s most advanced coupled physics technology, combining structural, thermal, CFD, acoustic and electromagnetic simulation capabilities in a single software product.
- Structural analysis of composite materials:
  - Static, linear, non linear, modal, and vibration.
  - Thermal analysis of composite materials: Steady state, transient, convection, conduction and radiation.
- Coupled analysis:

**GENOA**
- Durability and damage tolerance of composite materials
- Virtual testing
- Probabilistic analysis
- Part manufacturability
LS-DYNA is a general-purpose multiphysics simulation software package. In a given simulation any of LS-DYNA's many features can be combined to model a wide range of physical events. LS-DYNA's predecessor, LLNL DYNA3D, was originally written for military simulations, and consequently, LS-DYNA has advanced features for defense applications, simulating projectile penetration, blast response, and explosives.

**Key Applications**
- Penetration and perforation mechanisms
- Explosives and Blast
- Waste containment
- Bird strike, jet engine blade containment, and structural failure.
- Crash and Impact Analysis

**CADPRESS THERMOPLASTIC**

Software for simulation of the compression molding process for fiber reinforced melts, predicts final fiber orientation, material properties, cavity fill characteristics, and optimum charge size placement based on different polymer characteristics and input geometry. This package was developed to simulate the multi-phases of the injection/compression and extrusion-compression molding process.

**RTM-WORX**

- Software for the simulation of the VARTM/RTM process
- Prediction of mold filling times
- Resin rich/starved areas
- Local volume fraction
- Flow fronts contour plots
- Newtonian, Non-Newtonian,
- Iso & Non-Isothermal
- Reactive Processing modules

**PAM-FORM**

- Software for the modeling of the thermoforming / stamping process
- Predicts wrinkling, scissoring, stresses and deformation in thermoforming manufacture
- Lamination theory failure criteria included

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*Modeling and Simulation Capabilities for Advanced Materials and Structures, University of Alabama at Birmingham*

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