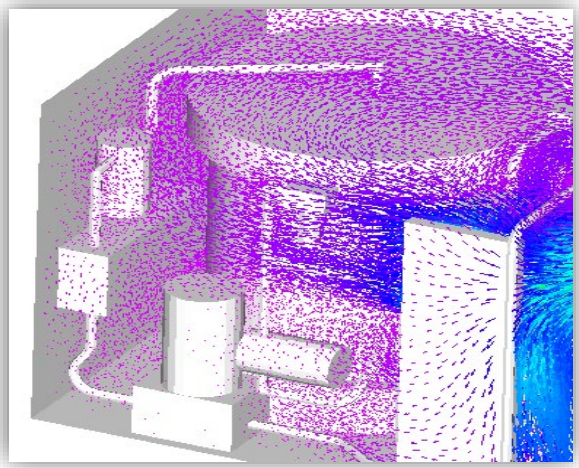
Structural, Thermal, and Dynamics Capabilities

Multi-Disciplined Engineering: Structural, Thermal, and Dynamics Capabilities

Performance - ZIN designed, built, tested, and delivered the MMSAMS Flight Inertial Navigation avionics units for the NASA Goddard Space Flight Center (GSFC). The Mission Critical TRL-9 design is the first device accurate enough to provide closed-loop thrust control which allows flight of multiple satellites in formation. For this instrument, ZIN designed a mixed-signal Rigid-FlexPWA to IPC-6013 specifications. This design allowed for signals to be collected, filtered, digitized and processed allowing for digital transmission of high dynamic range data with real time temperature and bias stability.

TOOLS:

- FEMAP: Pre/Post Model Processing
- NX NASTRAN: Structural Analysis
- Hypersizer: Structural Sizing
- Maya TMG: Thermal Analysis
- MATLAB and Simulink
- MSC Adams: Rigid body and flex body dynamic systems



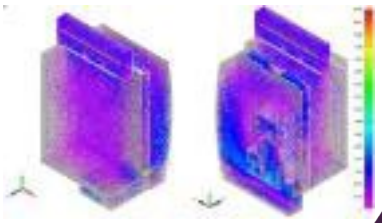
ZIN is comprised of experienced industry experts specializing in hardware designed for space flight including: facilities on ISS, payloads, satellites, satellite sub-systems, and launch vehicle elements.

Separate static and dynamic models are often developed to correctly capture the specific conditions being assessed. Results from the FE models are used to further analyze fracture control, fastener margins, and margins on primary structures. FE model validation checks are made based on FEMCI (NASA GSFC). Whenever possible, hand calculations are used to verify model results.

Thermal analyses is used in conjunction with thermal testing to verify hardware. The thermal analyses are also helpful in determining special/unique tests needed to verify thermal performance. Thermal modeling has also been used to assess science requirements on ISS experiments.

Dynamic/Kinematic Analysis is used in conjunction with thermal testing or Power 4-5-6 may be applied.

- **Structural Analysis is performed using a proven analytical method. FEMAP and NX NASTRAN are the primary tools used to develop and solve Finite Element (FE) models.**
- **The geometry used to develop the structural models comes from CAD models of the hardware. Loads and boundary conditions are carefully assessed to ensure appropriate model behavior is considered.**
- **FEMAP and MAYA TMG (FEMAP Thermal) are the primary tools used to develop thermal models.**
- **MAYA TMG has the ability to run coupled thermal/flow analyses. Generally, the thermal analyses are used to verify adequate cooling of electrical/electronic components in a micro-gravity environment.**



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