

Sample Task Order 1

Advanced Active Rotor Concept Assessment

Statement of Work

I. Overview

The contractor will provide a technology maturation effort for one contractor-selected advanced active rotor concept to be analyzed, tested in a simplified scaled model hover and/or wind tunnel test, incorporated into a rotor of contractor choosing, and subsequently tested in the National Full-Scale Aerodynamics Complex (NFAC). The active rotor concept can include, but is not limited to, active blowing, dynamic flaps or slats, deforming airfoils shapes, active twist, and deployable tabs or other devices. The intent is provide substantial improvement in hovering and/or forward flight aeromechanical behavior for a rotary wing aircraft.

II. Statement of Work Tasks

Concept Identification Task

This study task shall be to define and characterize a number of active concepts capable of improving rotorcraft aeromechanics. The advanced active concepts can be considered for either a helicopter rotor (coaxial included) or a tilting prop rotor. Bi-stable on-blade actuators can be considered for this study. The contractor will quantify benefits and then select a concept which holds major potential for substantial aeromechanical improvements using rotor efficiency as the primary metric.

Technology Evaluation Task

This task will define and execute a risk reduction and concept maturation effort that will include modeling and analysis of the concept and evaluation of the intended benefits through small-scale hover and/or wind tunnel testing. The analysis effort will include full physics modeling and quantifying the benefit of the proposed concept. The wind tunnel testing can be nonrotating or rotating, depending on approach, but should be performed in a manner so a realistic assessment of the flow physics being influenced are modeled.

Active Rotor Design and Fabrication

A large-scale rotor is to be selected for integration of the active concept that can be tested on the NFAC Large Rotor Test Apparatus, the NFAC Rotor Test Apparatus, the Tiltrotor Test Rig, or vendor-supplied test stand. The design of the rotor will be pursued from conceptual design through detail design. A modification to an existing rotor set is acceptable. Appropriate design reports will be prepared and reviews will be held to substantiate rotor design maturation. Rotor fabrication will be conducted subsequent to design completion.

NFAC Wind Tunnel Testing

The contractor shall fully support a 10-week test in the NFAC at NASA Ames Research Center of the completed advanced active rotor. Full support will include mechanical and aerodynamics personnel support as a minimum. Test preparation at the NFAC will occur for two weeks prior to tunnel entry. A data report and final briefing from the tunnel testing will be provided within 3 months of test completion.

III. Deliverables

The contractor shall provide a report describing the concepts evaluated and the methodology used within 3 months days of task initiation. The selected concept will be identified and the selection justified. A briefing will be held at NASA Ames Research Center within two months of task initiation.

The contractor will provide a report documenting the results of the risk reduction and concept maturation effort within 12 months of task initiation.

The rotor design and fabrication effort will be documented through preliminary design and detail design reports and presentations at NASA Ames Research Center within 18 and 24 months of task initiation, respectively.

Wind tunnel test preparation will be conducted consistent with U.S. Air Force Arnold Engineering Development Center test documentation and preparation requirements.

The wind tunnel test will occur within 36 months of task initiation and final reporting within 42 months of task initiation.

IV. Schedule

The schedule will be consistent with the deliverables cited immediately above. An initial task schedule showing all major work packages, deliverables, and presentations will be provided to the Government for approval at the completion of the Concept Identification Task, within 3 months after task initiation.