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Analytical Services, Inc.  
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**Education:**

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|-------|---|-----------|
| M. S. | Nuclear Engineering, North Carolina State University          | 1996      |
|       | Plasma Engineering Concentration/ Material Science Minor      | GPA: 3.33 |
| M. S. | Engineering Science, University of Tennessee, Space Institute | 1992      |
|       | Instrumentation Concentration/Mechanical Engineering Minor    | GPA: 3.75 |
| B. S. | Engineering Physics, University of Tennessee, Knoxville       | 1990      |
|       | (all GPAs referenced are on a 4.0 grading system)             | GPA: 3.40 |

**Highlights of Qualifications:**

- Significant experience modeling the natural space ionizing radiation environment and determining its effects on materials and electronics parts.
- Significant experience writing radiation requirements, developing environment reference documents, developing test requirements, performing tests, and performing all hardness assurance activities.
- Strong background in radiation effects on electrical and optical parts and materials
- Strong background in the Plasma Physics, Mechanical Engineering, Material Science, Instrumentation, and Nuclear Engineering
- Significant Teaching experience for both basic and advanced skills.
- FORTRAN programming using direct, iterative, and Monte Carlo modeling techniques
- Senior Member IEEE

**Technical Experience:**

**Senior Engineer:** Analytical Services Inc. April 9, 2007 – present

Developing tools for performing hardness assurance for Missile Defense. These tools include a Radiation Tested Parts Database (**RadCat**<sup>®</sup>), a Radiation Hardness Assurance Toolkit (Rad**HAT**<sup>™</sup>), and a test planning and test report writing software, Rad**TEST**<sup>™</sup>.

Performed radiation testing of a proprietary phosphate glass for NASA at Auburn's Co60 facility. Performed radiation testing of SemiSouth SiC jFET at the Auburn facility. Re developed the magnetic shielding model for the Earth's magnetosphere. Developed several applications of MCNPx for use with embedded materials, sensor calibration, and charge loss determination.

**Significant Projects at ASI**

- Developed a database of radiation tested parts for use in design of spacecraft and missiles
- Worked on conversion of CAD modeled parts into MCNPx objects.

- Modeled laboratory test sources in MCNPx for comparison to experimental data
- Developed radiation test guidelines and reporting software
- Developed a Monte Carlo technique based on the Smart-Shay technique to calculate solar proton flux on missiles in flight.
- Performed testing at Auburn's Leach Science Center Cobalt 60 facility
- Assisted in the development of SBIR proposals at all levels
- Assisted in securing funding for SBIR projects at all levels.

**Radiation Effects Engineer:** Sverdrup Technology, Inc., July 8, 1996 –April 6, 2007

Perform parts and materials analysis of spacecraft systems and designs to determine their sensitivity to the natural space ionizing radiation environment. This analysis includes determination of initial spacecraft orbit and projected variations, the natural space environment for those orbit, and placement of incidental and intentional shielding from spacecraft geometry. Furthermore, testing of specific electronic parts and materials that were believed to be sensitive to that environment has been performed to determine the relative system risk generated by that sensitivity. Other significant work performed under contract for NASA is presented below:

**Significant Projects at Marshall Space Flight Center**

- Developed the natural environment definition, requirements, and reporting for the Constellation architecture
- Performed ground crew duties and observed the Stardust re-entry from Battle Mountain, Nevada
- Developed the five radiation environments for the new "Natural Environment Design Document," which baselines environment requirements for the Crew Launch Vehicle, Crew Exploration Vehicle, and Lunar Lander.
- Developed a technique for estimation of galactic cosmic radiation through complex structures on the lunar surface.
- Provided space weather support for the Demonstration of Autonomous Rendezvous Technology (DART) flight demonstration project.
- Performed as radiation environment sub-task lead
- Assisted in the Leonid Observation Campaign in Tenerife, Canary Islands, Spain.
- Assisted in the STS-107 investigation
- Assisted in the testing, alteration of design, and re-testing for qualification of four DC/DC converters for the Environment Control and Life Support System (ECLSS) for the International Space Station.
- Performed the qualification of electronics parts for the radiation environment of the Propulsive Small Expendable Deployment System(ProSEDS)mission
- Developed a radiation test program and methodology which was used for the testing of the Solar Sail, Orbiting Wide Angle Lens, the Hubble Space Telescope passive multi-layer insulation, and silicon and diamond structures for Micro Electro Mechanical Systems (MEMS).
- Created a 3-D geometric radiation model of the Node 2 segment of the International Space Station using the NOVICE code.

- Reviewed the radiation environment models for the Manned Mars Exploration mission, the Mars Assent Vehicle, the Space Solar Power Generation Unit, and the Next Generation Space Telescope.
- Developed the Boilerplate Radiation Environment Document and the Alpha Particle Design Environment for NASA Marshall Space Flight Center.
- Assisted in electronics parts review and qualification for the Chandra Space Telescope, as well as considerable work in developing explanations for variations in the natural space environment during flight.
- Developed a database of radiation tested parts for use in design of spacecraft.

**Graduate Research Assistant:** North Carolina State University, June 1992 - July 1996  
 Performed research on plasma interaction with materials and surfaces under the direction of Dr. M. Bourham and Dr. John Gilligan. Compiled a database on plasma ablation experiments, constructed test apparatus and instrumentation for a rail gun and combustion experiment, and monitored tests for the SIRENS electro-thermal chemical plasma test apparatus.

Designed a model of the ablation shielding for a surface from a steady state approximation to the energy balance. Wrote a computer program from this model that is being used to verify other computer models and predict lab tests. A direct contribution of this program to the test department was the program's simplicity of use and speed. Use of this program allows the consideration of many materials before each use of a more time consuming computer code or laboratory test.

**Research Intern:** University of Tokyo, Tokai; May 1993 - August 1993  
 The project performed for the University of Tokyo involved planning a series of tests to differentiate physical and chemical sputtering of carbon by a hydrogen plasma. Aided Assistant Professor Tanaka and two Japanese graduate students in project design for the Materials And Plasma (MAP) device at the facility. Constructed and instrumented the targets, which were designed to be heated, cooled, and electrically biased for specific tests. Assisted in laboratory scheduling and supervision, testing, and initial data evaluation. Performed primary writing for the project report.

**Graduate Research Assistant:** University of TN, Space Institute, May 1990 - July 1992  
 Performed research on natural gas combustion and heat transfer under Professor John Lineberry and Dr. Harold Schmidt. Developed efficiency models for a 100,000 BTU natural gas furnace. Worked on the generation of electric power through magnetohydrodynamic combustion of coal in the UTSI energy conversion group. Assisted fluid flow research projects including a single stage, earth-to-orbit model.

**Work References:**

Dr. Mike Guthrie	Current Supervisor at ASI	256-562-2115
Dr. Joe Minnow	Supervisor at Jacobs	256-544-2850
Dr. Wes Swift	Co-worker at Jacobs/NASA	256-881-4438

## **Publication List**

### **Primary Publications:**

Richard L. Altstatt and Dr. David Edwards, "Modeling natural space ionizing radiation effects on external materials," *SPIE Photonics for the Space Environment* August 2000

Richard L. Altstatt, "A Simplified Model of Steady State Plasma Interaction with a Surface," May 1996, North Carolina State University; Raleigh NC

Richard L. Altstatt, "Laboratory Analysis of a 100,000 BTU Residential Natural Gas Furnace," August 1992, University of Tennessee, Space Institute; Tullahoma TN

Richard L. Altstatt and John Lineberry, "Furnace Characterization Studies, Final Report-Phase 1" Proprietary Report September 1991, University of Tennessee, Space Institute; Tullahoma TN

### **Secondary Publications:**

Minow, J.I., R.L. Altstatt, W. C. Blackwell, "Plasma Environments and Spacecraft Charging for Lunar Programs," Space Technology Applications International Forum 2007, Biarritz; France 12-15 Feb. 2007

Minow, J.I., R.L. Altstatt, W.C. Skipworth, "Genesis Radiation Environment," 45th AIAA Aerospace Sciences Meeting, Reno, NV, January 2007

Minow, J.I., L.N. Parker, R. Altstatt, and W. Skipworth, *Ion Flux Environments in Interplanetary Space*, AIAA-2006-0473, 44th AIAA Aerospace Sciences Meeting, Reno, NV, January 2006.

Minow, J.I., R.L. Altstatt, B.M. McWilliams, *Design and "As Flown" Radiation Environments for Materials in Low Earth Orbit*, International Symposium on Materials in a Space Environment, Collioure, France, 2006

Ohlhorst, Craig, Kathryn Wurster, Jeff Robinson, Jeffrey Anderson, Richard Altstatt, and William Cooke, "Baseline Reference Missions and Environments Definition Report, Lightweight Nonmetallic Thermal Protection Materials Technology Project," MSFC-RPT-3485, LMPMT Project Office 15 December 2005

Minow, J.I., L.N. Parker, and R.L. Altstatt, "Radiation and Internal Charging Environments for Thin Dielectrics in Interplanetary Space." presented at the 9<sup>th</sup> Spacecraft Charging Technology Conference, Tsukuba, Japan, 4-8 April 2005.

Minow, J.I., R.L. Altstatt, and L.F. Neergaard, "Interplanetary Radiation and Internal Charging Environment Models for Solar Sails," presented at the Solar Sail Technology and Applications Conference, Greenbelt, MD, 28-29 September 2004.

Watson, Michael D., Joseph Minow, Richard Altstatt, George Wertz, Charles Semmel, David L. Edwards, and Paul R. Ashley, "*Space Application Requirements for Organic Avionics*" Proceedings of SPIE, Volume 5554 Photonics for Space Environments IX, Edward W. Taylor, Editor, October 2004, pp. 92-105

David Edwards, Whitney Hubbs, Tesia Stanaland, Andrew Hollerman, Richard Altstatt, "*Characterization of Space Environmental Effects on Candidate Solar Sail Material*" Proceedings of the 14th Symposium, Propulsion Engineering Research Center (PERC), State College, PA; December 10- 11, 2002

Koontz et al., "*Materials Interactions with the Space Environment: International Space Station – May 2000 to May 2002*", 6<sup>th</sup> International Conference, Protection of Materials and Structures from the Space Environment, Toronto, Canada, 1-3 May 2002.

Edwards, D.L., W. Hubbs, G. Wertz, and R. Altstatt, *Space Environmental Effects Testing and Characterization of Candidate Solar Sail Material Aluminized Mylar*, at the NASA JPL/MSFC/UAH 12th Annual Advanced Space Propulsion Workshop, 3-5 April 2001, Huntsville, AL.

Howard, Jim, Margaret Bruce, Richard Altstatt, and Chris Palor, "*Single Event Transient and Destructive Single Event Effects Re-Testing of the MDI3051RES05ZF Modular Devices, Inc. DC/DC Converters*," NASA Electronic Parts Program. 2001