Checks for Calculation No: NSTXU-CALC-11-14-00 **Revision No: 0**

Title: Calculation of Thermal and Structural on Row 3 Tiles and Variants Styles 1 and 2

Component was checked against latest design

All required load cases are included and current

Discuss method used in the calculation

This report documents the thermal and structural calculations for OBD Row 3 tiles and variants with styles 1 and 2. The Workbench is used to do the transient thermal simulations based on the system required heat flux cases 1 and 2 for OBD3. The thermal results are input into the static structural model as the imported body temperature load. The halo current forces and eddy current moments are applied on the tile surfaces. The structure of each baseline tile and its variants with different embedded diagnostic sensors are analyzed. The report also shows the design history how to mitigate the over stress at local hole edges by chamfering.

Discuss how the calculation was checked (*)

Based on my experience with the similar transient thermal and structural analysis of NSTX-U OBD12 tiles, all the results look reasonable.

List issue identified and how they were resolved

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(*) independent calculations can be appended

Minimum Requirements for Checking Calculations

1. Assure that inputs were correctly selected and incorporated into the design.

2. Calculation considers, as appropriate:

   - Performance Requirements (capacity, rating, system output)
   - Design Conditions (pressure, temperature, voltage, etc.)
   - Load Conditions (Electromagnetic (Lorentz Force), seismic, wind, thermal, dynamic)
   - Environmental Conditions (radiation zone, hazardous material, etc.)
   - Material Requirements
   - Structural Requirements (foundations, pipe supports, etc.)
   - Hydraulic Requirements (NPSH, pressure drops, etc.)
   - Chemistry Requirements
   - Electrical Requirements (power source, volts, raceway, and insulation)
   - Equipment Reliability (FMEA)
   - Failure Effects on Surrounding Equipment
   - Tolerance Buildup

3. Assumptions necessary to perform the design activity are adequately described and reasonable.

4. An appropriate calculation method was used.

5. The results are reasonable compared to the inputs.

6. Error bars (range) for inputs used, results / conclusions, assumptions, have been considered and are acceptable.

NOTE: IT IS THE RESPONSIBILITY OF THE CHECKER TO USE METHODS THAT WILL SUBSTANTIATE TO HIS/HER PROFESSIONAL SATISFACTION THAT THE CALCULATION IS CORRECT.

BY SIGNING CALCULATION, CHECKER ACKNOWLEDGES THAT THE CALCULATION HAS BEEN APPROPRIATELY CHECKED AND THAT THE APPLICABLE ITEMS LISTED ABOVE HAVE BEEN INCLUDED AS PART OF THE CHECK.