

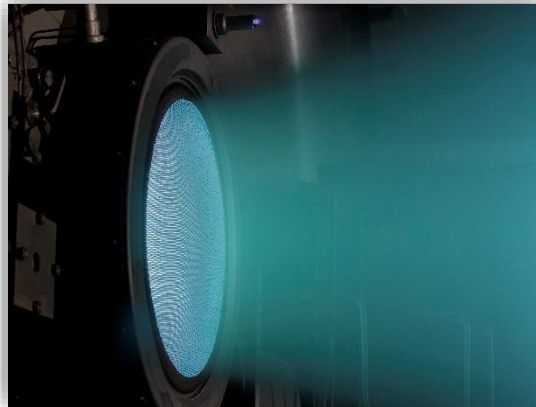
Propulsion Engineering Capabilities

Propulsion Engineering Capabilities

Performance – ZIN possesses the complete skill set to design, analyze, build and test varying complexities of propulsion subsystems and varying propulsive requirements. Expertise spans monopropellant blow-down to regulated bi-propellant propulsion systems, as well as various concept designs with SRMs, cold gas, and many types of electric propulsion systems (ion, Hall Effect, pulsed plasma, arcjets, nuclear, power process electronics).

TOOLS:

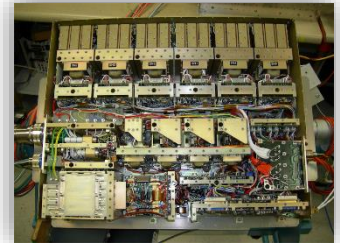
- GRIDGEN, DSMC Analysis
- Code (DAC), VIPER (Viscous Interaction)
- Performance Evaluation
- Routine) – thruster plume analysis
- AFT Impulse for pressure surge and transients
- Matlab Monte Carlo Simulations for propellant usage
- SolidWorks for mechanical design
- STK for orbital mechanics and delta-v analysis



ZIN personnel have historically provided engineering support for propulsion system integration and testing. This includes support of the Boeing Delta III upper stage hot fire verification testing, and support of RL-10 testing as part of the Air Force Atlas Reliability Enhancement Program. ZIN has conducted computational plume impingement, computational and analytical propellant slosh, thermodynamic cycle, multiphase flow and boiling and condensation heat transfer analyses.

ZIN also has experience with Electrical Propulsion (EP) system design and test support. This includes development and fabrication of a 2 kW hall thruster with segmented electrodes. ZIN has expertise in development of Laser Induced Fluorescence diagnostic thruster testing. ZIN can provide thermal modeling of thruster behavior. ZIN personnel were part of the design of a 20-kW bismuth Hall thruster.

- ❑ ZIN is providing flight Power Propulsion Units (PPU's) for the NEXT-C Ion Thruster and Advanced Electric Propulsion System (AEPS).
- ❑ ZIN is conducting design for Discovery and New Frontiers missions.
- ❑ Analytical qualifications include delta-v determination, and propellant usage and prediction models, flow modeling, pressure surge and transients, thruster plume impingement heating and contamination.
- ❑ Operational expertise spans LEO, GEO and Deep Space propulsive maneuvers and operations.



ZIN Technologies



Voyager Space External Use
johansonm@zin-tech.com | www.zin-tech.com