Innovative Small Disadvantaged Business Leader in Aerospace Design, Manufacturing, Integration and Operations
ZIN Technologies, Inc.
Small Disadvantage Business (SDB) – A North East Ohio Aerospace Partner

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<th>Event</th>
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<td>ZIN is founded</td>
<td>1957</td>
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<td>First NASA contract</td>
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<td>First Shuttle Payload</td>
<td>1987</td>
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<td>First MIR Payload</td>
<td>1997</td>
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<td>First ISS Payload</td>
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<td>TSC ISS Operations begins</td>
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<td>AS9100 Certification</td>
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<td>Commercial Space Capabilities</td>
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Experienced people, proven processes and tools to achieve total mission success

ZIN HQ - Cleveland
ZIN Labs - Cleveland
ZIN West - Pasadena

iAM Technologies Est.

FlexLife Health IDTF

AS9100 Certification

150th NASA Payload

TSC ISS Operations begins

First MIR Payload

First Shuttle Payload

First NASA contract

ZIN is founded

1957
ZIN - NASA Featured Partnerships

- Over 15 years operating International Space Station Physical Science Research Instruments
  - 75% of all physical science research developed, integrated and operated for NASA GRC

- ZIN provides Inertial Measurement Units (IMU)s for 1st NASA use of IMU for Space Based Flight control
  - GSFC MagnetoSpheric Multiscale (MMS) mission, GNC on a constellation of spacecraft with tightest formation ever attempted (less than three miles)

- ZIN is developing the Power Processing Unit (PPU) for the NASA NEXT-C Ion Thruster

- ZIN is a major subcontractor to Aerojet Rocketdyne on the Advanced Electric Propulsion System (AEPS) contract

- Providing design, fabrication and verification for Electrical Power System of the SNC Dream Chaser (Excluding Batteries)

- Prime contractor for the NASA-GRC SpaceDOC2 contract, Major Subcontractor on the NASA-GRC GESS contract and the Multi-Divisional Engineering, Design, Analysis Lab-wide Support (MEDALs) contract supporting JPL
Large Company Capabilities with small company flexibility

Core capabilities
- Product and Mission Assurance
- Manufacturing (Electrical, Subtractive and Additive Manufacturing)
- Flight and Ground Safety
- Safety & Health
- Project Management (PMP certified project managers)
- Configuration Management
- Change Control Processes
- Risk Management
- Parts and Material Control and Tracking
- Power & Avionics Systems
- Systems Engineering
- Instrument/Sensor Systems
- Embedded Systems (hw & sw)
- Space Communications
- Composite Design & Analysis
- Engineering Analysis & Modeling
- Flight and Ground Hardware Integration & Operations
- Human Performance Data Analytics

Mechanical Manufacturing
- Clean room & laminar flow workspace
- Machine Shop, Additive Manufacturing (DLS)
- Property Management, shipping and receiving area, and a climate controlled bonded storage.
- Manufacturing Work Order Process

Electrical Manufacturing
- Electrical Assembly Technicians
- 207 Unique PWA’s assembled in-house over the past 5 years
- Trained and certified to NASA 8739 standards and IPC Standards
- Inclusive of Harness, cable design, development & Test
60,000 sq. ft.
Spaceflight hardware assembly area with electronic buildup capability, and fabrication

PWA assembly laboratory where circuit boards can be processed, assembled, cleaned and conformal-coated.

Digital Thread - In-house Agile Manufacturing direct laser melting capability

AS9100C Certified Quality Management System
ZIN Projects and Programs – Products and Services

- GRC Space Flight Systems Development & Operations Contract (SpaceDOC II)
- GRC (VPL) Glenn Engineering Support Services (GESS III)
- GRC (SAIC) Orion Vibro-Acoustic Test Facility
- GRC (USAF) Advanced Research and Technology Support (ARTS)
- Commercial Space (CASSIS) Milken, Proctor & Gamble, Smuckers, Merk, Eli Lilly, Delta, Goodyear
- FlexLife Health – Broader Human Health Capabilities
- GSFC (SGT) Omnibus Multidiscipline Engineering Services (OMES)
- GSFC MMSAMS for MMS Mission
- JPL Multi-divisional Engineering, Design, Analysis Lab-wide Support (MEDALS)
- AMES Animal Access Unit (AAU)
- JSC (Wyle) Bioastronautics/Human Research Program
- MSFC (Wyle) Engineering Solutions and Prototyping (ESP)
- iAMT Integrated Additive Manufacturing Technologies
ZIN Technologies (ZIN) is a minority owned Small Disadvantage Business (SDB) leader in the development of complex ground and flight space systems, integration and operations.

- 250+ person organization consisting of experienced scientists, multi-disciplinary engineers, designers, technicians, operators, safety and quality assurance professionals.
- AS9100C certified facilities and quality management systems.
- Over the past 25 years, ZIN has developed, integrated and operated over 230 ground and flight space systems for sounding rockets, shuttle, MIR, ISS, satellite and new exploration.
- ZIN has developed Class A/B systems (Power, Instrumentation, Inertial Navigation) for long duration missions, with radiation requirements.
75% Of Physical Science Research on ISS Since 2001 – Current Status

- **FCF/CIR/FIR/LMM** – 7 Yrs of Successful Operations
- **OASIS** – Liquid crystal-display mfg is a $300 billion/year industry
- **ZBOT** – Enables exploration missions
- **MCT** – Efficient Medical Consumable Inventory Tracking
- **SAMS** – Longest Running Operational ISS Payload
- **SCAN** – Improve space transceivers for communications, networking, & navigation
- **PBRE** – On-Orbit and ready for Operations
- **BCAT** – Colloids in a microgravity environment
- **ACME** – Reduce pollutant emissions
- **SLS (eCALF)** – Equidistant Chamber Attenuator for Low Frequencies
- **ACE** – Increase the profitability of commercial products such as TIDE
- **BASS** – Burning rate, flame shape, and flame extinction
Multi-Discipline Engineering Services
Supporting Diverse NASA Programs

- GHAPS – Gondola for High Altitude Planetary Science
- SLS – Space Launch System Upper Fairing Structural Analysis
- COMPASS – Modeling Parametric Assessment of Space Systems
- ERA – Environmental Responsible Aeronautics
- FBCE – Flow Boiling and Condensation Experiment
- ARRM – Asteroid Recovery and Redirect Mission Systems Engineering
- NEXT-C – Ion Propulsion Systems Engineering
- SAFFIRE – Spacecraft Fire Experiment-I
- EVA Suit – Power, Avionics, and Software (PAS)
- SEP – Solar Electric Propulsion Power Integration Testbed
- UHB – Ultra High Bypass Fan Noise Reduction Technology
- Plum Brook – Maintenance and Upgrades
ZIN Technologies

Power, Propulsion, Navigation & Communications Capabilities

- ZIN is a subcontractor to Aerojet for NASA’s Evolutionary Xenon Thruster-Commercial (NEXT-C) power processing units for flight that will be available for use on one of the agency’s Discovery missions or other future mission (DART).

- ZIN is a subcontractor to Aerojet for the Advanced Electric Propulsion System (AEPS) contract that could potentially increase spaceflight transportation fuel efficiency by 10 times over current chemical propulsion technology and more than double thrust capability compared to current electric propulsion systems.

- ZIN is a certified supplier to Aerojet who is responsible for developing the Dream Chaser electrical power system for Sierra Nevada.

- ZIN was the prime contractor that supported the NASA GSFC in the design, fabrication, verification or a flight attitude controls system (MMSAMS) for the Magnetospheric Multiscale (MMS) mission. The MMS mission will study magnetic reconnection in the Earth’s magnetosphere.

- ZIN is a subcontractor to JPL MEDALS contract that is designed to duplicate JPL’s in-house spacecraft formulation capability and will be utilized for development, engineering, analysis, fabrication, and testing of spaceflight and ground systems and subsystems. Efforts include all phases of the systems engineering lifecycle, and could require development of anything from specific assemblies to entire systems, depending on JPL Project needs and requirements.
Unique Small Business Additive Manufacturing Capability

- **Direct Laser Melting** Additive Manufacturing Capability
  - **Strategic relationships** with GRC, propulsion engine manufacturers, and powder metal suppliers to develop unique technologies for Aerospace AM parts design and manufacture

- **Aerospace focus** on Inconel and Ti Materials/Powder Metal Production - Characterization
  - Powder Metal **Material Characterization** and Final Part Material Characterization strategic partnership with GRC

**Digital thread**
- Model based qualification and verification
- Re-combine Engineering and Manufacturing
ZIN develops technologies to solve medical and physiological problems of long duration spaceflight requiring novel, small, low power, non-invasive and versatile instrumentation and hardware.

- Compact Wireless Biometric Monitoring And Real Time Processing System
- Space Suit Sensing, Data Display and Management System
- Advanced Exercise Concepts (AEC)
- Glenn Harness (International Space Station Treadmill)
- Medical Consumable Tracking (MCT)
- In Suit Injection System
- IntraVenous Fluid Generation
- Human Performance Data Analytics
Commercial Spinout Success

- Flexlife Health Startup with Cleveland Clinic
- Sold in 2015 to Lifewatch [www.lifewatch.com](http://www.lifewatch.com) – Telemedicine arrhythmia and INR services
- ZIN provides INR telemedicine vMetrics™ devices and architecture connectivity

vMetrics™ Platform Technology

- OAC
- AFIB
- COPD
- Sleep Apnea
- Cardiac Care

Point of Need

Point of Care

- EMR
- Clinic
- Hospital
- Private Practice
- Visiting Nurse