



# **ZIN Technologies**

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



ZIN HQ - Cleveland



ZIN Labs - Cleveland








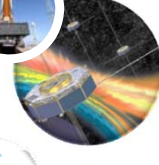




ZIN West - Pasadena



*Experienced people, proven processes and tools to achieve total mission success*

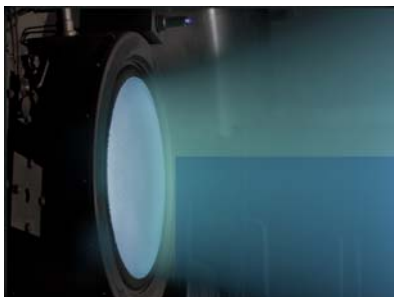
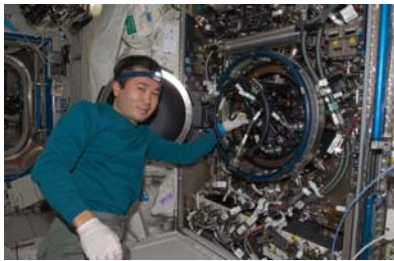


○ ZIN is founded	1957	
○ First NASA contract	1969	
○ First Shuttle Payload	1987	
○ First MIR Payload	1997	
○ First ISS Payload TSC ISS Operations begins	2001	
○ AS9100 Certification	2009	
○ 150 <sup>th</sup> NASA Payload	2010	
○ FlexLife Health IDTF	2012	
○ iAM Technologies Est.	2014	
○ Commercial Space Capabilities	2016	



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## 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 1<sup>st</sup> 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





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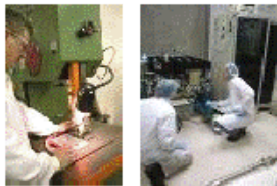
## Large Company Capabilities with small company flexibility



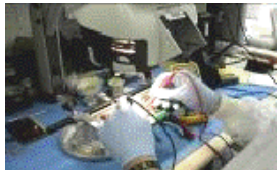
**Admin & Engineering**



**Laboratories**



**Manufacturing**



**Assembly**



**Integration & Test**

### 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 (hdw & 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

## Slide 4

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**ac1**

alan chmiel, 5/24/2016



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## ZIN Manufacturing



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

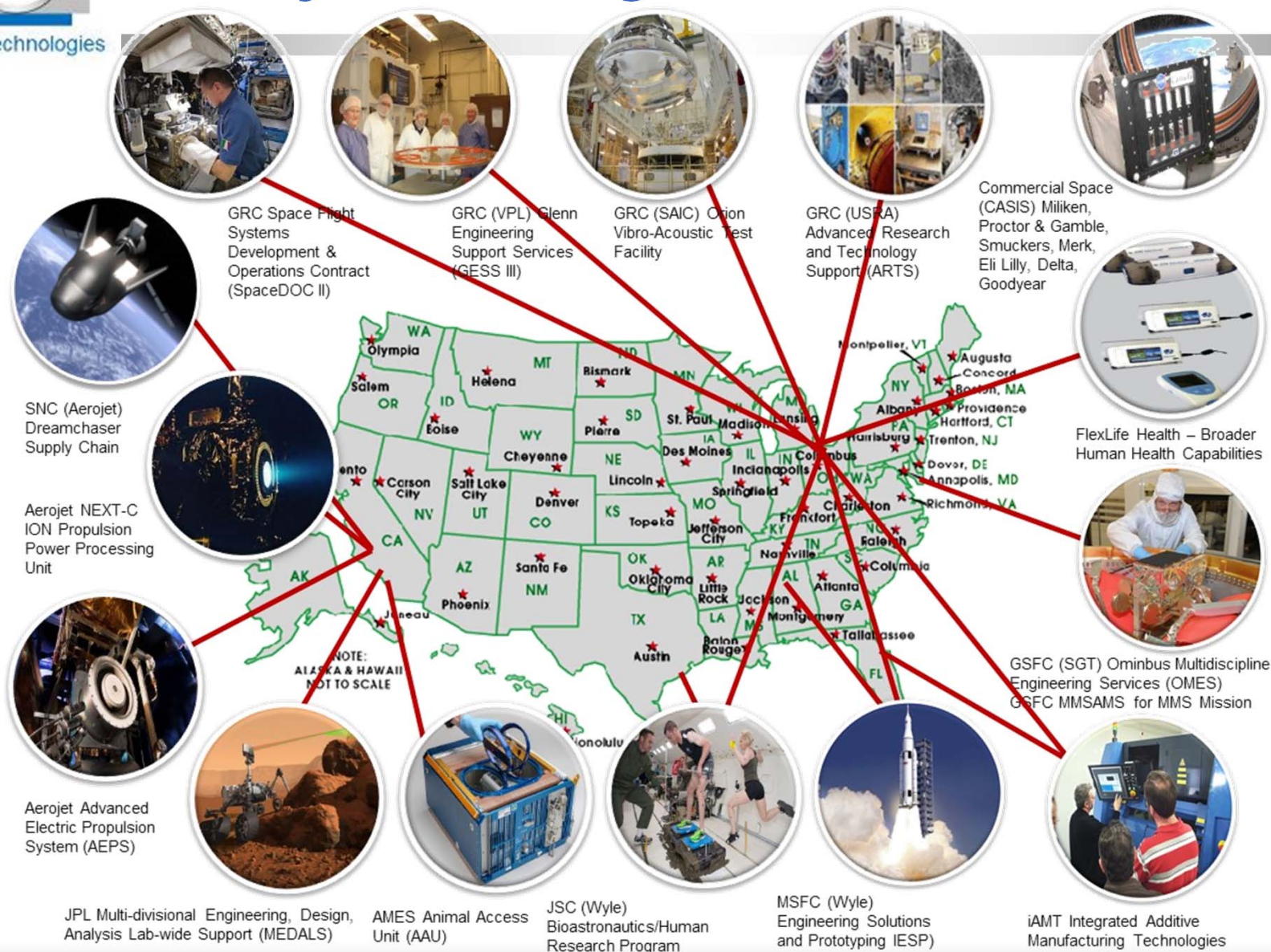


AS9100C  
Certified Quality  
Management  
System





# ZIN Projects and Programs – Products and Services





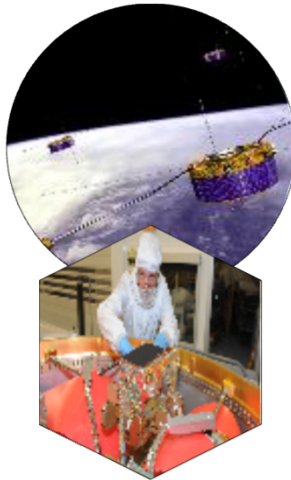


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## Extensive Ground and Flight Hardware and Software Experience



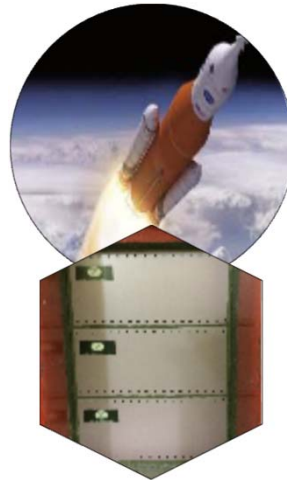
*Space Station*



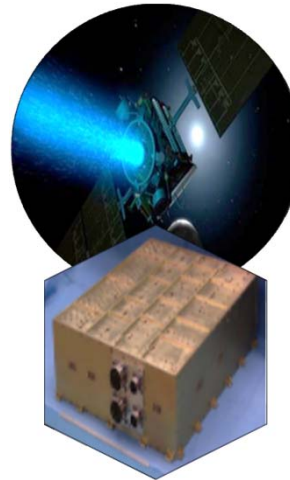
*Technology*



*Commercial Space*



*Exploration Systems*



*Defense Systems*

- 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





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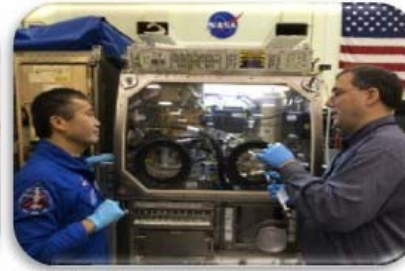
## 75% Of Physical Science Research on ISS Since 2001 – Current Status



**FCF/CIR/FIR/LMM** – 7 Yrs of Successful Operations



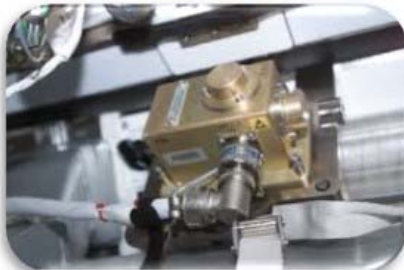
**OASIS** – Liquid crystal-display mfg is a \$300 billion/year industry



**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





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## Multi-Discipline Engineering Services Supporting Diverse NASA Programs



**GHAPS** – Gondola for High Altitude Planetary Science



**SLS** – Space Launch System Upper Fairing Structural Analysis



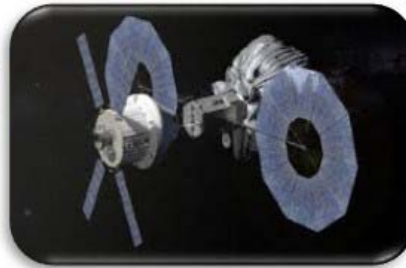
**COMPASS** – Modeling Parametric Assessment of Space Systems



**ERA** – Environmental Responsible Aeronautics



**FBCE** – Flow Boiling and Condensation Experiment



**ARRM** – Astroid Recovery and Redirect Mission Systems Engineering



**NEXT-C** – Ion Propulsion Systems Engineering



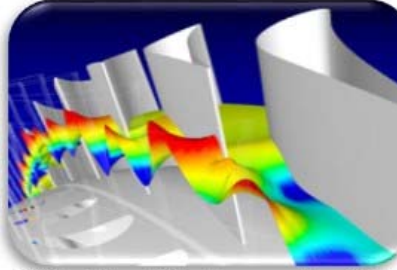
**SAFFIRE** – Spacecraft Fire Experiment-I



**EVA Suit** – Power, Avionics, and Software (PAS)



**SEP** – Solar Electric Propulsion Power Integration Testbed



**UHB** – Ultra High Bypass Fan Noise Reduction Technology

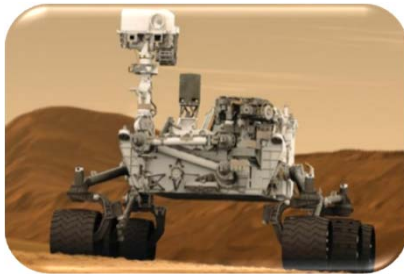


**Plum Brook** – Maintenance and Upgrades

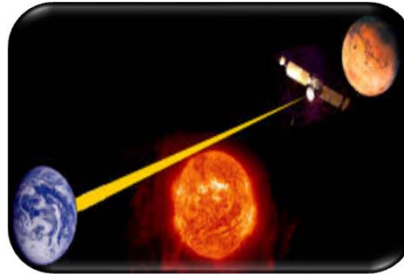


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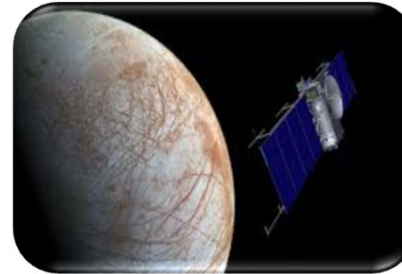
# Power, Propulsion, Navigation & Communications Capabilities



MARS 2020



Deep Space Optical Communications (DSOC)

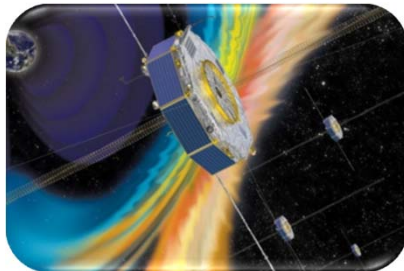


Europa Cold Capable Electronics



SWOT KaRIn High Power Amplifier

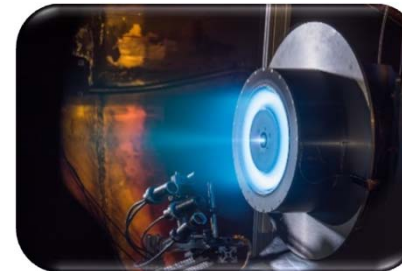
- ZIN is a small business prime contractor to JPL MEDALS contract that is designed to duplicate JPL's in-house spacecraft formulation capability and will be utilized for development, engineering, analysis, fabrication, and testing of spaceflight and ground systems and subsystems. Efforts include all 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.



GSFC MMS MMSAMS



GRC NEXT-C



GRC AEPS



Dream Chaser

- 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 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.





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## Unique Small Business Additive Manufacturing Capability



*3D PHENIX PXL*



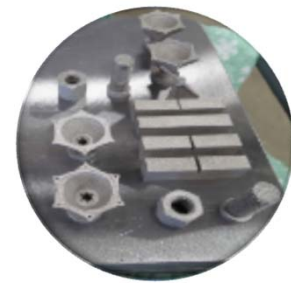
*Design for AM*



*Powder Metal*



*Laser Sintering*



*Finished Product*

### Direct Laser Melting **Additive Manufacturing Capability**

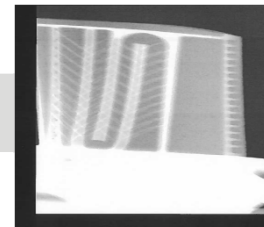
- **Strategic relationships** with GRC, propulsion engine manufacturers, and powder metal suppliers to develop unique technologies for Aerospace AM parts design and manufacture

### • **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



**iAMTech**

Reengineering Innovation 11

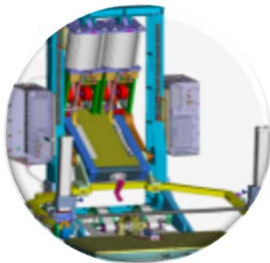


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## Astronaut Countermeasure, Simulation & Devices Support Exploration



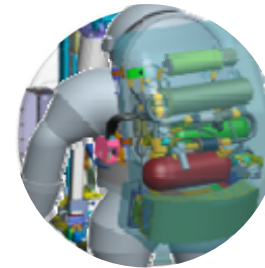
*Advanced Exercise*



*Kinematic Modeling*



*Ground Research*



*Space Suit Sensing*



*Medical Devices*

- 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





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## 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

