December 2011 MSS/LPS/SPS Joint Subcommittee Meeting
ABSTRACT SUBMITTAL FORM

The submission of an abstract is an agreement to complete a final paper for publication and attend the meeting to present this information. Complete all information requested in the author and co-author information sections; the first author listed will receive paper acceptance notices and all correspondence. Abstracts must be submitted electronically; submittal instructions are located in the call for papers. **The abstract deadline date is June 13, 2011.**

ABSTRACT INFORMATION

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AUTHOR INFORMATION

Author/Presenter Name: Andy Hissam
Affiliation NASA/MSFC
Address Marshall Space Flight Center
City Huntsville State AL Zip 35812
Telephone 256-544-8388 Telefax
e-mail: andy.hissam@nasa.gov

2nd Author:
Affiliation
Address
City State Zip
Telephone Telefax
e-mail:

3rd Author:
Affiliation
Address
City State Zip
Telephone Telefax
e-mail:

Additional Author(s):
Affiliation
Address
City State Zip
Telephone Telefax
e-mail:

MANAGEMENT APPROVAL

The individual below certifies that the required resources are available to present this paper at the above subject JANNAF meeting.

Responsible Manager authorizing presentation: Dave Whitten

Title/Agency: Branch Chief/ER34

Telephone Number: 256-544-7027 e-mail: dave.whitten@n Date: 6/10/11

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Unclassified Abstract

(250-300 words; do not include figures or tables)

In aerospace design, where minimizing weight is always a priority, achieving the full capacity from fasteners is essential. To do so, the initial bolt preload must be maximized. The benefits of high preload are well documented and include improved fatigue resistance, a stiffer joint, and resistance to loosening. But many factors like elastic interactions and embedment tend to lower the initial preload placed on the bolt. These factors provide additional motivation to maximize the initial preload. But, to maximize bolt preload, you must determine what torque to apply. Determining this torque is greatly complicated by the large preload scatter generally seen with torque control.

This paper presents a detailed methodology for generating limit torques for threaded fasteners. This methodology accounts for the large scatter in preload found with torque control, and therefore, addresses the statistical nature of the problem. It also addresses prevailing torque, a feature common in aerospace fasteners. Although prevailing torque provides a desired locking feature, it can also increase preload scatter. In addition, it can limit the amount of preload that can be generated due to the torsion it creates in the bolt. This paper discusses the complications of prevailing torque and how best to handle it. A wide range of torque-tension bolt testing was conducted in support of this research.

The results from this research will benefit the design engineer as well as analyst involved in the design of bolted joints, leading to better, more optimized structural designs.