AlphaSTAR

GENOA
MS - PFA

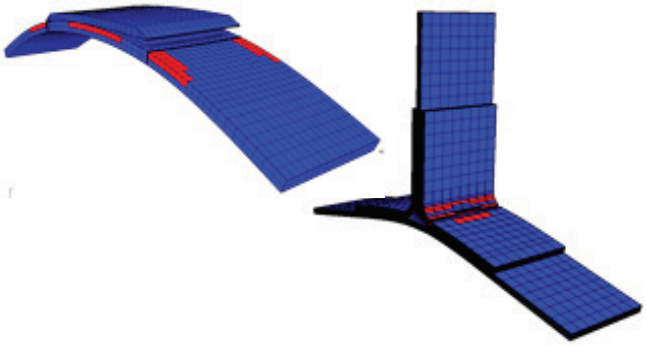
OVERVIEW

GENOA Multi Scale Progressive Failure Analysis is a tested & verified simulation software that augments traditional Finite Element solvers to predict behavior of advanced composite materials & structures subject to various loading conditions. The predictive computational technology integrates damage and fracture mechanics allowing analysts to track damage initiation and propagation until the loss of structural integrity occurs. The platform supports both virtual testing (e.g. static, fatigue, impact, allowables) and virtual manufacturing (e.g. filament winding, injection molding, 3D-Printing) and helps reduce the need for expensive physical experiments. GENOA is tightly coupled with Abaqus, Ansys, Lsdyna, NX-Nastran and MSC-Nastran.

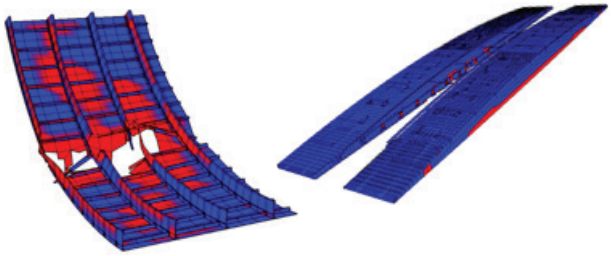
CAPABILITIES

VIRTUAL TESTING

Static: Predict maximum loads that structures can sustain using a step-by-step virtual loading procedure that takes into consideration material degradation, nonlinearity and changes in structural geometry



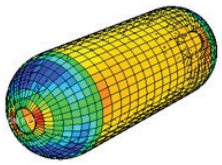
Fatigue: Determine fatigue life of components subject to various conditions such as (a)constant, variable, or dynamic amplitudes, (b) static or dynamic loads, (c)sequence of external cyclic excitations



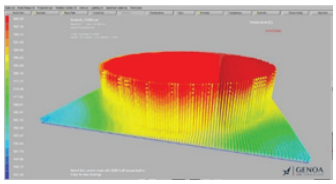
Impact: Dynamic analysis coupled with Lsdyna or Abaqus Explicit to replace various impact tests such as crush & crash, bird-strike, drop, compression after impact, etc…

A-& B- Basis Allowables: reduce coupon testing by simulating the scatter in composite material properties and fabrication parameters

VIRTUAL MANUFACTURING



Filament Winding: Simulate winding process of composite overwrapped pressure vessel and determine residual stress, leakage and burst pressure



Additive Manufacturing: Supports polymer and metal applications(e.g. FFF, SLS, LPBF, SLM, etc..) Uses printer and material information as input to provide granular control of the printing process.

Injection/Compression Molding: The code takes in account the fiber orientation tensor components for both injection and compression molded parts to model the anisotropic nature of stiffness and strength and perform micro mechanics based de-homogenized multi-scale progressive failure analysis.

BENEFITS

- Predict structural performance considering defects (void, fiber waviness, curing and residual stress)
- Modeling and simulation of complex parts and materials
- Compatible with HPC for parallel processing of large complex models
- Guides test by analysis to reduce testing up to 65%
- Optimizes design of lightweight structures and vehicles
- Delivers greater accuracy with minimal computational overhead

BUSINESS VALUE

- **Accelerate Time to Market** – minimize process defects to improve performance
- **Improve Engineering Productivity** – integrate process simulation with assessment of properties and structural analysis.
- **Reduce Manufacturing Costs** – reduce scrap rate and trial and error

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