**FOR IMMEDIATE RELEASE**

## Seoul National University Leverages VABS for Optimization of Composite Helicopter Blades

West Jordan, Utah (USA), May 30, 2018- AnalySwift, LLC, a provider of efficient high-fidelity modeling software for composites and other advanced materials, announced today Seoul National University is leveraging its powerful VABS software to accelerate and optimize design of composite helicopter rotor blades and high aspect ratio wings. Seoul National University has used VABS for a variety of structural optimization projects in its Active Aeroelasticity and Rotorcraft Laboratory (AARL), which is part of the Department of Aerospace Engineering.

"We have worked with the Active Aeroelasticity and Rotorcraft Laboratory at Seoul National University for several years and we are pleased they selected VABS to be part of their toolset for simulation of composite rotor blades and other slender structures," said Allan Wood, president and CEO of AnalySwift. "The AARL is involved in a variety of exciting research areas for which VABS can accelerate design by delivering accurate and efficient results."

The AARL investigates aeroelastic phenomena occurring in aircrafts and spacecrafts, under the direction of Professor SangJoon Shin. Specifically, aeroelasticity examines interactions among the inertial, aerodynamic, and elastic forces on the aerospace vehicles, which generate large deflections of the structures that may lead to destructive failures. Thus, precise prediction of the aeroelastic behaviors is required to prevent failure of the aerospace vehicles. Moreover, aeroservoelasticity seeks more comprehensive solution where active devices or control surfaces alter coupled structural behaviors, and aerothermoelasticity investigates aeroelastic problems involving thermodyamic effects.

"The VABS program is a uniquely powerful tool for modeling composite blades and other slender structures, commonly called beams," said Dr. Wenbin Yu, CTO of AnalySwift. "VABS reduces analysis time from hours to seconds by quickly and easily achieving the accuracy of detailed 3D FEA with the efficiency of simple engineering models. With VABS, engineers can calculate the most accurate, complete set of sectional properties such as torsional stiffness, shear stiffness, shear center for composite beams made with arbitrary cross-section and arbitrary material. It can also predict accurate detailed stress distribution for composite beams, which are usually not possible with 3D FEA for realistic composite structures."

Comprehensive analyses for rotorcrafts and high aspect-ratio wings are performed at AARL using commercial, open source, and in-house codes for the geometrically exact beam theory where the one-dimensional beam and two-dimensional cross-sectional properties are used. Therefore, structural

optimization programs using VABS are frequently developed and used. Thanks to the powerful pre-post processing utility PreVABS, global optimization framework using scripts written in other tools is easily constructed. Two current projects being designed, in part, using VABS include an active helicopter rotor blade equipped with a trailing-edge flap, as well as a slender wing for human-powered aircraft.

In order to solve coupled problems regarding aerospace structures, researchers use computational structural dynamics (CSD) and computational fluid dynamics (CFD), and attempt to verify those with experimental correlations. Examples of the past and current research projects include: 1) fully coupled CSD/CFD analysis for flexible structures such as an insect-inspired flapping wing micro air vehicle using an enhanced structural element and Navier-Stokes equation; 2) coupled aeroelastic dynamic analysis with control for unmanned aerial and space launch vehicles; 3) nonlinear flutter prediction for flexible aircrafts; 4) acoustic analysis for high speed vehicle applications; and 5) multidisciplinary design optimization of rotorcrafts and active rotor blades such as active trailing-edge flaps. Please visit the AARL website for details on ongoing research.

With continuous development spanning nearly 30 years for performance and robustness, VABS is used in the aerospace and wind energy industries for modeling complex composite rotor blades, wing section design, and simulating other slender composite structures. Developed at Georgia Institute of Technology (Georgia Tech) and Utah State University, VABS is available through AnalySwift at analyswift.com.

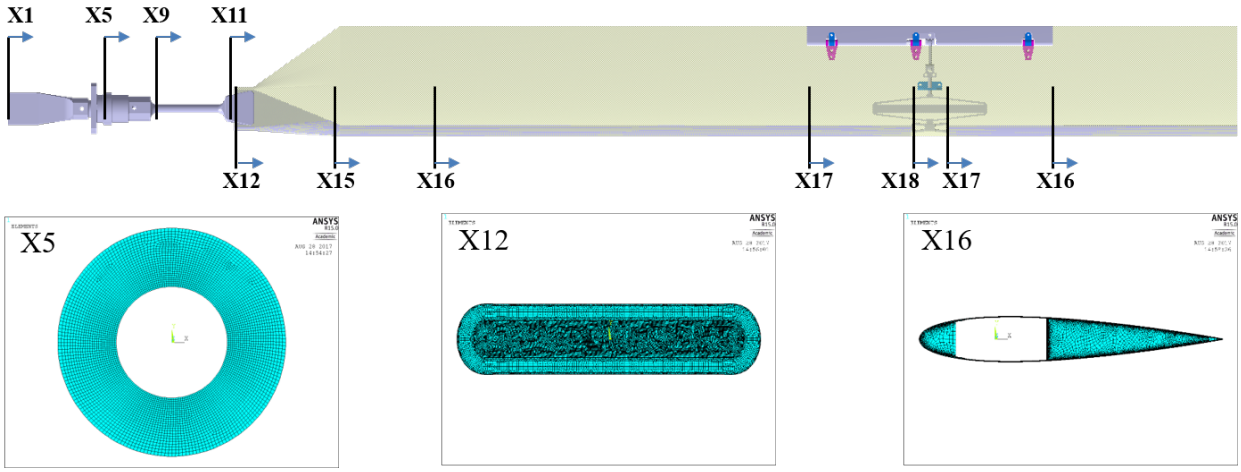


**Figure 1. Example of VABS for designing and analyzing a composite blade with a trailing-edge flap installed on Korea Aerospace Research Institute hingeless hub, by Ph. D. Eun, alumni of AARL.**

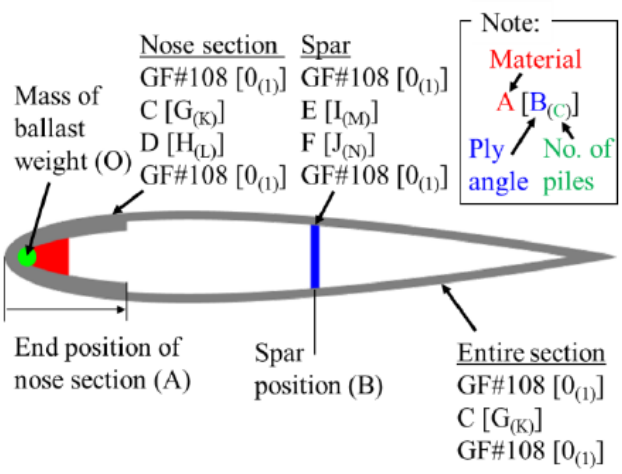


**Figure 2. Optimization of the cross-sectional configuration of helicopter rotor blade.**

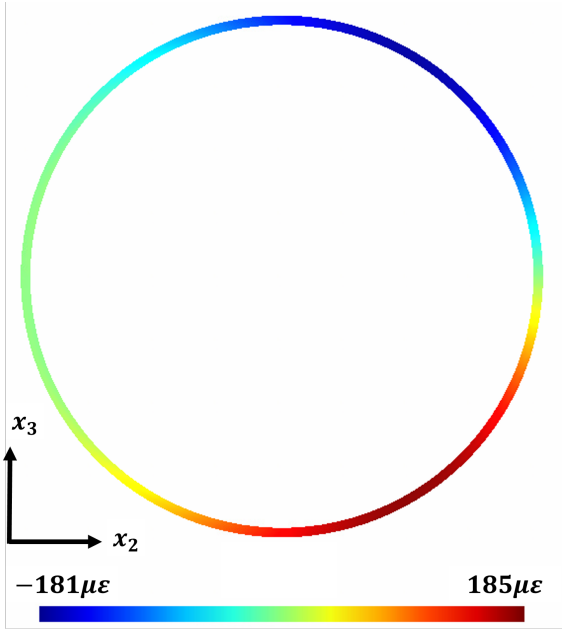


**Figure 3. $\gamma_{12}$ strain recovery analysis result of a pipe-type main spar of a human-powered aircraft by Kang, graduate student of AARL.**

**About AnalySwift**

AnalySwift, LLC is a provider of composite simulation software, which enables an unprecedented combination of efficiency and accuracy, including multiphysics structural and micromechanics modeling. Drawing on cutting edge university technology, AnalySwift's powerful solutions provide customers a competitive advantage through drastic reductions in engineering time, virtual testing earlier in the design process, and handling of more complex composite structures. Our technologies deliver the

accuracy of detailed 3D FEA at the efficiency of simple engineering models, cutting analysis time by orders of magnitude. SwiftComp is licensed from Purdue Research Foundation. VABS is licensed from Utah State University, and Georgia Institute of Technology. AnalySwift is a member of the Institute for Advanced Composites Manufacturing Innovation (IACMI. Find out more at analyswift.com.

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