



# **FIRE/RECONSTRUCTION CONSULTANTS, INC.**

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## VITA

### CHARLES ROBERT (BOB) DENABURG

#### EDUCATION:

College: University of Alabama, Tuscaloosa  
Degree: B.S. in Metallurgical Engineering  
Other: Professional Engineering, 5816 AL 1964

#### PROFESSIONAL AFFILIATION:

- American Society For Metals (ASM)
- American Ceramic Society, Engineering Division - Member
- National Management Association - Member

#### MAJOR FIELDS OF EXPERIENCE:

- Forensic Engineering
- Failure Analysis
- Problem Solving/Trouble Shooting
- Fracture Studies
- Corrosion/Causes and Prevention
- Expert Witness

#### HONORS AND ACHIEVEMENTS:

- NASA Exceptional Service Medal
- Numerous Letters of Commendation and Appreciation on File
- Team Member of Four Separate Group Achievements Awards, KSC
- Silver Snoopy Award from the Astronaut Office for Safety
- Certificate of Commendation
- Several Monetary Awards for Time and Money Savings Suggestions
- Letters of Commendation and Appreciation/Work Performed
- Listed in "Who's Who In Engineering in West and Southwest" 1976, "Who's Who in Science and Engineering", Premiere Edition, 1992/1993
- Selected as Committee Member to prove the technical content on the Chapter on "Corrosion Failures" for Volume 10, "Metals Handbook", published by ASM
- Several Quality Step increases: An increase in pay for superior job performance
- Nominated by the Center Director to be a Candidate for Membership to the Committee on Materials of the American Institute for Aeronautics and Astronautics (AIAA)
- Directed, conducted, completed and published for Government and Industry over 700 case histories of failures. Several topics are listed below:
- Malfunction Investigation of Apollo Command Service Module 108 Liquid Hydrogen Storage Tank, Saturn Program
- Failure Analysis of the Secondary "K" Truss Members, Mobile Service Structure, Saturn Program
- Malfunction Investigation of the Saturn 208/Sky Lab IV Fin Spars and the SIVB Reaction Beam Failures

- Failure Analysis of the Caster 4 Solid Rocket Motors, Delta 134 (OTS)
- Failure Analysis of two Atlas Centaur Unmanned Launch Vehicle
- Failure Analysis of the Solid Rocket Motor, Challenger Incident
- Failure Analysis of numerous Ball/Roller Bearings, Fasteners, Various Tools
- Materials Which Involved Failures include, but are not limited to, the following:
  - Plain Carbon Steels - Cast and Wrought
  - High Strength Low Alloy Steels and Cast Irons
  - Precipitation Hardening and Dispersion Hardening
  - Stainless Steels 200, 300 and 400 Series
  - Aluminum Alloys
  - Copper Base Alloys
  - Nickel and High Temperature Alloys
  - Titanium Alloys
  - Plastics
  - Rubbers
  - Fibers
  - Composites
  - Ceramics
  - Integrated Circuits
  - Platings and Coatings

***These Analyses Involved Some of the Following Modes of Failure:***

- General Corrosion
- Pitting Corrosion
- Crevice Corrosion
- Stress Corrosion
- Stress/Rupture
- Thermal Fatigue
- Dissimilar Metals/Galvanic
- Corrosion Fatigue
- Fatigue
- Ductile - Brittle
- Dimensional
- Resonant Frequency

**PROFESSIONAL EXPERIENCE SUMMARY**

**Consultant to Fire/Reconstruction Consultants, Inc. for 26 years.**

**Employer:** C.R. Denaburg & Associates, Inc

- Location: Indian Harbour Beach, Florida
- Period: Full Time: December 1990 to Present
- Position: Chief Executive Officer and Manager

**Employer:** Benedict Engineering Company, Inc.

- Location: Tallahassee, Florida
- Period: July 30, 1990 to December 21, 1990
- Position: Engineering Associate

**Employer:** National Aeronautics & Space Administration

- Location: Kennedy Space Center, Florida
- Period: June 1983 to June 1990 (Retired)
- Position: Chief, Malfunction Analysis Branch

**Major Duties:**

Served as Chief of the Malfunction Analysis Branch making policy and setting guidelines as to the function of the Branch and its personnel within the broad direction of the Division policies. Assigned all work and approved for technical accuracy and grammatical correctness all formal written reports for publication. Planned, directed, supervised and managed approximately 11 scientists, engineers and technicians whose specific function was to perform malfunction investigations. The above involved coordination with NASA operations and support elements, familiarization with space craft, launch vehicles and ground support equipment systems, and a general knowledge of the principal and physical structure of the instrumentation, materials and environmental analysis. The position required an extensive knowledge, understanding and application to the extremely difficult and complex malfunction analysis problems such as the rapid failure analysis of a material, component or system removed from the Space Transportation System (STS), payloads, expendable launch vehicles and ground support equipment. The duties required interfacing with NASA and NASA Centers top management, that of other government agencies, contractors and industry.

**Employer:** National Aeronautics & Space Administration

- Location: Kennedy Space Center, Florida
- Period: April 1981 to June 1983
- Position: Chief, Malfunction Analysis Section

**Major Duties:**

*Same as Branch Chief's duties described in the above paragraph.*

**Employer:** National Aeronautics & Space Administration

- Location: Kennedy Space Center, Florida
- Period: September 1967 to April 1981
- Position: Aerospace Technology, Materials

**Major Duties:**

Served as advisor, consultant and review authority on all matters involving materials, application of materials, materials compatibility and materials testing. Personal work contacts were with top management, technical and scientific personnel of KSC, other NASA Centers, other government agencies, and private industry, for the purpose of providing authoritative advice and guidance, resolving problems, and coordinating general and specific requirements for equipment and techniques in areas of expertise.

Served as one of the Centers' authority on materials and their relationship with catastrophic failures and served, upon request, on boards of inquiry following such failures.

Served as Acting Chief of the Malfunction Investigation Group in absence of Chief.

**Employer:** National Aeronautics & Space Administration

- Location: Marshall Space Flight Center, Huntsville, AL
- Period: October 1960 to September 1967 (Excluding US Army 1961-62)
- Position: Aerospace Technology, Materials

**Major Duties:**

Performed metallurgical engineering research with responsibility to plan and conduct research programs on materials (metal alloys and composite materials) for space vehicle systems. Investigated the structure of these materials and their relationship to the mechanical behavior in simulated flight parameter. From the results of these investigations, made recommendation to other segments of the Laboratory, Center, and outside agencies pertaining to material developments needed to meet the requirement for space vehicles systems. Acted as consultant pertinent to the flight systems performance of various stages and components to the Saturn Vehicle.

F-1 Engine - struts, propellant injector and related hardware, fuel and oxidizer ducts, and flexible lines

S-IC Test, Structure and Flight Vehicles - Instrument Unit, Cold Plate, and related hardware

Ground support Equipment - Holddown Arms and related hardware

All necessitated the knowledge of the parameters and expected capabilities; including pressures, purging, fill and drain sequences, etc., which could or did result in the unsatisfactory performance of the component, systems, or the vehicles. Acted as consultant to the Manufacturing Engineering Laboratory, this Center, on various research programs, including the development of a more advanced concept of the S-IC skin section, the Gore Segments, and the development-of certain light-weight, high strength fasteners.

**TECHNICAL PAPERS PUBLISHED**

"Low Temperature Properties of Sandwich Construction, Saturn S-1V Common Bulkhead Type," by O. Y. Reece and C.R. Denaburg, IN-P&VE-M-63-12, October 1963

"Low Temperature Mechanical Properties of 8A1-IMo-IV Titanium Alloys and Composite Weldments," by C. R. Denaburg, NASA TMX-53178, December 1968

"Low Temperature Mechanical Properties Evaluation of TD-Nickel," by C. R. Denaburg, IN-P&VE-M-65-7, December 1965

**Employer:** Lazarov Surplus Sales Company

- Location: 1450 Thomas Street, Memphis, Tenn
- Period: August 1959 to September 1960
- Position: Metallurgical Engineer, Supervisor

**Major Duties:**

Supervised and directed procedures of eight to ten men in the smelting and quality control of various aluminum and zinc alloys.

**Employer:** U.S. Bureau of Mines

- Location: University of Alabama, Tuscaloosa, AL 1959

- Period: February 1959 to August
- Position: Extraction Metallurgist

**Major Duties:**

Designed, constructed, and operated equipment for the investigation of various minerals beneficiation processes.

**PRIVATE CONSULTANT:** (Part Time)

**Employer:** Fowler, Fuehrer and Associates Florida

- Location: Orlando,
- Period: 1978-1962
- Position: Engineering Associate

**Employer:** C.R. Denaburg & Associates, Inc.

- Location: Indian Harbor Beach, Florida
- Period: 1983 to Present
- Position: CEO and Chief Engineer

**Employer:** Fire/Reconstruction Consultants, Inc.

- Location: Cape Canaveral, Florida
- Period: 1981 to Present
- Position: Engineering Consultant

**REFERENCES:** ON REQUEST

**DEPOSITIONS:** APPROXIMATELY 60

**COURT TESTIMONY:** APPROXIMATELY 40