

MCQ MANUFACTURING DEFECTS MECHANICS AND CHARACTERIZATION (MDM, MDC)

MCQ-Composites MDM is a nano code that feeds the micro mechanics properties that are related to defects – voids, shapes & sizes, and fiber waviness – into MCQ or GENOA. The inputs can be obtained from micrographs of sliced specimens. Voids can be spherical, ellipsoidal, cylindrical and the parameters are length, width, and height. Fiber waviness length and amplitude are needed to perform this analysis. **The result is ##.** This capability is given to engineers and is only a subset of what MCQ-NANO can do.

- ✓ Predict isotropic, transversely isotropic, and orthotropic properties due to
 - Fiber waviness
 - Void shape and size
- ✓ Defects observed in inspection of coupons or structures can be incorporated into Durability and Damage Tolerance (D&DT) analysis
- ✓ Layer properties with defects can be used at any or all laminate layers

MDM: Predict layer properties with defects

Description	Value
Analysis	
Defect Type	VOIDS
Steps	VOIDS
Materials	FIBER_WAVINESS
Fiber Name	IM7
Matrix Name	977-2_NL
Void Parameters	
RHO Void (tonne/mm ³)	1.205000E-12
Alpha Void (1/C)	3.430000E-03
KE Void (SIEMENS/mm)	5.500000E-18
KT Void (mW/(mm ² C))	2.500000E-02

Key Benefits

- Use existing test data to model defects
- Predict behavior of composites with defects – important for fatigue!
- Reduce Physical Tests by over 65-70% thus saving significant costs

System Requirements

- Windows XP/Vista/7/8 or Linux (64-bit)
- Java 1.7 minimum Runtime Libraries
- Java3D 1.5

Minimum Configuration

With the minimum configuration, performance and functionality may be less than expected.

- 1 GHz or higher CPU, 4GB RAM, 10GB disk space

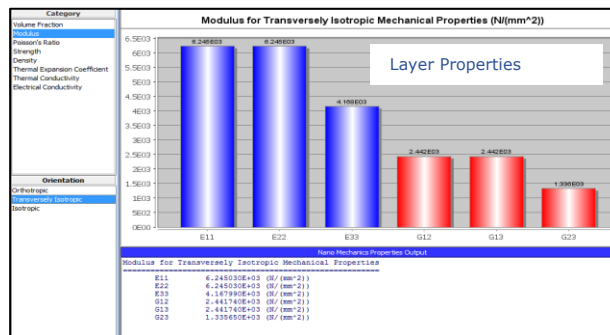
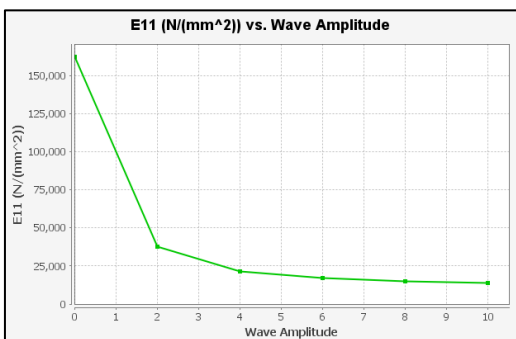
MDC: Study Strength or Stiffness Drop vs Wave Amplitude or Void Shape/Sizes

Void Shape/Sizes

Void Shape/Sizes	Length (mm)	Width (mm)	Height (mm)
1 ELLIPSOID	2.000000E-02	1.000000E-03	3.000000E-05
ELLIPSOID			
DISC			
SPHERE			

Fiber Waviness

Void Volume (Fraction)	Volume (Fraction)	Wave Length (mm)	Wave Amplitude (mm)
2.061900E-02	5.709130E-01	3.000000E+01	2.000000E+00



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More of Alpha STAR's Test Validated products:
MCQ: Composites, Ceramics, Metals, Nano, Chopped
GENOA: PFA, PFDA, UAB, URD, ABS, PCP, PA, Quasi Static Fatigue & Random Fatigue, Harmonic & PSD Fatigue, Fatigue with Fracture Mechanics, PFA_AGING, VCCT, DCZM, Filament Winding, Jobspooler, GENOA_CLOUD