CDS: COMPOSITE DESIGN AND SIMULATION SOFTWARE
NEXT GENERATION INTERFACE FOR DESIGN AND ANALYSIS OF COMPOSITE STRUCTURES

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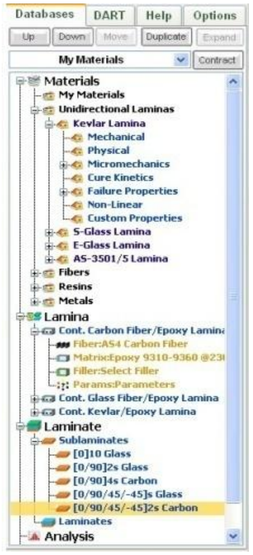
NEED FOR NEW CDS INTERFACE

- The original CDS software suite was comprised of 10 separate codes which include data reduction software, micromechanics, structural mechanics, progressive failure, environmental analysis, processing science and ballistics
- Need exists to consolidate codes into one interface for the following reasons:
  - Aid users with more complex analysis features with a better GUI
  - Material databases should be stored within analysis environment
  - Interface from single environment to commercial FEA software
  - Improved deployment, only one software package to manage
  - Single program can be tailored for demos, full access and customized code incorporation

CDS v1.2

http://www.ccm.udel.edu/Tech/CDSindex.html/

SMART MENU TREE



- CDS v1.2 is driven by a new menu tree interface
- User stores all materials, laminas, laminates, structures, load cases, and material source information.
- User can create, edit, duplicate, delete their own data sets for materials, laminas, laminates, structures etc.
- Menu tree actively analyzes your work to ensure that your analysis does not have incomplete data or errors.

CURRENT CDS CLIENT LIST

GENERAL DYNAMICS Land Systems · Honeywell · BOEING · SIEMENS · PETROLEUM COMPOSITES · AEROJET · BAE SYSTEMS · CUBED TECHNOLOGIES, INC. NEW MATERIALS FOR A NEW AGE · V System Composites · msc · DASSAULT AVIATION · agy · GM · ARMORWORKS Providing Leading Edge Armor Technology · Greene Tweed The Inside Advantage · AMRDEC Army Center of Excellence for Aviation and Missile Technology · Middle River Aircraft Systems · TARDEC · Redstone Arsenal, AL · FAU · KOP-FLEX · AERONOVA · UAH · Barrday · Penn · USC · ATM · PURDUE UNIVERSITY · University at Buffalo The State University of New York

Materials Database Management & Generation
(CDS-MAT, DART, MAT162)

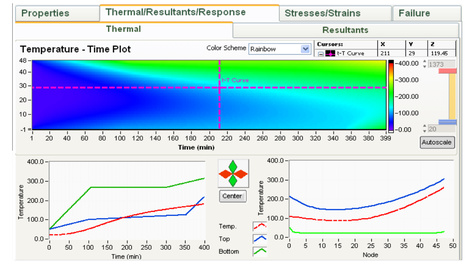
Thermal Modeling
(COMPROSOFT, PIRSA4 CCDS, FEA IMPORT)

Process/Environment
- Cure Kinetics (PIRSA4)
- Crystallization Kinetics (COMPROSOFT)
- Moisture Diffusion (MDS)

Microstructure
- Micromechanics (MICRO,MICRO2, TEXCAD)
- SLS Viscoelastic (PIRSA, COMPROSOFT)
- Quality Development (PIRSA, COMPROSOFT)

Structural Mechanics
- Thin Plate Mechanics (CMAP)
- Thick Section Mechanics (LAM3D, LAM3DNL)
- Cylinder Design (CCDS)
- Progressive Failure (CMAP,LAM3D,LAMPAT)
- Specialized Codes (CST)

MATERIAL PROCESSING



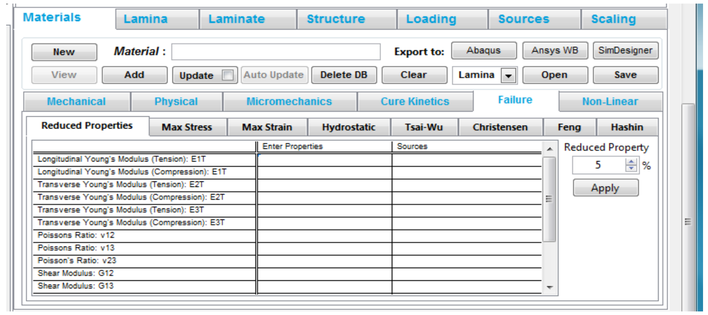
Heat Transfer Model

- Time based input – Autoclave, Oven, Elevated VARTM Processing
- Dimension Based input – Pultrusion, extrusion, Automated Tape Placement, continuous lamination

CDS: Composite Design Software
Next Generation Interface for Design and Analysis of Composite Structures

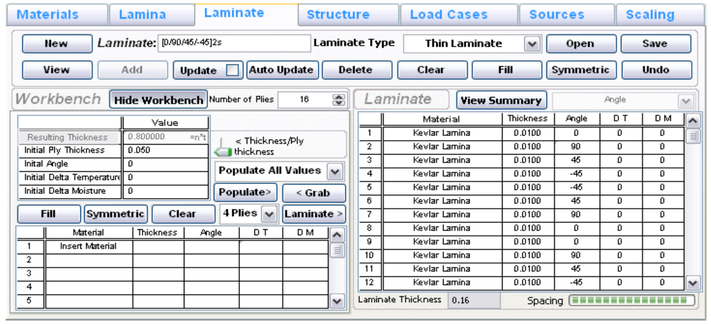
(Continued)

MATERIAL INPUT



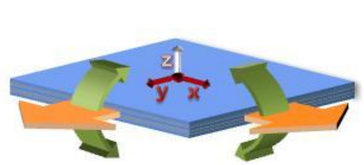
- Material input for CDS includes the following properties
  - Mechanical Properties, micromechanics input
  - Physical Properties, cost
  - Failure properties, reduced property sets
  - Non-linear properties, MAT162 Property lists

LAMINATE INPUT

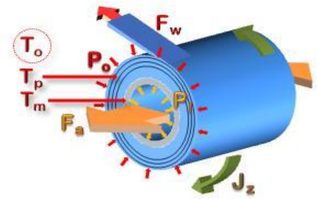


- Laminate input for CDS includes the following:
  - Material Selection, thickness, angle, ply delta temperature and moisture, and winding tension (for cylinders)
  - Workbench allows for rapid creation of multiple laminates for design studies

STRUCTURES

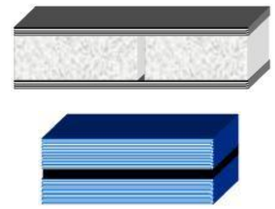


Thin Section Composites



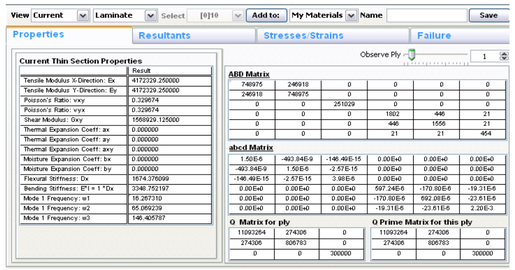
Thick Walled Cylinders

Thick Section Composites



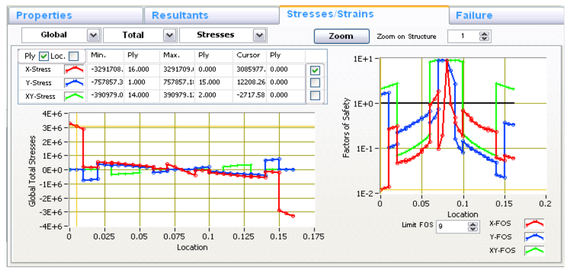
Hybrid Structures

EFFECTIVE PROPERTIES



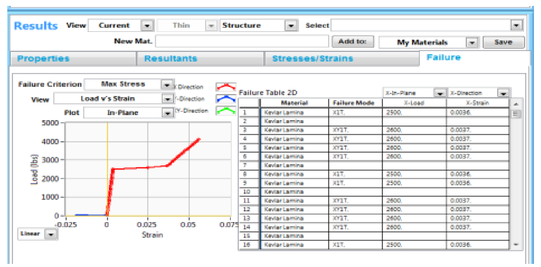
- Outputs results for:
  - Thin or thick section effective properties
  - Load and Strain Resultants

STRESSES/STRAINS



- Outputs include internal stresses, strains, displacements and factors of safety from mechanical, thermal or moisture loading for thin, thick walled plates or cylinders

PROGRESSIVE FAILURE



- Progressive failure using max, stress and strain, Tsai-Wu failure results under multi-axial loading
- Outputs include, failure ply and mode, load-strain plots, property reduction over loading

CDS AVAILABILITY

Software available to current Industrial Consortium members, university researchers and collaborating government agencies

ACKNOWLEDGEMENTS

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