# Department of the Navy SBIR/STTR Transition Program

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Topic # N221-007
VIVA: A Software Toolkit for Automated Multiscale In-Situ Effective Mechanical Property Prediction from Computed Tomography of As-Built Composites
ATA Engineering, Inc

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-261

**Transition Target:** CH-53K King Stallion

**TPOC:** (301) 342-8139

**Other Transition Opportunities:** V-22, H-1, H-53K, MQ-4C

**Notes:** The VIVA software from ATA Engineering, Inc., (ATA) automates creation of finite element models (FEMs) from computed tomography (CT) inspection data to streamline assessment of effects of defects and data-driven predictive maintenance planning for as-inspected composite aircraft parts.

Photo courtesy of U.S. Navy:

## WHAT

**Operational Need and Improvement:** Navy review boards decide on composite part acceptance, repair, or replacement using a combination of nondestructive inspection (NDI) data and prior fatigue testing. These decisions are subjective, often with high uncertainty in linking as-inspected part features to fatigue or damage outcomes. VIVA closes this knowledge gap by automating the creation of a quantitative linkage between NDI data and a part's remaining life via finite element (FE) simulations correlated to material test data, thereby enabling data-driven decision-making by flight review boards.

**Specifications Required:** A software toolkit to automate the generation of nonlinear, anisotropic mechanical properties for as-built composite structures, including the effects of defects, to accelerate FE analysis to guide fleet repairs and aircraft production non-conformal dispositions.

**Technology Developed:** Volume Image-based Virtualization for Allowables (VIVA) delivers a first-ever streamlined software workflow to convert X-ray CT data from NDI of composite parts into FEMs that directly represent the as-inspected part condition, enabling accurate prediction of usable part life and more-quantitative, data-driven decisions for part acceptance, repair, or replacement in a digital-twin fleet sustainment environment. VIVA leverages advanced machine learning (ML) algorithms for CT data processing and uncertainty quantification (UQ) of ML results to enable straightforward assessment of ML model trustworthiness by end users.

**Warfighter Value:** More efficient, objective, and quantitative flight review board decisions to reduce time, effort, and backlog for sustainment of composite aircraft components.

## WHEN

**Contract Number:** N68335-24-C-0236 **Ending on:** Oct 05, 2026

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|---|---|---|---|
| Established feasibility for a streamlined CT-to-FEM workflow | N/A | Verification of ML-predicted features against human analysis | 3 | 2nd QTR FY23 |
| Delivery of prototype VIVA software to DoN and initial experimental verification | Low | Verification of semiautomated CT-to-FEM workflows and UQ features with demonstrated applicability to Navy parts | 4 | 4th QTR FY26 |
| Option Period: VIVA experimental verification and validation of fatigue damage predictions | Medium | Demonstrated accuracy of fatigue damage predictions using Navy-relevant test articles | 6 | 1st QTR FY28 |

## HOW

**Projected Business Model:** Deployment of VIVA tools and tailoring of methods to individual production and sustainment programs as contracted engineering services, with no-cost transition of SBIR-developed software.

**Company Objectives:** Directly benefit the warfighter and our clients in Government and industry through rapid transition of innovative engineering tools and methods to programs of record through our engineering services and consulting business focused on providing deep expertise in simulation- and test-driven design of highly engineered systems.

**Potential Commercial Applications:** Ongoing commercialization efforts are focused on guiding prime contractors and Government program review boards on definition of streamlined, data-driven part acceptance criteria and evaluation processes using VIVA-generated insights to increase production volume and mitigate uncertainty in as-inspected part performance.

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