ZIN Technologies

Supply Chain 2011
Moving Innovative Product into NASA Mission Projects
Carlos Grodsinsky, Ph.D. V.P. Technology

YOUR STRATEGIC DIVERSIFIED SMALL BUSINESS (MO-SDB) PARTNER

Management | Design | Analysis | Integration | Manufacturing | Test | Operations

MO-SDB

AS9100B certified

DoD Facility Clearance

DCAA Approved Forward Pricing

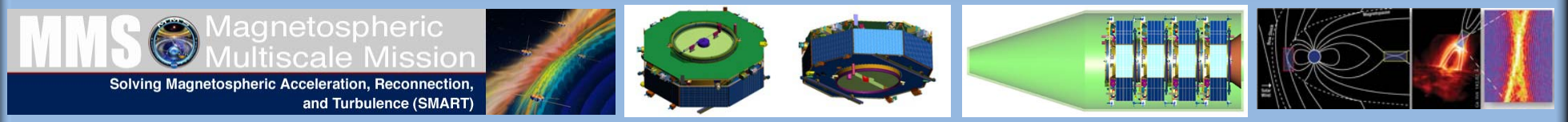
Experienced Team

Award Winning Capabilities

Headquartered in Cleveland Ohio

Presentation Outline

- Introduction – Understanding the NASA Market Place
- NASA Mission Centers and Mission Needs
- Technology Driven Competitive Product/Services within the NASA Market Segment
- An Innovative Product NASA Success Story - Magnetospheric MultiScale (MMS) Mission Acceleration Measurement System (MMSAMS)



Understanding the NASA Market Place

Product/Service Solutions

Technical : Product

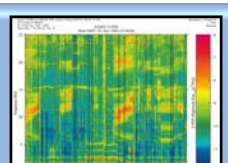
Past Performance: Experience, Core Competence, History

Cost: Competitive Pricing

Know Your Customer and the Products and Solutions they Need to Successfully Complete Their Mission, Objectives, Goals

- **NASA Supply Chain is Segmented into Research and Mission Centers**
  - **Mission Center Needs**
    - Flight Systems, Subsystems, Engineering Services (System Engineering and Integration, Hard Engineering, Engineering Processes)
  - **Research Center Needs**
    - Each Research Center has their core expertise which dictates the types of Engineering Services /Products and Development tools and Systems
    - Research Centers Support Mission Centers and also are responsible for demonstration programs/projects








Understanding the NASA Market Place (Cont.)

Identifying Opportunities in Relation to NASA Needs

- All procurement and solicitation opportunities are published through the NASA procurement sites
  - http://prod.nais.nasa.gov/cgi-bin/nais/index.cgi
- All products or services follow three main criteria for competitive award:
  1. Technical Solution – Product or System Capability to Requirements
  2. Past Performance – Experience, Capability and Evidence of Relevant Past History
  3. Competitive Cost Solution (Competitive Range and Competitive to Scope of Mission and Program/Project Budget)

Understanding the NASA Market Place (Cont.)

Know your Customers Organization and Objectives

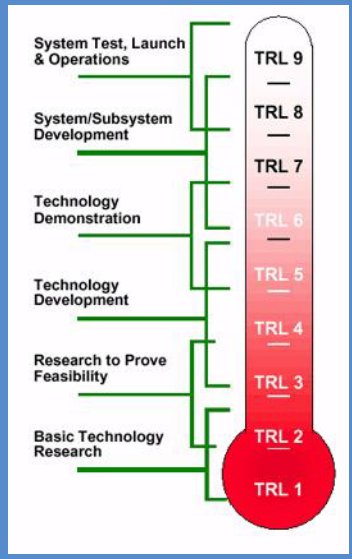
- NASA Unmanned Missions are driven by independent decadal science reviews, competed missions, or specific missions against four broad scientific pursuits
  - (Earth Science, Planetary Science, Heliophysics, and Astrophysics)

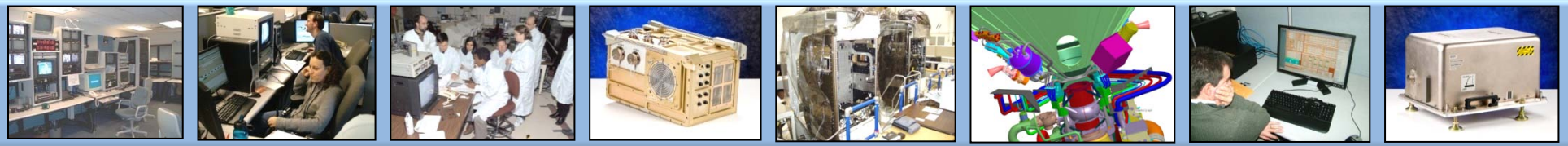
http://science.nasa.gov/media/medialibrary/2010/03/31/Science_Plan_07.pdf

Examples -

- Planetary Science Decadal Survey
- Earth Science Decadal Survey – the source of Announcement of Opportunities which are published to science community – MMS came from one of these AO's

- NASA Research Centers support these missions by working on technologies that enable these missions
  - Technology Roadmaps are developed to provide requirements and needs for these mission enabling technologies – standard formulation of Technology Readiness Levels (TRL 1 through 9)





ZIN Technologies
Technology without Boundaries

RESEARCH AND TECHNOLOGY Driven

Products and Services

Concept Definition

Detailed Design

Engineering

Manufacturing

Integration

Testing

Verification

Certification

Maintenance

Ground Processing

Training

Operations Services

Technology Driven Product/Services

Unique Services Aligned to NASA Missions and Technology Needs

- Engineering Services – Analysis, System Engineering and Integration, Configuration Management, Hardware and Software design, development , fabrication and integration
- Safety and Payload Integration
- Ground Processing and Ground Systems
- Operations

Innovative Products driven by Technology Roadmap Gaps

- Utilize SBIR and other sources of development funds
- Directed Research and Development under NASA Infrastructure or Prime Delivery Order contracts

Innovative Technology Driven Product Example

- Inertial Accelerometer Flight Hardware - MMSAMS – Heritage from Space Acceleration Measurement System and Microgravity Acceleration Measurement System (SAMS/MAMS)

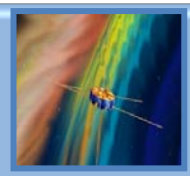
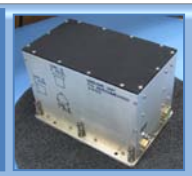
ZIN Technologies
Technology without Boundaries

A Technology Driven Innovative Product Success Story MMSAMS

MMS Required Unique Set of Inertial Measurement Requirements to Provide Formation Flying information for MMS Satellites

- **Technical - Technology Driven Solution**
  - High Resolution High Accuracy Performance
  - High Reliability Design and System
  - Diverse set of Communication Requirements
- **Past Performance – Heritage in Space Flight High Reliability**
  - Past Performance providing Space Flight Hardware
  - Space Flight Heritage in Design
  - Experience (core expertise in acceleration measurement and flight dynamics)
- **Competitive Cost – Competitive Award and within Mission Budget for sub system**


Technology Knowhow and Mission Requirements

SAMS

ZIN Technologies
Technology without Boundaries

Space Acceleration Measurement System (SAMS)

SAMS Has Characterized Every Current NASA Manned Spacecraft in the Past 20 Years

ISS, MIR, SHUTTLE, SPACELAB, SPACEHAB

SAMS Unit On Display at the Smithsonian Air & Space Museum

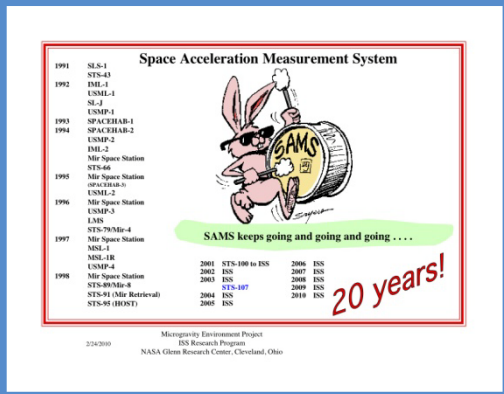
MIR SAMS Unit on Display At the Smithsonian Institute Steven F. Udvar-Hazy Center

Objective:

Provide acceleration measurement systems that meet the requirements of the researchers on board the ISS and provide vehicle health data. SAMS measures the acceleration environment in the 0.01 to 400 Hz range for payloads.

Longest running Near Earth Orbit Inertial Measurement (Acceleration package) over 20 STS, MIR and ISS missions

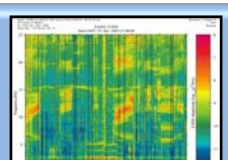
- A SAMS unit is currently displayed in Smithsonian Air and Space Museum as example of NASA Microgravity Science Payload with over 20 missions inclusive of MIR operation

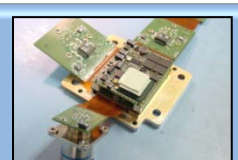


Current Space Acceleration Measurement and Microgravity Acceleration Measurement Systems (SAMS) on-board ISS for 8 years in April 2010 (continuous operation)

- MAMS – inertial sensor resolution 2-3 nano-gs
- SAMS – inertial sensor package resolution .1 micro-gs
- Corrected Bias error for SAMS, less than .5 micro-g
- MEMS based inertial measurement unit designs for sub .01 degree per second angular resolution, and sub-100 nanog/root Hertz linear acceleration resolution








ZIN Technologies
Technology without Boundaries

Microgravity Acceleration Measurement System (MAMS)

MAMS Currently Supports ISS Reboost Approximately Every 2 to 3 Months

Supports ISS Loads and Dynamics Group

Objective:

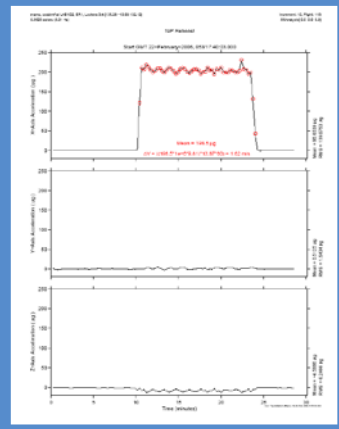
One of the major goals of the International Space Station (ISS) is to provide a quiescent low-gravity environment to perform fundamental scientific research. However, small disturbances aboard the ISS impact the overall environment in which experiments are being performed. Such small disturbances need to be measured in order to assess their potential impact on the experiments. The Microgravity Acceleration Measurement System (MAMS) is used onboard the ISS to do just that.

Provides acceleration measurement system that measures the Quasi steady and vibratory acceleration data in the 0.00001 to 100 Hz frequency range on board the International Space Station (ISS) vehicle.

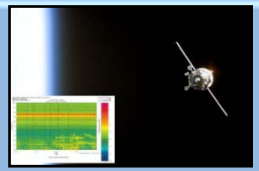
- MAMS will measure the acceleration environment for ISS structures as requested and provide data to vehicle (ISS and/or Shuttle) for health and dynamic analyses.
- MAMS was developed to operate with minimum crew interaction, and can be commanded with ground commands.
- MAMS supports the ISS reboosts, dockings, and exercise.
- MAMS current on board mass is 53.1 kg, with a volume of 0.154 cubic meters.

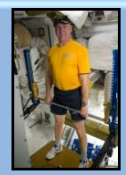
- Future applications could include new spacecraft docking assessments and rocket stage separation characterization

ISS On-orbit Front Panel



MAMS ISS Reboost Data

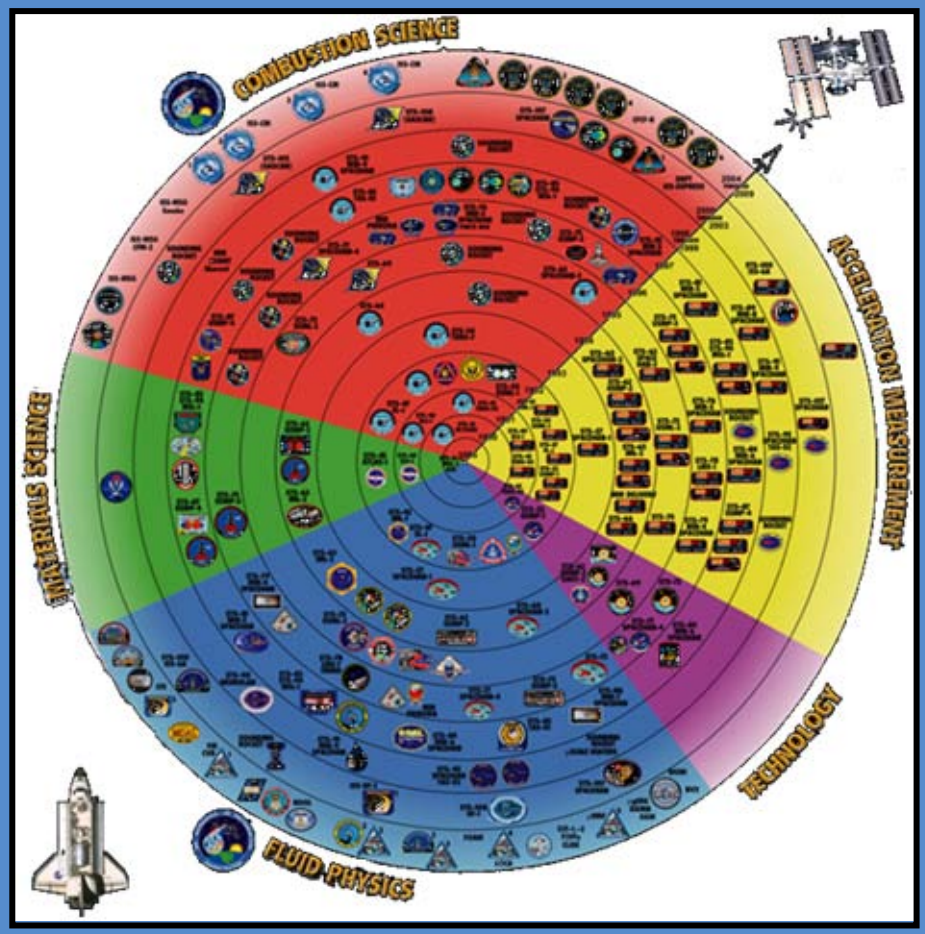

Spaceflight Hardware/Software Heritage

- Space Flight Hardware Experience
- Concept Definition
- Detailed Design
- Engineering
- Manufacturing
- Integration
- Testing
- Verification
- Certification
- Maintenance
- Ground Processing
- Training
- Operations Services

AS 9100 REGISTERED

For over 20 years, the ZIN engineering team has partnered with NASA management, scientific experts and industry to manage and develop space flight technology development and scientific systems, from concept definition, design, development, and fabrication to system assembly, integration, test, launch, operations and return.

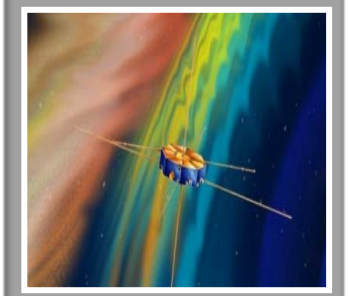
- ZIN has extensive experience developing NASA human-rated space flight systems as well as experience with Sounding Rockets and Drop-Towers. Our engineering Team has designed, fabricated and operated over **133 human-rated space flight payloads** with thousands of hours of space flight logged on the shuttle, MIR, and ISS.



ZIN Technologies
Technology without Boundaries

Magnetospheric Multiscale Mission (MMS)

- Three-Axis Accelerometer System
- SAMS Heritage
- Will Measure Changes in Spacecraft Velocity
- Four MMS observatories
- Will Fly Tetrahedral formation



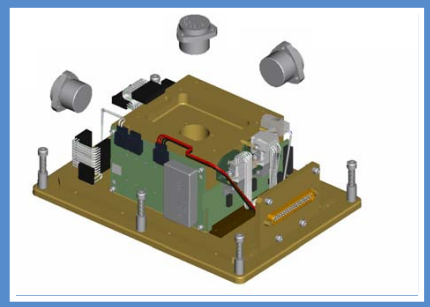
The Magnetospheric Multiscale (MMS) mission is the fourth mission of the Solar Terrestrial Probe (STP) program of the National Aeronautics and Space Administration (NASA)

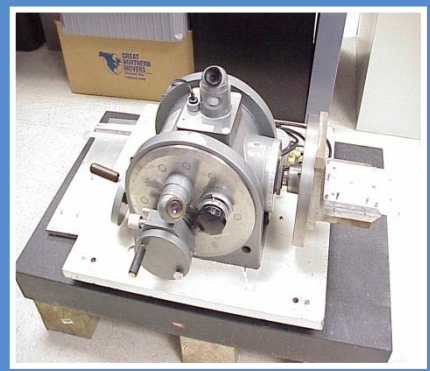
The MMS mission will study magnetic reconnection in the Earth's magnetosphere. The four MMS observatories will be required to fly in a tetrahedral formation in order to unambiguously determine the orientation of the magnetic reconnection layer.

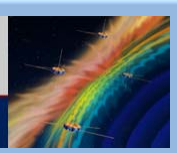
ZIN is working on providing the Three-Axis Accelerometer Systems based on our NASA developed Space Acceleration Measurement System (SAMS).

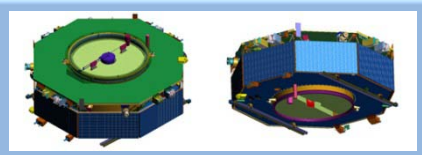
The Accelerometer System will be used to accurately determine changes in spacecraft velocity to precisely maintain formation of the four spacecraft and to provide velocity feedback during apogee raising maneuvers.

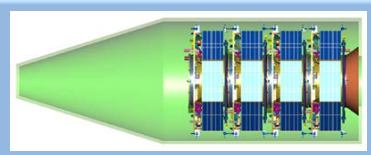
Demonstrated capability to integrate the corrected acceleration, at 1000 Hz, by applying Delta V calculations.

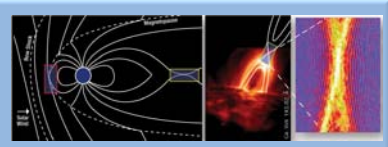












MMS

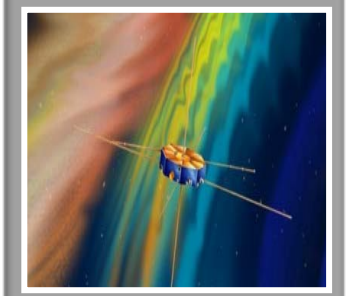
Three-Axis Accelerometer System

SAMS Heritage

Will Measure Changes in Spacecraft Velocity

Four MMS observatories

Will Fly Tetrahedral formation

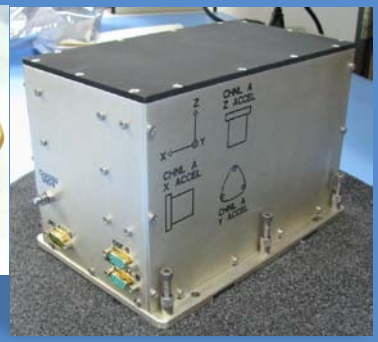


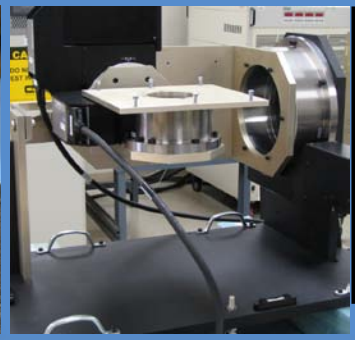
ZIN Technologies

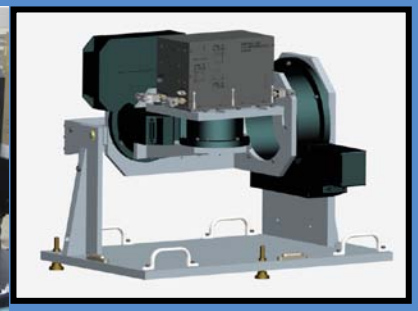
Technology without Boundaries

Magnetospheric Multiscale Mission (MMS)

Item #	Description	Reference	Category	Quantity	Delivery Date
1	Accelerometer System Engineering Test Unit	SOW 4.2	A	1	6/30/2011
2	Accelerometer System Flight Unit	SOW 4.2	A	4 units	Flight 1: 2/3/2012 Flight 2: 5/11/2012 Flight 3: 8/12/2012 Flight 4: 11/23/2012
3	Accelerometer System Connector Savers	SOW 4.3	A	5 sets	With items #1 and #2
4	Accelerometer System Supporting Hardware	SOW 4.4	A	5 sets	Closeout Caps Transport Caps and ESD Caps: With Items #1 and #2 Mating Connectors: 6 months after Award of Contract Drill Template: 18 months after Award of Contract

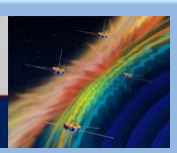


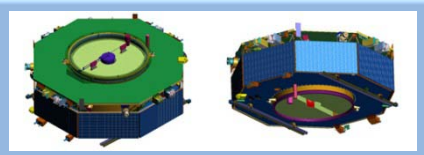


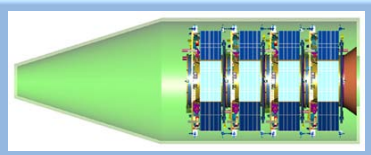


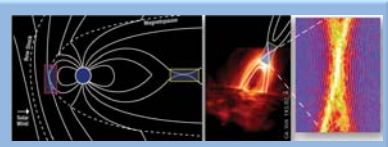
MMS Magnetospheric Multiscale Mission

Solving Magnetospheric Acceleration, Reconnection, and Turbulence (SMART)









Company Overview

MO-SDB

AS9100B certified

DoD Facility Clearance

DCAA Approved Forward Pricing

Experienced Team

Award Winning Capabilities

Headquartered in Cleveland Ohio

ZIN Technologies Inc. (ZIN) a minority owned small disadvantage business (MO-SDB) has provided advanced aerospace / biomedical engineering services and products for NASA, DoD, centers for scientific research and aerospace corporations.

With over five decades of experience, our capabilities are continually being improved to stay on the leading edge of rapidly evolving technologies that meet the needs of our customers.

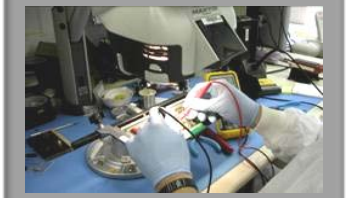
ZIN specializes in the seamless and transparent progression between concept, detailed design, engineering, manufacturing, integration, testing, verification, certification, maintenance and ground, air and space operations.

- 175+ person organization consists of scientists, engineers, designers, and technicians experienced in managing complex programs and technical requirements.
- ZIN has extensive experience developing NASA human-rated space flight systems. Our engineering Team has designed, fabricated and operated over 133 man-rated space flight payloads with thousands of hours of space flight logged on the shuttle, MIR, and ISS.
- 50,000 square feet AS9100 certified facility
- Robust/Certified Government support systems and DCAA approved forward pricing
- DISC Central Verification Activity can provide information regarding our current DOD facility clearance status to the appropriately requesting parties at (888)282-7682
- We have received numerous quality and performance awards including recognition as a 2003 and 2004 NASA George M. Low Quality Award Finalist

Admin & Engineering


Laboratories


Manufacturing


Assembly


Integration & Test

AS9100B Certified Facilities

ZIN Technologies occupies 50,000 square feet in its AS9100 certified corporate headquarters in Cleveland, Ohio.

Our facility includes a separate flight hardware assembly area with an electronic buildup capability, all located adjacent to our corporate headquarters. The assembly area provides 20,000 square feet of work space and is equipped with a circuit board fabrication laboratory where circuit boards can be processed, cleaned and conformal-coated.

Our engineers and technicians routinely build, test and fabricate ground and flight hardware including prototype analog and digital instrumentation using our oscilloscopes, microscopic inspection stations, soldering stations, precision voltage sources, digital multimeters, logic analyzers, & dynamic signal analyzers.

Hardware Assembly Area - Clean room & laminar flow workspace are available for contamination-sensitive components. Our laboratories can be operated as a class 100,000 visibly clean room with a humidity control system for ESD prevention. Laser-safe work areas and a thermal test chamber are available.

Machine Shop - ZIN has an in-house capability and 5000 sq ft work area for fabrication of prototype hardware and limited quantities of deliverable hardware.

Property Management - ZIN has an approved procurement department, Government Property Control System certified by the Defense Contract Management Agency, shipping and receiving area, and a climate controlled bonded storage area.

Manufacturing Work Order Process - Our manufacturing systems include material and process control plans, EEE parts control, contamination allowance and control, risk management, PRACA system and engineering review boards.

ZIN Technologies
Technology without Boundaries

Experienced Engineering and Management

ESTABLISHED ENGINEERING AND MANAGEMENT SYSTEMS

Experienced Technical Resources and Managers

Large and Small Project experience

Collaboration and Teamwork

Established Support Systems

Turn Key or Task Order

Business Management Systems and Reporting

Experienced Technical Resources:

- Self-directed motivated work team capable of hardware and end item deliverable accountability
- Project-focused development teams, defined milestones & deliverables
- Long term experience with hardware and software development, launch, mission and flight centers

Established Project Mgmt Infrastructure:

- Mature Business and Project Management infrastructure capable of supporting Large Business Management Systems and reporting requirements
- Earned-Value Management systems
- Configuration Management Systems
- Product Assurance Systems
- Verification and Requirement Management Systems
- Scheduling, monthly reporting and administration systems

Experienced Management Team:

- Experienced with Small "turn-key" contracts with small budgets & tight schedules
- Decades Of Experience Working with Customers Such as NASA, DoD, and Fortune 500 Companies
- We are an experienced NASA Prime Contractor with demonstrated responsibilities for large manned space flight programs
  - An example is the $110 Million International Space Station Fluids and Combustion Facility (multi-year and inclusive of sustaining engineering and long-term on-orbit operations)
- Experienced management of multiple subcontractors including large prime contractors, SDBs, 8As, Hub Zone and woman owned certifications

Established Engineering Support Systems:

- AS 9100 Quality System
- Processes controlled via Procedures and Work Instructions
- Manufacturing Work Order System
- Configuration Management expertise for NASA and DOD programs
- Hardware traceability including waivers, deviation, engineering changes through hardware certification
- Experience with ZIN, Konfig and Windchill CM products
- Change Control Board Processes
- Engineering Review Board Processes
- Risk Management Database and PRACA Systems
- Certified-QA inspectors for electronic and mechanical workmanship
- Parts & material tracking including material certifications, material test results, certificates of conformance, lot numbers, and other special documentation

EXPERIENCED MANAGEMENT TEAM

Experienced Technical Resources and Managers

Business Management Systems and Reporting

Project Focused Teams

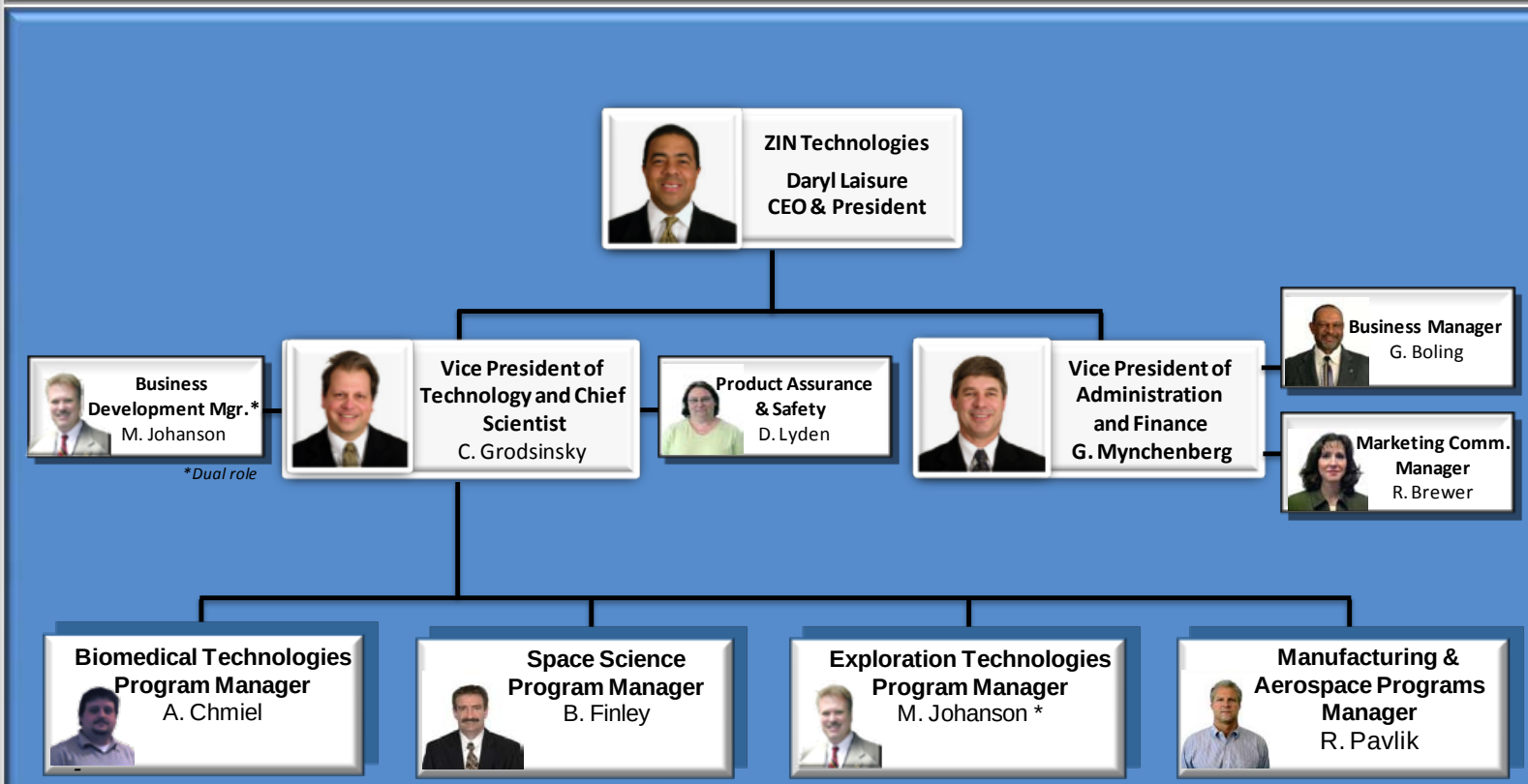
Collaboration, Partnership and Teamwork

Large and Small Project Experience

Turn Key or Task Order

Self-directed motivated Team capable of hardware and end item deliverable accountability

Organized to Meet Customer Requirements



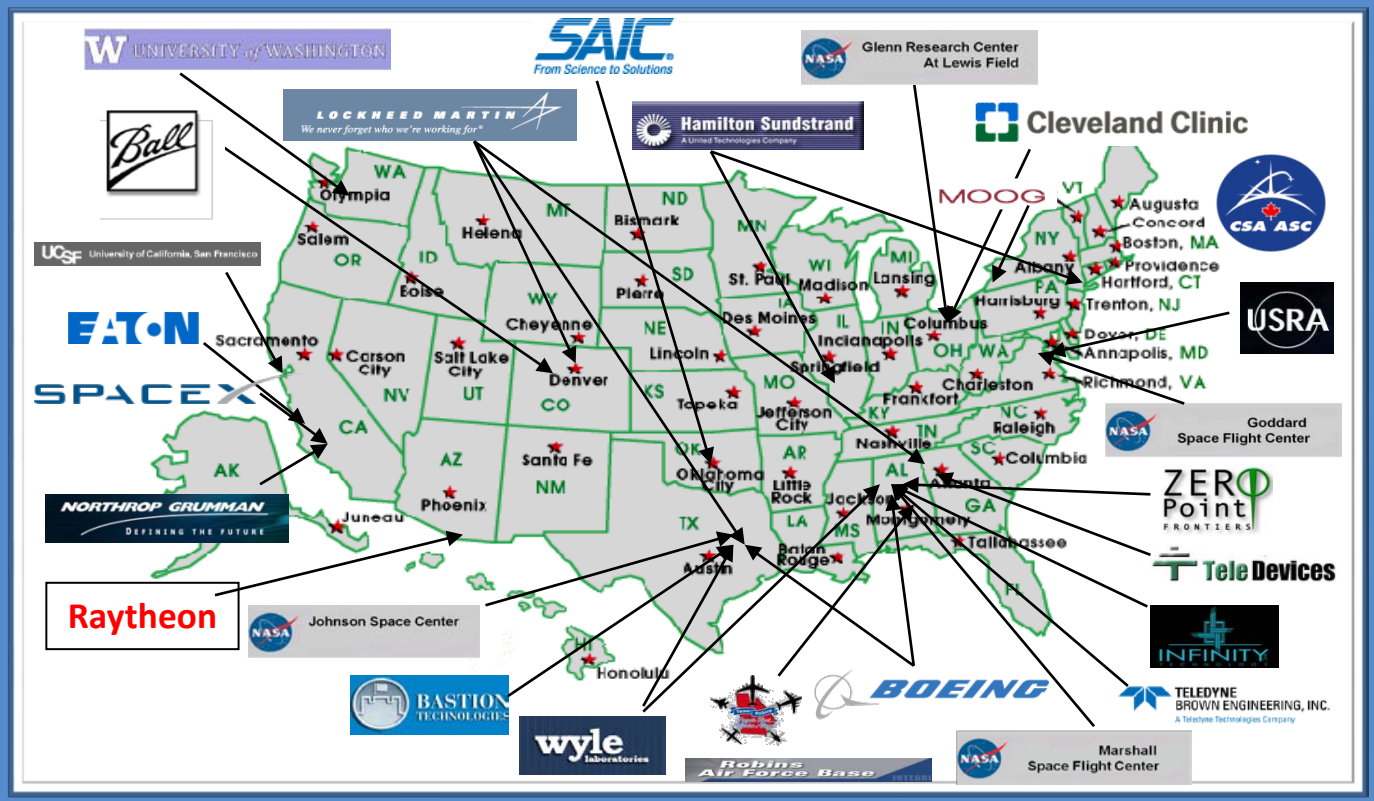
Each Division is managed by professionals with outstanding knowledge and valuable experience in their areas.

CUSTOMER AWARDS AND RECOGNITION

- 2004 Steve Sabo Engineering Excellence Award
- 2004 NASA George M. Low Award for Quality
- 2003 NASA Minority Contractor of the Year
- 2003 R&D 100 Software Award
- 2003 National Science Foundation Award
- 2003 GRC Quality and Safety Achievement Recognition
- 2002 Silver Snoopy Award
- 2002 GRC Software of the Year Award
- 2002 Manned Spaceflight Awareness Award

Customers/Partnerships

Based on our experience as a NASA prime contractor, we are capable of providing complex aerospace products and engineering support with confidence. By working closely with you over time to integrate into your business and understand your full range of requirements, we hope to be your technology solution for the long term.





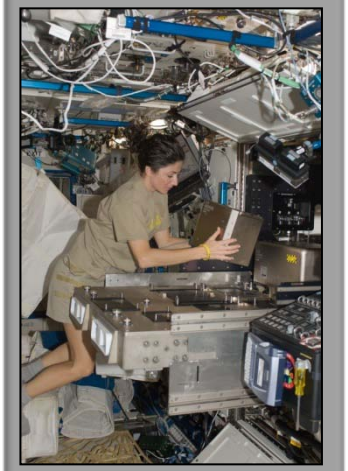


Examples Of ZIN Developed Custom Avionics

Data Acquisition • Health & Status • Control • Processing & Storage

CUSTOM AVIONICS PRODUCTS

- Control Systems
- Processing
- Data Acquisition
- Data Storage
- Image Processing
- Digital & Analog
- Programmable
- Health & Status
- COTS & Custom
- Communications



ZIN Developed Avionics Package on ISS

Fluids Science Avionics Package

Serves as the control and data acquisition system for a science payload: RS -422, 2 channels, A/D, D/A, DIO, Motion control, Analog video, CAN bus control of diagnostics and PI Hardware

Two 36 GB hard drives

P3-500mhz -RAM

Compact PCI: 8 Slots, 32 bit

28V @ 77 Watts

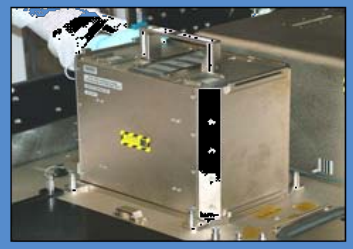


Image Processing and Storage Unit

Stores digital image data from a camera

Image analysis, processing and reduction

Control signals to camera and Illumination packages

IEEE 1394, FireWire Interface

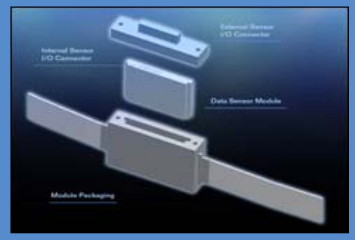
Analog video, RS -170A, input/output

Two 36 GB hard drives

P3-500mhz -RAM

6 slot Compact PCI, 64 bit custom designed backplane

28V @ 100 Watts



Bio Watch

Dynamic Data Acquisition

16 channels of data acquisition, w/ 24 bit resolution

10-4000 Hz Sample Rate (32,000 Hz max throughput)

120 dB dynamic resolution

Programmable individual channel filtering

Data Communication - Investigation into using commercial wireless technologies in space vehicles

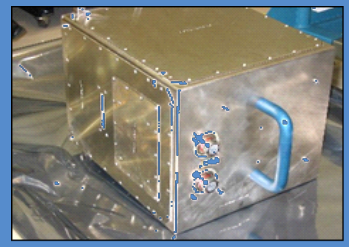
Achieve bandwidth to support aggregate 32 kHz

CVB Control Box

Serves as avionics control interface for Fluids Science Avionics Package through a data/power cable

28V and a maximum current of 4 Amps.

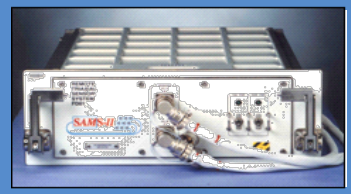
Compatible with FSAP Compact PCI Interfaces



FOMA Control Unit

Serves as the control and data acquisition system for the FOMA:

- Provide power conditioning
- Controls all gas blending
- Controls gas chromatograph for chamber sampling.
- Provides hardware status to the IOP via Ethernet and CAN bus
- 6u VME – 7 Slots
- 28V @ 92 Watts



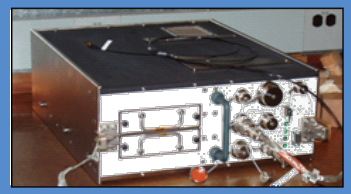
Space Accelerations Measurement System

ISS Microgravity Environment System and Subsystem Test Verification and Analysis

COTS PC/104 Embedded Controller

QNX Real -Time OS Multi -Tasking, Preemptive Scheduling, and Fast Content Switching

Custom Triaxial Sensor Head, Closed -Loop Fiber Optical Roll -rate Gyro, and Custom Very Low Frequency Sensor



Input/Output Processor

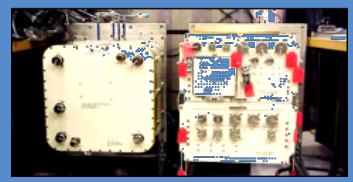
Main Fluids& Combustion Facility controller and data acquisition system.

Video – 16x8 video switch, Ethernet Switch, Sync Bus

6u VME & Compact PCI

4 Slot 6u VME, 1 Slot compact PCI

28V @ 120 Watts



PCS Avionics Section

Ethernet (10Base -T) Communications

PCI/ISA Form Factor

Analog -to-Digital Conversion w/Conditioning, 8 -axis Motion Control

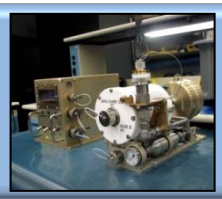
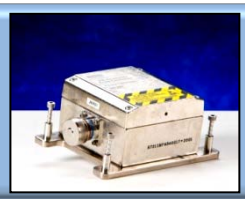
Digital I/O, 16 -Bit Digital Framegrabber Interface

RS-170 Interface

Removable SCSI Hard Drives

Laser Controller Interface (2)





Examples Of ZIN Developed Hardened Diagnostics

CUSTOM DIAGNOSTICS

- Illumination
- Imaging
- Diagnostics/Sensors
- Communications
- Fiber Optic Interface
- Laser Systems
- Analog & Digital
- Low Resolution
- High Resolution
- Ultra Violet

ZIN Developed Light Microscopy Module (LMM) an Automated Microscope Diagnostic Tool on ISS

Illumination • Imaging • Diagnostics/Sensors • Communications

White Light Package

Provides uniform, broad brand lighting
Two independent light engines
Adjustable intensity
Fiber Optic Quick disconnects
Mounted to rear of bench, quick connect/disconnect of fiber bundles
C-515C Microcontroller
151 Watts

Nd:YAG Laser

Provides a laser source for various diagnostic techniques such as Particle Image Velocimetry
532 nm, 150mw Output power
Analog control of laser functions
Laser output power monitoring
C-515C Microcontroller
26 Watts

Color Camera Package

24 Bit, 3 chip CCD
1/3 inch array, 768 X 494 pixel
RS 170C output (30 FPS)
Remote and interchangeable head allowing for in-situ calibration with controller
C-515C Microcontroller
35 Watts

Surveillance Camera

Low resolution observation
Point Grey Firefly™ Monochrome Camera IEEE–1394 digital
1/3 CCD Sony, VGA 640x480 format - 3.75, 7.5, 15 and 30 FPS
Focal lengths of 4mm, 6mm, or 8mm

QImaging Camera

High resolution imaging QImaging Retiga 1300C
1280 × 1024 pixels, 12 bit monochrome
6.7 µm × 6.7 µm pixel size
Dark Current 0.15e-/pix/s cooled Selectable Region of Interest (ROI)

HiBMs

High Bit-Depth Multi-spectral Diagnostic Package
Field of View: 50 mm square or 90 mm diameter
Spectral filtering provided with the use of a Liquid Crystal Tunable Filter.
12 bit per pixel output
4095 gray levels
frame rates of 7.5, 15 or 30 fps
PC 104
54 Watts

Low Light Level UV

field of view : 50mm or 80mm
4095 gray levels
12 bits per pixel output
frame rate 7.5, 15, 30 fps in 1x1 mode (1kx1k resolution)
7.5, 15. 30 and 54 fps in binning mode (2x2, higher sensitivity less resolution)
Low Light Level in the Ultra Violet spectrum.
PC 104
49 Watts

Illumination Control Module

Illumination source used for general backlighting and Soot Volume Fraction experiments
5 mW coupled power minimum from diode Illumination Source
Spectral Bandwidth: 10 nm maximum at 50% points
90 mm beam diameter
Wavelength 675 ± 15 nm
PC 104
24 Watts







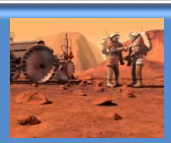

EXPLORATION TECHNOLOGY DEMONSTRATIONS

- Project & Program Management
- System Engineering
- Electro-Mechanical & Electrical Design
- Embedded System Design & Development
- Fluids Systems
- Structural & Thermal Analysis
- Digital & Analog System Design
- Environmental Testing
- Product Assurance
- Safety & Material Engineering
- Power Conversion Systems
- Optical Diagnostics
- Embedded Software Development
- Remote Biomedical Monitoring
- Bioastronautics Flight Hardware
- Flight Hardware Integration and Operations

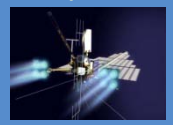
ZIN Technologies
Technology without Boundaries

Space Technology Demonstration

Experienced in Exploration Technology Demonstration


Habitation


Pre-Positioned Propellants


Power

Technology Options

- Power Systems
- Propulsion Systems
- Life Support Systems
- Air Revitalization
- Water Reclamation
- Thermal Management
- Sensors & detectors
- Radiation Monitoring
- Radiation Hardened Electronics
- Nano Thin Film Processing
- Low Gravity Environments
- Composites Structures


Crew Transport


Launch


Crew Support

Transit & Launch Systems

- Power Systems
- Propulsion Systems
- Thermal Protection
- Cryogenics Management
- Fluids handling Systems
- Structures
- Life Support Systems
- Radiation Hardened Electronics
- Sensors & Detectors
- Communications Systems
- Spaceflight Hdw & Sw
- Integration n& Operations Services
- Space Structure Interactions
- Low Gravity Environments


ISS Research


Resource Identification


Biomedical Countermeasure

Supporting Research

- 133 Man-Rated Science payloads
- Fluids & Combustion Facility
  - Fire Safety
  - Advanced Life Support
  - Water Reclamation
  - BioScience
  - Contaminants Identification
  - Microorganism identification
  - Human Health
- Human Health, Bioastronautics/ Infomatics
  - EMG Data Analysis Tools
  - Astronaut Exercise
- Requirements & Systems Engineering

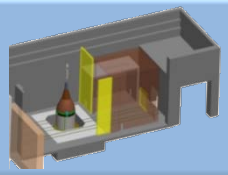
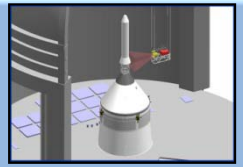

Landing Systems

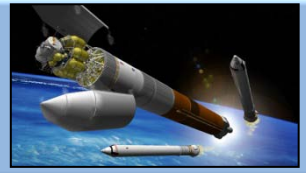

Comm/Nav

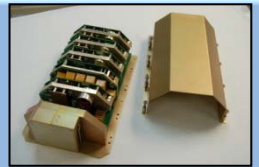

Surface Mobility

Orbital & Surface Systems

- Power Systems
- Propulsion Systems
- Thermal Protection
- Fluids Handling Systems
- Life Support Systems
- Radiation Hardened Electronics
- Sensors & Detectors
- Communications Systems
- Low Gravity Environments
- Spaceflight Hdw & Sw
- Integration & Operations Services
- Automated Operations



Crew Vehicle Spacecraft Technology Demonstrations

CREW VEHICLE SPACECRAFT TECHNOLOGY DEMONSTRATIONS

Requirements Definition

Systems Engineering

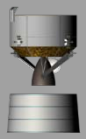
Analysis

Design Development

Manufacture

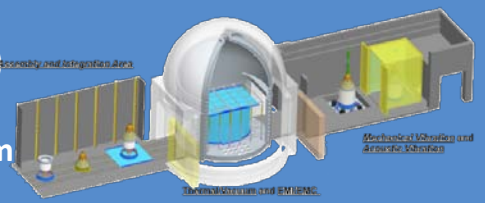
Integration

Test



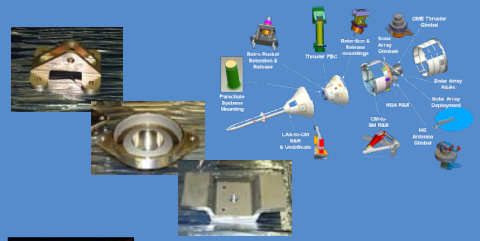
ORION Vibro-Acoustic Test Capability at NASA Plum Brook Station Space Power Facility

- This new capability includes a Mechanical Vibration Facility (MVF) and a Reverberant Acoustic Test Facility (RATF). In support of the GRC-based contract, ZIN is responsible for the design, installation, test and commissioning of the High Speed Data Acquisition System (HSDAS).



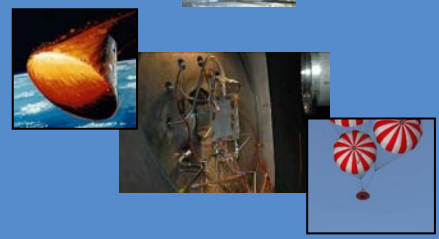
ORION Mechanisms and Structural Detailed Parts

- Under this contract with the Orion Prime Contractor Lockheed Martin, ZIN with our partner Infinity Technologies manufactured, inspected and delivered mechanisms and simulator detailed parts to be used in early ground testing and any initial flights of the Orion Crew and Service Module.



ORION, Active Cooling Technology Development Testing

- In support of prime contractor Hamilton Sundstrand, ZIN performed testing to simulate the active cooling of the Orion Crew Vehicle electronics during the reentry phase of Orion spacecraft.

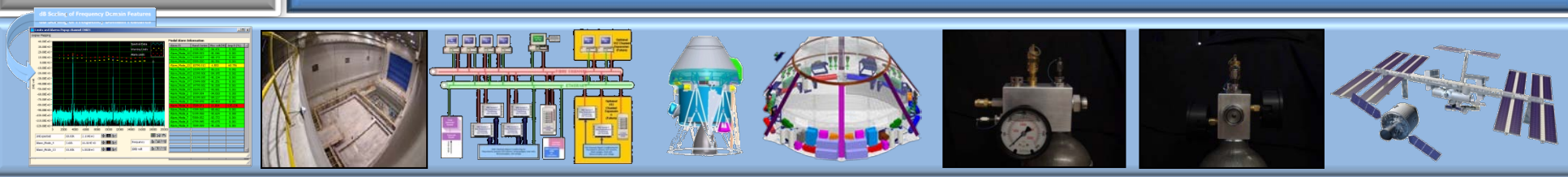


ORION, Portable Fire Extinguisher

- In support of prime contractor Hamilton Sundstrand, ZIN performed requirements definition and development program. ZIN assisted in foam selection, nozzle design and test of engineering model hardware. Design allows for water mist as an alternative.

CEV (ORION), Phase I Team

- In support of prime contractor Northrop Grumman/Boeing, ZIN contributed to the Electrical Power System design. We utilized our expertise in power systems to create a detailed model for spacecraft energy balance. This required a comprehensive database of electrical loads with provisions to model on/off/duty cycle status that varies with time.



Space System Integration & Operations Expertise

EXPERTISE INCLUDES MULTIPLE LAUNCH VEHICLES

- Sounding Rockets
- Space Shuttle
- Soyuz
- Progress
- ATV
- HTV
- Commercial

INTEGRATE AND OPERATE IN MANY ON-ORBIT CARRIERS

- ISS
- Glovebox (MSG)
- Fluids & Combustion Facility (FCF)
- EXPRESS Rack
- Exterior Pallet
- Commercial

Payload Analytical Integration

- Requirements Definition
- Manifesting
- ICD Development
- Payload Verification

Mission Analytical Integration

- Safety Certification
- Mission Requirements Definition
- Mission Design
- Mission Design Verification

Mission Training

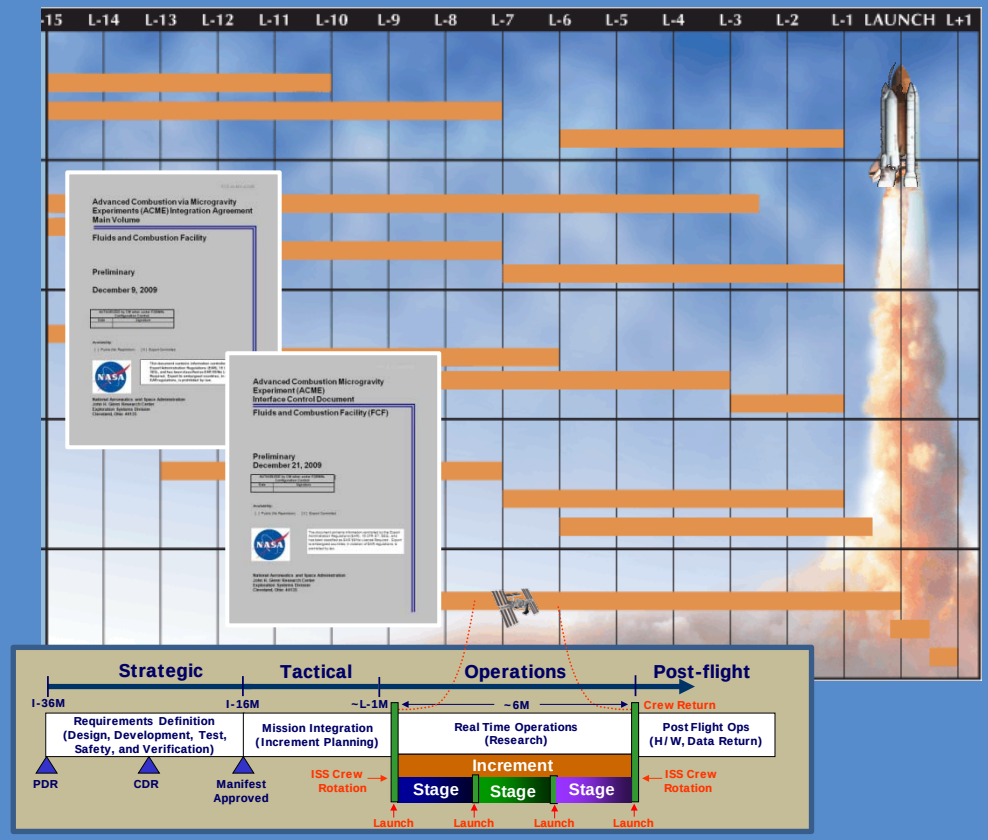
- Ground and Flight Personnel
- Mission Training Plan
- Familiarization Training
- Hands-on Training
- Joint Integrated Simulations

Hardware Physical Integration

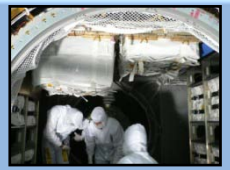
- Requirements Development
- Carrier Integration and Test
- Payload Integration and Test

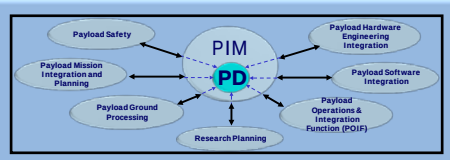
Mission Operations

- Procedure Development
- Real-Time Flight Operations
- Daily Planning
- Mission/Post-Flight Analysis



The ZIN Team has ISS Payload Integration facilitates support expertise from concept through on-orbit operations


ZIN Technologies
Technology without Boundaries

ZIN Technologies Summary

Current Contract Work Scope

- ISS FCF sustaining engineering and operations;
- Unique ISS flight investigations in combustion science, fluid physics, materials science and accelerometry;
- Ground-based and flight research investigations in exercise countermeasures equipment, medical devices and biosensors for long duration space missions;
- Advanced EVA (extravehicular activity) technologies in power, communications, avionics and infomatics in support of lunar surface operations;
- Instrument packages, and power, propulsion and sensor subsystems for Earth science, lunar exploration and other space science missions aboard spacecraft and airborne science platforms;
- Advanced technology development and demonstrations in the areas of power, propulsion, space communications systems and subsystems, lunar surface and in-situ resource applications, spacecraft fire safety, human research and exploration medical capability;
- STS/ISS and other space flight systems and subsystems;
- Advanced Exploration Technology Development - Ares, Orion and Altair systems and subsystems;
- Satellite Subsystem development;
- Commercial Spacecraft.

Experienced Minority Owned Small Disadvantaged Business (MO-SDB) Partner

- **ZIN is an experienced developer of ground and flight systems and components for manned and unmanned aerospace applications. Our engineering expertise includes Electro-Mechanical Systems, Instrumentation, Power, Data Acquisition, Software Development and Power Conversion products.**
- **ZIN specializes in the seamless and transparent progression between concept, detailed design, engineering, manufacturing, integration, testing, verification, certification, maintenance and operations.**

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