

**Aerospace
engineering**

**Reach higher
performance altitudes**

Take the next step in your simulations by employing the standard in multi-disciplinary simulation

The broad range of functionality complemented by special tools, along with the high level of process automation, will ensure high performance and efficiency for all your required tasks. The BETA suite will streamline your working ways and offer you all the tools you need for effective multi-purpose simulations.

Core Functionality

- Integrated CAD tools for easy and fast geometry creation, modification, cleanup and defeaturing.
- Middle Surface extraction of complex parts.
- Batch Meshing that respects user-specified quality criteria and mesh parameters for each part of the assembly. ANSA offers automatic feature recognition, defeaturing and special treatment for fillets, flanges, tubes, and holes, tailored meshing rules, local refinement and coarsening.
- High tech tools for mesh editing that speed up pre-processing.
- Part and Sub-Assembly based model build-up offering: Part, Version and Representation Control & Exchange.
- Flexible, updatable definition of Connections, Fasteners, Adhesives and Welds within ANSA.
- Model Comparison: identification of different regions, specific characteristics capturing, and reuse of validated work.
- Tools to organize a step-wise sequence procedure.
- Direct coupling with IDE software from within ANSA interface to automate ANSA processes with Python language.
- Interoperable pre-processing decks for numerous solvers for FEA and CFD analyses.
- Output of ready to run solver input files for all industry used solvers.

CFD Oriented Features

- Powerful surface wrapping tool, capturing all sharp edges of the model, with curvature and proximity refinement. Rapid creation of fully watertight models regardless of the geometry complexity. Leak detection tool.
- Automatic curvature-dependent surface meshing with user controlled growth rate, min & max element size and mesh feature angle.
- Fast and robust volume meshing for tetra, prism, pyramid and hexa elements.
- Generation of smooth boundary layers, advanced control for squeezing, collapsing or excluding to overcome quality and proximity issues.
- A variety of options for boundary conditions definition.
- Easy setup and high accuracy results of Smoothed-Particle Hydrodynamics (SPH) simulations.

Composites

- Creation, modification and visualization of thickness and fiber orientation of composite structures.
- Integration of VISTAGY's FiberSIM and SIMULAYT's Layout for seamless exchange of composite material data.

Morphing & Optimization

- Parametric shaping of both FE model & geometry.
- Model validation through preview of model shaping.
- Generative morphing tools to create new features and parts from scratch.
- Feature recognition, scaling and sliding onto a surface.
- Optimization tool for:
 - Enhanced Design Of Experiments allowing the exploration of the design space. Automatic generation of designs via numerous algorithms.
 - Optimization studies via various available algorithms. Run direct optimization studies or exploit the state-of-the-art Machine Learning functionality to run Response Surface Model (RSM) based optimization studies.
 - Definition of full model reports during the optimization process, checking model validity.
 - Direct coupling of ANSA & META with all industry-standard parametric optimizers.
 - Integrated TOSCA interface.

Special Tools

- Creation, manipulation & calculation of cross sections.
- Automatic creation of beam elements.
- Replacement of meshed parts with beams of equivalent Cross Section.
- Distribution of non-structural mass for proper total weight equivalence.
- Model sub-structuring while preserving the original loadcase setup.
- Mapping of pressure & temperature results from a CFD simulation to the FEA model.
- Fatigue life prediction in both frequency and time domain with the FATIQ platform.
- ASERIS interface for electromagnetic simulations set up.
- Trapped Fluids volume identification.
- Creation & efficient handling of fasteners & connections.

Features

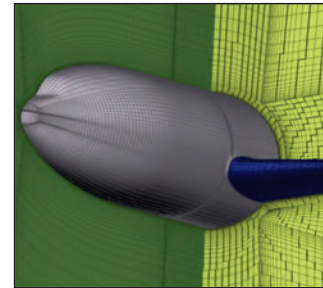
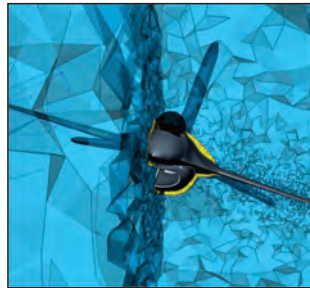
- Process automation
- Geometry clean up
- Shell and Volume meshing
- Boundary layer meshing
- Interoperable decks
- Solver-like entity cards
- Model assembly
- Model checks & auto fixes
- Welds & Fastener modeling
- Mass trimming
- Sub-structuring
- Results mapping
- Parametric morphing
- Optimization studies
- Automated 3D & 2D post-processing
- Results calculation
- Automated reporting

Benefits

- Multidisciplinary processing in a single environment
- Cost and time-to-market minimization
- Decrease of human error potential
- Fast design modifications for reanalysis
- Easy handling of large and complex models
- Machine learning optimization using advanced optimization techniques
- Coupling with any optimizer
- Fast generation of comprehensive and ready-to-show reports
- Effortless execution and repetition of frequent tasks

EPILYSIS: The Finite Element Solver

- Linear Statics, including AMLS & block-Lanczos Eigen-Value analysis.
- Dynamics: Direct, Modal & Transient.
- Small-strain Non-Linear / Contact.
- Substructuring/Static Condensation/Component Mode Synthesis.
- Shared Memory Parallel Architecture, in & out-of-core, for large problems.



Post-processing

- Support of results from all popular Structural, CFD, Thermal and Electromagnetics solvers and measurement formats.
- Multiple visualization styles of Streamlines, Streaklines, Particles and more, colored by any variable available.
- Hot spots identification through filtering capabilities incorporated in many tools of META.
- Overview of results achieved through statistics tables with spreadsheet functionality.
- Integrated calculator for linear combination of results deriving from other loadcases.
- Calculation of forces and moments on any user defined section and output in solver format for sub-modeling.
- Integrated powerful graph tool for direct plotting of data deriving from the 3D model or from imported solver time history files and measurement data.
- NVH post processing with a whole variety of 2D plots (Polar, Magnitude-Phase, DNA and more) and integrated tools like Modal Model Building, Modal Response calculator and FRF assembly.
- Automation capabilities via session commands, python scripting and fully customized user toolbars facilitate the post-processing for durability and fatigue analysis, among other analyses.
- Direct coupling of META with external optimizers.
- Image matching and video synchronization for results validation.
- Reports creation in pptx, pdf, html or Postscript format using the Report Composer.
- Dedicated Toolbars for CFD, Composites (failure criteria) and Bore Distortion.

