

**DESIGN REVIEW DOCUMENTATION – RESULTS**

**Title:** NSTX CSU TF Bundle Joint Peer Review \_\_\_\_\_ **WP#:** 1511 (ENG-032)

**Type of Review:**     Peer     CDR     PDR     FDR

**Cog Individual:** J. Chrzanowski \_\_\_\_\_ **Date of Review:** \_\_\_ March 23, 2009 \_\_\_\_\_

<b>Review Board Members:</b>	<b>Invited attendees :</b>	
Chairperson L. Dudek _____	QA _____	J. Winston _____
J. Chrzanowski, M. Kalish _____	E. Perry _____	J. Schmidt _____
P. Heitzenroeder _____	J. Makiel _____	W. Reiersen (via telephone) _____
A. Brooks _____	HM Fan _____	R. Pillsbury ( “ “ ) _____
C. Neumeyer _____	R. Hatcher _____	D. Williamson ( “ “ ) _____
Regulatory Compliance _____		

<b>Items Reviewed:</b>	<b>Sat.</b>	<b>Unsat.</b>	<b>Comments</b>
Appropriate requirements identified	<input type="checkbox"/>	<input type="checkbox"/>	Not Presented _____
Development plans and schedules	<input type="checkbox"/>	<input type="checkbox"/>	Not Presented _____
Regulatory compliance including USQD and NEPA	<input type="checkbox"/>	<input type="checkbox"/>	Not Presented _____
Disposition of CHITS from previous reviews	<input type="checkbox"/>	<input type="checkbox"/>	Not Applicable _____
Cost objectives	<input type="checkbox"/>	<input type="checkbox"/>	Not Presented _____
Other review objectives addressed (attachment 4 of ENG-033)	<input type="checkbox"/>	<input type="checkbox"/>	_____

**SUMMARY OF RESULTS:**

The purpose of this review was to present the four (4) TF Bundle to Outer TF Leg concepts and to solicit comments and recommendations from the engineering community and to downselect from four to 1 or 2 concepts. Over 65 chits, comments and recommendations were submitted and are recorded in an attached spreadsheet. The working group met to disposition the chits and again a second time to discuss the path forward.

The Working Group agrees that the trapped OH design (ebeam welded stub) is desirable from the standpoint of reducing the EM forces to be carried by the TF joint and increasing the width available for making the joint connection. By moving the joint radially outward the width of the contact area increases such that joints with greatly improved strength and contact area may be possible. It will also permit the use of a slightly larger OH coil conductor (due to larger space envelope) which would help alleviate water cooling issues via a larger cooling passage and lower current densities.

Analysis is required to determine whether a simple, unsupported bolted radial flag will work or features such as “shaped” (e.g. constant tension) radial flags, external supports (e.g. flag boxes or potting), and flexible links are needed. Analysis should be performed starting with the simplest configuration to determine which if any of these features are needed. The group agreed that an ANSYS modeling effort should be initiated including the TF Bundle and the Outer TF envelope in such a way that various joint / flex designs can be “plugged in” to assess the effect of EM loads in terms of stresses and contact pressure distribution at the joint as well as current distribution and heating. This is expected to take approximately one month. In parallel, the details of the joint designs starting with the simple radial flag should be further developed in terms of fasteners and CAD model of conductor sections so that a realistic configuration fed into the ANSYS model. The simple bolted radial flag should be assessed first since it would present the least complexity in implementation.

The working group felt the bolted design concept presented less risk than the cinched ring or jacking bolt ring concept and that the design should focus now on the bolted connection.

**Disposition:** [check one]

\_\_\_\_\_ **Acceptable**

**Acceptable pending resolution of concerns-** CHITS identified above must be resolved prior to installation.

\_\_\_\_\_ **Incomplete** - Additional design work is required prior to another design review.

**Chairperson Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Distribution:** Review Board Members, Operations Center, Cognizant Design Engineer, System Engineer(s), Attendees, QA, ES&H