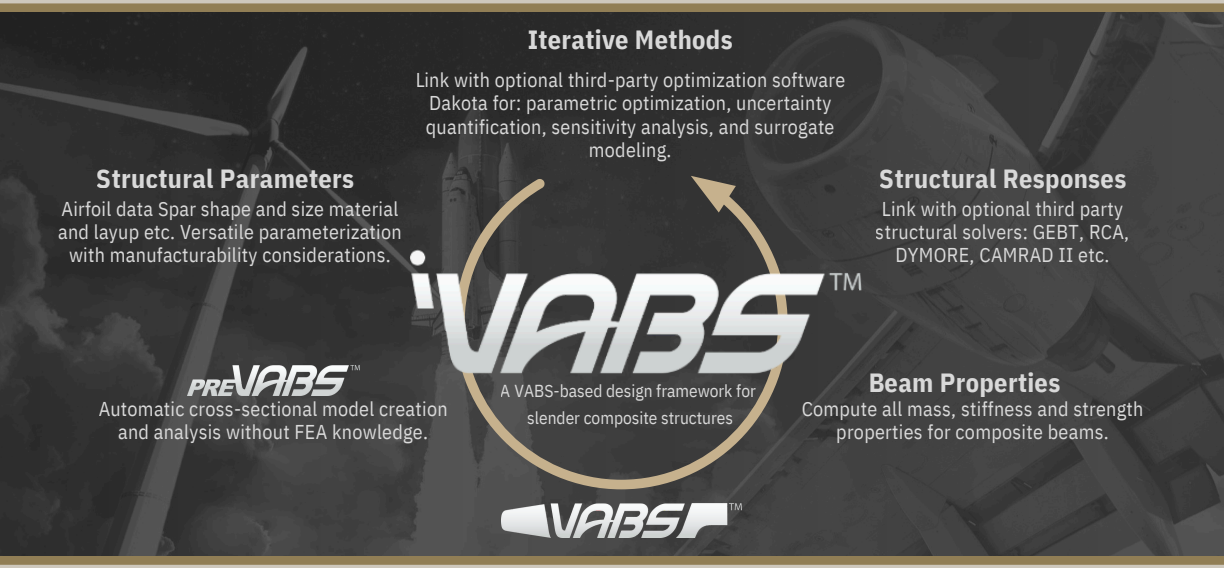
AnalySwift™

RIGHT RESULTS. AWAY.

iVABS | iVABS is an integrated computational framework built around VABS (Variational Asymptotic Beam Sectional Analysis) for the design, modeling, and optimization of slender composite structures (beams). iVABS enables engineers to leverage the fidelity of 3D FEA within an efficient 1D beam formulation. VABS, the core engine, provides efficient yet accurate cross-sectional analysis, while iVABS surrounds it with automation tools, optimization workflows, and integration capabilities to support advanced composite design. While VABS has been popular for decades for modeling helicopter rotor blades, it has quickly become a tool of choice for modeling blades and propellers used in air mobility (AAM/UAM), UAVs/drones, and wind turbines.



UNIQUE TECHNOLOGY

VABS | Performs high-fidelity cross-sectional analysis based on variational asymptotic methods

PreVABS | Automates parametric modeling of cross sections

SGIO | Python-based interface that manages I/O operations and workflow control

Optimization Tools | Supports parameter studies and design optimization via Dakota

Structural Solver Integration | Links with global beam solvers such as GEBT, RCAS, DYMORE, CAMRAD II, and others for complete structural simulation

ENERGY *SPACE* *AERO* *SPORT*

LEARN MORE AND TRY IVABS AT WENBINYUGROUP.GITHUB.IO/IVABS

KEY BENEFITS

The method combines the accuracy of 3D finite element analysis with the efficiency of beam theory, while robustly handling anisotropy, heterogeneity, and complex layups. It supports multiscale modeling from material constituents to full structures and facilitates optimization of mass, stiffness, strength, and fatigue life. The workflow integrates with commercial and custom global analysis tools and ships with clear documentation and examples for rapid adoption.

APPLICATIONS

ENERGY | Wind turbine blade structural tailoring

AERO | Rotorcraft blades and propellers cross-sectional optimization

SPACE | Composite booms and spars in aerospace systems

SPORT | Golf clubs and fishing rods

iVABS FOR COMPOSITE BEAMS

iVABS for composite beams delivers efficient 2D cross-sectional analysis to compute full beam properties—mass, stiffness, and strength—while automating the entire design workflow from cross-section generation to global performance evaluation. It links beam-level modeling with full-field stress, strain, and failure recovery via VABS, and supports parametric studies, sensitivity analysis, and optimization through seamless Dakota integration. The platform handles slender structures with arbitrary cross-sectional geometries and composite layups, accommodates both spatially constant and spatially varying designs, and integrates cleanly with RCAS, GEBT, and Dymore for end-to-end structural analysis. High-fidelity modeling is enabled through PreVABS, SGIO, and Python scripting for rapid, repeatable studies.

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