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.

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**AUTHOR INFORMATION**

Author/Presenter Name: Erika Alvarez
Affiliation NASA Marshall Space Flight Center
Address Marshall Space Flight Center - ER31
City MSFC State AL Zip 35812
Telephone 256-544-2009 Telefax 256-544-2032
e-mail: Erika.Alvarez@nasa.gov

2nd Author: Kristin Morgan
Affiliation NASA Marshall Space Flight Center
Address Marshall Space Flight Center - EM20
City MSFC State AL Zip 35812
Telephone 256-544-1024 Telefax

3rd Author: Doug Wells
Affiliation NASA Marshall Space Flight Center
Address Marshall Space Flight Center - EM20
City MSFC State AL Zip 35812
Telephone 256-544-3300 Telefax
e-mail: Douglas.N.Wells@nasa.gov

Additional Author(s): Frank Zimmerman
Affiliation NASA Marshall Space Flight Center
Address Marshall Space Flight Center - EM32
City MSFC State AL Zip 35812
Telephone 256-544-4958 Telefax
e-mail: Frank.R.Zimmerman@nasa.gov
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: Randall J. Thornton

Title/Agency: Turbomachinery Branch Chief, NASA Marshall Space Flight Center
Telephone Number: 256-544-1141   e-mail:  Date: 6/7/11
As part of an internal research and development project, NASA Marshall Space Flight Center (MSFC) has been developing a high specific impulse 9,000-lbf LOX/LH2 pump-fed engine testbed with the capability to throttle 10:1. A Fuel Turbopump (FTP) with the ability to operate across a speed range of 30,000-rpm to 100,000-rpm was developed and analyzed. This small size and flight-like Fuel Turbopump has completed the design and analysis phase and is currently in the manufacturing phase. This paper highlights the manufacturing and processes efforts to fabricate an approximately 20-lb turbopump with small flow passages, intricately bladed components and approximately 3-in diameter impellers. As a result of the small scale and tight tolerances of the hardware on this turbopump, several unique manufacturing and material challenges were encountered. Some of the technologies highlighted in this paper include the use of powder metallurgy technology to manufacture small impellers, electron beam welding of a turbine blisk shroud, and casting challenges. The use of risk reduction efforts such as non-destructive testing (NDT) and evaluation (NDE), fractography, material testing, and component spin testing are also discussed in this paper.