NASA National Center for Advanced Materials

PERFORMANCE BULLETIN

at the National Institute for Aviation Research

NCAMP
NATIONAL CENTER for ADVANCED MATERIALS PERFORMANCE

NASA

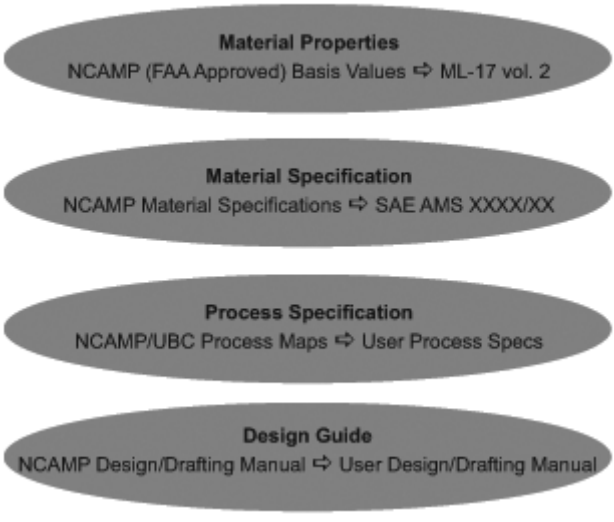
NIAR
NATIONAL INSTITUTE FOR AVIATION RESEARCH

September 12, 2005 N05-03

NCAMP Looking to the future

In order to further the NCAMP mission to provide the nation with a localized center for the validation and quality assurance of composites and advanced materials, the organization is compiling feedback from throughout the advanced materials industry. At the last MIL-17 meeting, NCAMP began the initial stages of understanding the needs of those in the composites industry. In the months following the meeting, we have received a significant amount of input, and have formed a tentative long-term plan based on that feedback.

The Plan - Completing the M&P Puzzle



Under the **Material Properties** development effort, NCAMP plans to perform material qualifications and publish NCAMP basis values for each material system as soon as they are approved by an appointed group of experts along with FAA concurrence. The basis values will be created using MIL-17 procedures and reviewed by key MIL-17 members to ensure that they are “as close as possible” to MIL-17 standards. Material property monitoring will begin immediately as the material is being produced. Unless sufficiently confident with the qualification test results, NCAMP plans to monitor quality control data for some period of time before formally submitting the qualification data for inclusion into MIL-17 volume 2. This process is designed to ensure that the qualification data is representative of the actual material properties representative over a wide range of fiber and resin lots as well as processing conditions. The approved NCAMP basis values will allow material suppliers to sell the material before formal inclusion into MIL-17.

A similar two-step approach will be used for the **Material Specifications**. NCAMP will create NCAMP material specifications for the materials that have been approved based upon recent guidelines published by the FAA (available on the WilliamJ.HughesTechnicalCenterwebsite - see below for details). NCAMP will become the custodian of the specifications and be in charge of responsibilities such as facility audit and reviewing/signing of the prepreg process control document (PCD). Material users (e.g. original equipment manufacturers) will be encouraged to participate in these audit/review activities. Material users may convert the non-proprietary NCAMP material specifications into their own company specifications. Alternatively, the NCAMP material specifications may be called out directly in engineering drawings. Since NCAMP will work closely with SAE P-17 committee, the NCAMP material specifications will be very similar to SAE AMS specification. The NCAMP material specification may be superceeded by the SAE AMS specification if and when the material receives an SAE AMS designation.

The process/material equivalency methodology described in the

DOT/FAA/AR-03/19 report (available on the William J. Hughes Technical Center website - see below for details) has been used by many follow-on companies to show equivalency with original qualification data, to justify using the basis values obtained in the original qualification without having to perform their own qualification. The diverse customer base for shared database materials requires in-depth and thorough understanding of the effects of process parameters on final/cured material properties. The Universityof British Columbiawill work with NCAMP to develop "process maps" which may be used to create cure cycles for the shared database materials. Information related to processing will be included in NCAMP **Process Specifications**.

During the last survey (see NCAMP e-bulletin N05-02, August 2005) 18 out of 19 respondents indicated that will it be beneficial to qualify compatible film adhesives with the prepreg materials in the shared database for co-curing purposes. As a result of this survey, NCAMP has started to develop a test plan to determine the compatibility of film adhesives with prepregs. The goal is to create a list of compatible materials which will be included in a **Design Guide**. The design guide will also contain other design information related to the materials in the shared database.

NCAMP participants worldwide

In August, NCAMP Associate Director Yeow Ng met with Dr. Takashi Ishikawa of the Japan Aerospace Exploration Agency (JAXA), the Japanese equivalent of NASA, to discuss possible collaboration opportunities. Ng also met with Fuji Heavy Industries (FHI), Kawasaki Heavy Industries (KHI), and Mitsubishi Heavy Industries (MHI) to explain NCAMP's mission and direct a presentation, "FAA's Perspective on Composite Manufacturing," prepared by Dr. Larry Ilcewicz of the FAA/Seattle Aircraft Certification Office. These companies, suppliers of the Boeing 787, were invited to participate in the NCAMP Advisory Board, a board responsible for selecting materials for qualification into the shared database.

For more information contact Yeow Ng at yeow.ng@wichita.edu.

FAA Report References

Tomblin, J.S., Ng, Y.C & Raju, K.S. (2003) "Material Qualification and Equivalency for Polymer Matrix Composite Material Systems: Updated Procedrues," **DOT/FAA/AR-03/19**, National Technical Information Service (NTIS), Springfield, VA 22161 (available at www.tc.faa.gov/its/worldpac/techrpt/ar03-19.pdf)

Bogucki, G., McCarvill, W., Ward, S. and Tomblin, J. (2003) "Guidelines for the Development of Process Specifications, Instructions and Controls for the Fabrication of Fiber Reinforced Polymer Composites," **DOT/FAA/AR-02/110**, National Technical Information Service (NTIS), Springfield, VA 22161. (available at www.tc.faa.gov/its/worldpac/techrpt/ar02-110.pdf)

McCarvill, W., Ward, S., Bogucki, G. and Tomblin, J. (2003) "Guidelines and Recommended Criteria for the Development of a Material Specification for Carbon Fiber/Epoxy Unidirectional Prepregs," **DOT/FAA/AR-02/109**, National Technical Information Service (NTIS), Springfield, VA 22161. (available at www.tc.faa.gov/its/worldpac/techrpt/ar02-109.pdf)