



Propulsion Engineering Capabilities

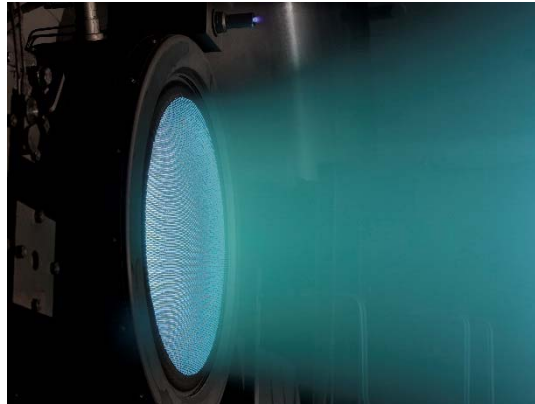
ZIN Technologies

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:

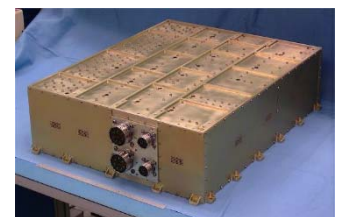
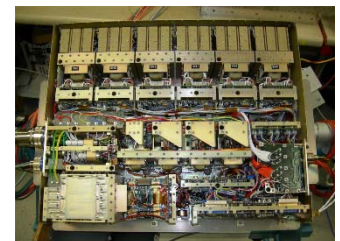
- GRIDGEN, DSMC Analysis
- Code (DAC), VIPER (Viscous Interaction)
- Performance Evaluation
- Routine) – thruster plume analysis
- AFT Impulse for pressure surge and transients
- Matlab Monte Carlo Simulations for propellant usage
- SolidWorks for mechanical design
- STK for orbital mechanics and delta-v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



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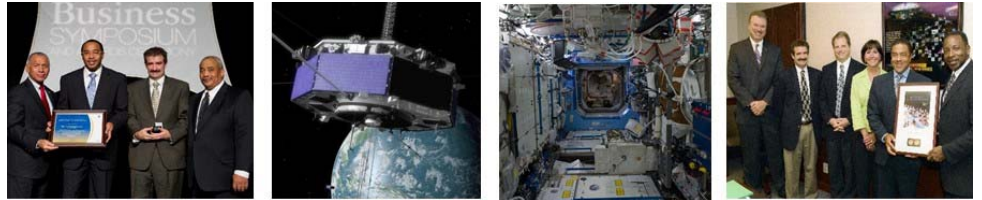
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Founded in 1957, ZIN provides multidisciplinary engineering services to NASA and the aerospace industry and has managed the development of space flight and ground system hardware (aerospace/space systems) from formulation, design, and development through to fabrication, integration, testing, verification, and mission operations.

Our experience includes the development and validation of new technologies (sensors, inertial navigational measurement units (IMUs), composites, advanced acoustic resonant attenuation, optics, power, additive manufacturing and wireless/RF), ISS research investigations, space launch systems (Orion, commercial crew/resupply), satellite (IMU) accelerometer systems, and space based human research projects enabling future space and science missions.

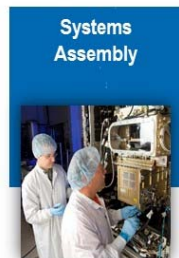


Focus on Quality - Certified and Compliant with Industry and Government Quality Standards



ZIN Technologies, Inc. is an experienced developer of ground and flight systems for manned and unmanned aerospace applications. Marking history for almost five decades, we have provided integrated hardware and software development products and services to NASA, DoD and Fortune 500 companies.

OUR PRODUCTS & SERVICES



- Minority Owned-SDB
- AS9100 certified
- Experienced Team of scientists, engineers, designers, and technicians
- DCAA Approved Forward Pricing
- Headquartered Cleveland Ohio
- Award Winning Capabilities

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