

Advanced Materials

CECAM

# Technology Bulletin

at the Center of Excellence for Composites and Advanced Materials



JOINT ADVANCED MATERIALS & STRUCTURES CENTER OF EXCELLENCE

CECAM ACADEMIC TEAM

November 6, 2006

C06-07

Wichita State University

Northwestern University

Purdue University

Tuskegee University

University of Delaware

University of California at Los Angeles

CECAM featured project

ADVANCED MATERIALS IN TRANSPORT AIRCRAFT STRUCTURES

FEDERAL AVIATION ADMINISTRATION

NATIONAL INSTITUTE FOR AVIATION RESEARCH

## Technology Assessment of the Airworthiness of Unmanned Aerial Systems

### Principal Investigator(s):

Dr. Walter Horn, Professor, Department of Aerospace Engineering, Wichita State University  
Allison Crockett, Research Engineer, National Institute for Aviation Research, Wichita State University

### Overview:

The introduction of unmanned aircraft systems (UAS) into the National Airspace System (NAS) poses great challenges to the Federal Aviation Administration (FAA) in order to maintain safety and integrate them into the NAS with no adverse impact. It will require the FAA to establish new standards and operational requirements. Currently, the FAA is working closely with the aviation industry and other government agencies, such as DoD, DHS, NASA, etc., as well as international partners on UAS safety integration issues.



**An unmanned aircraft flies in the NAS under the FAA Certification of Authorization (COA).**

To meet UAS technical challenges, the FAA established the unmanned aircraft system research program to support its regulatory actions and safety oversight to assimilate them into the NAS. FAA UAS research activities will focus on technology assessments, methodology development, data collection and generation, laboratory and field validation, and technology transfer. These activities provide the basis for developing airworthiness standards, devising operational requirements, establishing maintenance procedures and conducting safety oversight activities for UAS civil applications.

This CECAM research project is part of the FAA UAS research initiatives. Results from this study will provide the first step to address the development of standards in UAS airframe certifications and airworthiness requirements.

### **Objective:**

The goal of the work proposed is to provide to the FAA an understanding of the current technologies applied to UAS airframe design and production. It will also identify the differences in certification requirements and airworthiness standards needed for UAS operation with those set forth by current FAA regulations. This study is essential to the FAA in order to address the UAS issues for establishing airworthiness standards.

For this investigation the following basic assumptions are made: a UAS is defined as an aircraft in which the pilot in command is not onboard the aircraft, and the UAS operations to be considered are not those that fall into the general category of very small light-weight remote controlled aircraft for sport or recreation. The UAS airframes of interest are complex systems that will need to meet FAA certification standards for airworthiness, operations and operators to fly in the NAS.

The basic elements of this study are shown in the following tasks:

- Review certification standard practices of major manufacturers of manned aircraft to develop an understanding of the philosophy of design, analytical validation along with testing verification, material selection and quality control, manufacture procedures and control, system

reliability, system quality and other key elements necessary to meet FAA regulations for a reliable airframe that is safe to operate in the NAS

- Develop a generic checklist of objectives (milestones) followed by these companies from initial concept to certification. (These will form the standard to gauge the level of similarity by UAS vehicle manufacturers.)
- Assess the current validation procedures in the UAS manufacturing community relative to the common standard of the manned aircraft community
- Analyze the results of the assessment to identify the regulatory needs that the FAA must address in the development of UAS standards.

#### **Expected Outcomes:**

The results of the proposed study will provide the initial step toward the development of regulatory standards that will support FAA effort for the safe integration of UAS in the NAS.

**For more information about the Center for Advanced Materials Performance at Wichita State University's National Institute for Aviation Research visit the [website](#).**

