

DSG Ansys R&D Meeting Minutes

Date: November 16, 2023

Time: 2:00 PM – 2:30 PM

Attendees: Aaron Brown, Peter Bonneau, Pablo Campero, George Jacobs, Tyler Lemon, and Marc McMullen

1. NPS thermal analysis with Ansys Mechanical

Aaron Brown

1. Reviewed mesh improvements for the model with crystal array, cooling plates, and dividers
2. Convection thermal condition applied to the air region (central section of the crystal) using the mesh cell selection option
3. Ran thermal simulation using Ansys Mechanical Transient Thermal
 - Simulation took ~66 hours to complete; results are illogical—the maximum temperature is below the ambient temperature (25°C)
 - At the 46th second, the ambient temperature was increased from 20°C to 25°C
 - Increased time steps and length of simulation from 110 s to 1000 s
4. Reviewed configurations for thermal analysis simulation in transient mode
5. Discussed output controls options used for data recording
 - Recording data points is related to set time step condition
 - Recommended changing the option All Time Points to Specified Recurrence Rate to get the desired data points in a set period

2. NPS thermal analysis with Ansys Mechanical and Fluent in transient mode

Aaron Brown and Pablo Campero

1. Discussed common model to be used in both analyses
 - A single model of the crystal array, cooling plates, and dividers will be developed
 - Each crystal will have a volume (20x20x1 mm³) attached to its rear face to allow application of the internal heat (W/m³) thermal condition
2. Defined meshing software and methods
3. Defined materials and thermal boundary conditions
4. Transient analysis settings, such as step time and number of steps, will be defined based on the results from initial simulations
 - The total time or steps to get thermal equilibrium is unknown

3. EIC beampipe Ansys Fluent thermal analysis

Pablo Campero

1. Reworking mesh in Ansys Mechanical due to issues found during second attempt of simulation; mesh in progress
 - Previously used automatic method to mesh the inner volume of the beampipe; changing to multizone method
 - Adding inflation meshing feature for solids in contact with fluid
2. Started meshing of the beampipe using Ansys Fluent with Meshing software