



# NASA National Center for Advanced Materials

## PERFORMANCE BULLETIN

at the National Institute for  
Aviation Research



**NCAMP**  
NATIONAL CENTER for  
ADVANCED MATERIALS  
PERFORMANCE



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FOR AVIATION RESEARCH

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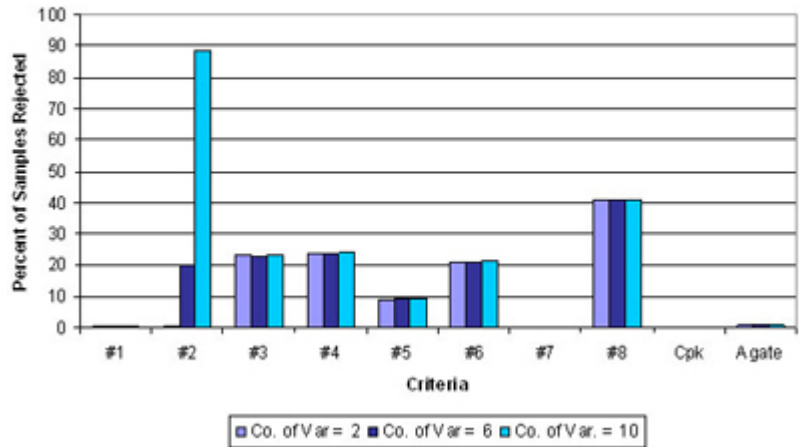
NO6-01

### Comparison of Acceptance Criteria

In order to determine appropriate acceptance limits used for various material systems, NCAMP evaluated the level of conservatism between various acceptance criteria. In this task investigations compared the AGATE Criteria, Cpk-based criteria, and various acceptance criteria documented by Scott Reeve and Mark Vangel during the September 1994 MIL-HDBK-17 conference.

The statistical program, SAS, was used to generate simulated samples and determine if it would be accepted or rejected according to each criterion. See the graph below for an example.

## Comparison of Different Criteria Rejection rate of 'Good' samples



Details of each acceptance criteria and the results are outlined in presentation provided by Elizabeth Clarkson, a quality engineer and statistician at NCAMP. For more details or to obtain a copy of the presentation, click on the link below:

[Simulation of Different Acceptance Criteria.](#)

### Progress of Material Qualification Effort

After a survey of the NCAMP industrial advisory board, NCAMP has selected the first material systems to be characterized. Based on NCAMP's budget, there were five resin systems chosen for qualification. These material systems are:

1. Cytec Cycom 5215, 1st Most Popular Industrial Choice
2. Cytec Cycom 5250-4, 2nd Most Popular Industrial Choice
3. Hexcel 8552, 3rd Most Popular Industrial Choice
4. ACG MTM 45-1 - AGATE Legacy Material / Air Force Collaboration
5. Toray 2510 - AGATE Legacy Material (involves minor additions to the existing database only)

Each resin system may have up to three product forms.

The companies that participated in the industrial material selection process were:

- Boeing (Seattle)
- Boeing (St. Louis)
- Lockheed Martin (Palmdale)
- Gulfstream
- Cirrus Design Corporation
- Israel Aircraft Industries
- Mitsubishi Heavy Industries
- Northrop Grumman
- Adam Aircraft
- GKN
- General Atomics

- Embraer
- Bell Helicopter
- Cessna
- Sikorsky
- Bombardier
- AAR Composites

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### Did you know?

Basis values are not constants. Statistically based basis values (e.g. b-basis values) are statistics rather than constants. They are dependent on, among other things, the sample size and the data scatter. Data with higher scatter will generally yield lower basis values. Larger sample size will generally yield higher basis values.

To help engineers understand the definitions of basis values, NCAMP has created a simulation program that explains their meanings in a graphical format. It will plot the distribution of B-basis values along with the population distribution so users can visualize the level of conservatism. It also allows users to change the standard deviations and sample size so users can observe the effects of these changes on the b-basis values. In addition to being an education tool, the simulation program may also be used to predict basis values and determine sample sizes for test programs. Click here to access the "[B-basis Distribution Simulator](#)."

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