

Failure analysis, consultant on materials selection, product liability, product development. Expertise in scanning electron microscopy, fracture mechanics, metallurgical tests and techniques. Over 3500 failures investigated including steal roofing, copper and plastic piping, cast iron piping turbine/heat exchanger failures, welded joints, brazes, glass failures, metal and plastic chair failures, composite poles, ski-boots, chains, seatbelts, ladder failures, tire cases, automotive & airplane component failures. ABS piping/construction defect cases. Paints and engine contamination cases. Expert witness consultations / courtroom testimony in over 500 civil and criminal investigations (plaintiff and defense).

## Licenses & Certifications

State of California, License No. MTE1739

## Positions Held

### Engineering Systems Inc., Anaheim, CA

Senior Managing Consultant – Present

### Kars' Advanced Materials, Inc., Anaheim, CA

President/Principal – 1990 – 2022

### Northrop Corporation, Hawthorne, CA

Program Manager and Lead Engineer – 1982 – 1990

### Anamet Laboratories, Berkeley, CA

Senior Metallurgist – 1979 – 1982

### Lawrence Berkeley Labs, Berkeley, CA

Research Scientist – 1974 – 1978

### Independent Mechanical Metallurgy/Materials/Forensics Engineering Consultant

1982 – Current

## Publications & Presentations

Over 50 presentations at national/international meetings Over 35 publications in international journals

Editor of 3 Technical Books, ASM International Editor, Composites Failure Analysis Handbooks (US Air Force/Fed. Aviation Administration)

### Ramesh J. Kar

Senior Managing Consultant

**Email:** rjkar@engsys.com

**Phone:** 714-527-7100

### ESi Anaheim

2528 W Woodland Drive  
Anaheim, CA 92801

### Education

PhD, Materials Science & Engineering, Mechanical Engineering (Minor), Business Administration (Minor), University of California, Berkeley, 1979

MS, Materials Science & Engineering, University of California, Berkeley, 1976

BS, Metallurgical Engineering, Indian Institute of Technology, Bomba, 1974

### Areas of Specialization

Product design and analysis  
Materials Science  
Commercial vehicles  
Commercial and residential structures  
Wildfire investigations  
Failure analysis  
Construction defect investigations  
Materials Testing  
Plumbing systems

## Partial List of Papers/Publications

Failure Analysis of a Polymer centrifugal impeller - Nikhil K. Kar, Yinghui Hub Naresh J. Kar, and **Ramesh J. Kar** – Elsevier Science Direct Case Studies in Failure Analysis, Volume 4 pp 1-7, October 2015

**R. J. Kar**, "Methodology Development for Fractography of Honeycomb Structures and Joints," SBIR Contract DOT-C-89-0023, Final Report, July 1992, DOT/VOLPE RSPA TSC Center, Cambridge, Mass.

**R. J. Kar**, "Methodology Development for Fractography of Honeycomb Structures and Joints," SBIR Contract DOT-C-89-0023, Interim Reports 1 and 2, January and March 1992.

**R. J. Kar**, "Composite Failure Analysis Handbook," DOT/FAA/CT-91/23, Federal Aviation Administration Tech. Ctr., Atlantic City, New Jersey 08405, & USAF WL-TR- 91-4032, ML/AFSC, Wright Patterson AFB, Ohio 45433

**R. J. Kar**, "Composite Failure Analysis Handbook", USAF Contract F33615-87-C-5212, Fifth Interim Report, Northrop Corporation Technical Report NOR 89-80, Hawthorne, CA, November 1989

**R. J. Kar**, "Composite Failure Analysis Handbook", USAF Contract F33615-87-C-5212, Fourth Interim Report, Northrop Corporation Technical Report NOR 89-67, Hawthorne, CA, May 1989

**R. J. Kar**, "Composite Failure Analysis Handbook", USAF Contract F33615-87-C-5212, Third Interim Report, Northrop Corporation Technical Report NOR 89-52, Hawthorne, CA, February 1989

**R. J. Kar**, "Composite Failure Analysis Handbook", USAF Contract F33615-87-C-5212, Second Interim Report, Northrop Corporation Technical Report NOR 88-34, Hawthorne, CA, July 1988

**R. J. Kar**, "Composite Failure Analysis Handbook", USAF Contract F33615-87-C-5212, First Interim Report, Northrop Corporation Technical Report, Hawthorne, CA, February 1988

**R.J. Kar**, "An Investigation of Current and New Fractographic Techniques for Evaluation of Fiber/Resin Composites," ISTFA 1988 Conference Proceedings, ASM International, Materials Park, Ohio, 1988

**R. J. Kar**, "Fractography of Fiber/Resin Composites", Proceedings of the Resin-Based Composites Symposium, ISTFA 87, ASM International, Metals Park, Ohio, (1987)

**R. J. Kar**, "Fractographic Failure Analysis of Resin-Based Composites", WESTEC '87, ASM International, Los Angeles, CA (1987)

**R. J. Kar**, G. V. Scarich, and K. M. Bresnahan, "Microstructural and Fractographic Characterization of Rapidly Solidified CW67 Aluminum Alloy", (invited paper), Earl R. Parker Symposium on Structure-Property Relationships, 1986 Annual AIME Meeting, New Orleans, LA, 1986

**R. J. Kar** and R. T. Kessler, "Fractography of Resin-Based Composites", (invited paper), Proceedings of the ASTM Symposium "Fractography of Engineering Materials", American Society for Testing and Materials, PA ; Presented at the Symposium in Nashville, TN (1985)

**R. J. Kar** and R. T. Kessler, "An Overview of The Fractographic Failure Analysis Capabilities at Northrop for Composite Materials," (invited paper), Proceedings of the First International Conference on Post-Failure Analysis of Resin-Based Composites, US Air Force Materials Laboratory-sponsored, Dayton, Ohio, June 1985

**R. J. Kar**, T. P. McHale and R. T. Kessler, "TEM/STEM Characterization of Advanced Aluminum Alloys", Proceedings of the 20th Annual Meeting of the Electron Microscopy Society of America, San Francisco Press, pp 216-218 (1985)

## Partial List of Papers/Publications (cont.)

**R. J. Kar** and R. T. Kessler, "Failure Analysis of Gr/Ep Composites", WESTEC '85, ASM International, Los Angeles, CA (1985)

**R. J. Kar** and R. T. Kessler, "Fractography of Composites", Proceedings of the 18th Meeting of the Microbeam Analysis Society, Lehigh University, Bethlehem, PA (1985)

J.W. Bohlen, **R. J. Kar** and G. R. Chanani, "Evaluation of Rapidly Solidified Powder Metallurgy Aluminum Alloys", Proceedings of the ASTM Symposium on Rapidly Solidified Aluminum, ASTM STP, April 1984

**R. J. Kar**, R. E. Herfert, and R. T. Kessler, "A Microstructural and Fractographic Examination of Compression Failures in Gr/Ep Composites", ASTM 7th Conference on Testing and Design of Composite Materials, STP 710, American Society for Testing and Materials, April 1984

**R. J. Kar**, J. W. Bohlen and G. R. Chanani, "Correlations Between Microstructure, Heat Treatment and Properties In I/M and P/M Al-Li Alloys", Proceedings of the 2nd International Aluminum-Lithium Conference, AIME Publication, 1983

**R. J. Kar**, R. G. Hocker and R. T. Kessler, "The Role of Microstructural Variables in the Fracture Properties of 7091 Al Alloy Extrusions", ASM Metals Congress, October 1983, Philadelphia, PA

J. J. Scutti, **R. J. Kar**, J. W. Bohlen and G. R. Chanani, "Evaluation of Aluminum- Lithium Alloy NOR 14", Technical Report NOR 83-11, Northrop Corporation, Hawthorne, CA (1983)

**R. J. Kar** and J. A. Todd, "Alloy Modification of Thick Section 2.25 Cr-1Mo Steel", ASTM Symposium on The Application of 2.25 Cr-1Mo Steel for Thick Wall Pressure Vessels, Denver, 1980, ASTM STP 755, American Society for Testing and Materials, PA (1981)

**R. J. Kar** and E. R. Parker, "An Investigation of The Microstructure and Mechanical Properties of Thick Section 2.25 Cr-1Mo Steel, Annual Meeting of the AIME, Las Vegas, NV, February 1980

**R. J. Kar**, "Alloy Modification of Cr-Mo Steels ", PhD. Dissertation, University of California, Berkeley, June 1979

**R. J. Kar** and E. R. Parker, "Low Alloy Steels That Minimize the Hydrogen-Carbide Reactions", Annual Report 1979, Energy Research, Contract DE-AS03-764FO-0034

**R. J. Kar**, E. R. Parker and V. F. Zackay, "Low Alloy Steels for Thick Wall Pressure Vessels", Symposium on Hydrogen Reactions in Steels, EPRI Publication, Electric Power Research Institute, Palo Alto, California, May 1979

**R. J. Kar**, S.P. Agrawal, W. E. Quist, Conference Proceedings, 1987 Aluminum-Lithium Conference; Editors, "Aluminum-Lithium Alloys", 1987 Aluminum-Lithium Symposium, ASM International, Materials Park, Ohio, 1988

S.P. Agrawal, **R.J. Kar** and W.E. Quist, Westec Conference Proceedings, 1986 Aluminum-Lithium Conference; Editors, "1986 Aluminum-Lithium Symposium", American Society for Metals, Los Angeles, California, 1987.

W.E. Quist, **R.J. Kar** and S. P. Agrawal, 1988 Aluminum-Lithium Conference, American Society for Metals, Los Angeles, California, 1988

**R. J. Kar**, and V.F. Zackay, "The Role of Heat Treatment on the Microstructure and Mechanical Properties of 52100 Steel," 1985 AIME Annual Meeting, New Orleans, LA.

M.S. Dissertation, University of California, Berkeley, CA 94720.

## Technical Presentations of Engine Component Failures

### Metallurgical Failure Analysis of Stage 2 NGV and HPT/LPT Blades

Presentation to Thai Airways/GE Aircraft Engines Bangkok Thailand – November 2003

### Metallurgical Failure Analysis of Asiana HPT Blades

Presentation to Asiana Airways –January 2007

### Failure Analysis Delta ESN 876642 LPT1 NGV Segments

August 2008

### ESN 704-247 Failure Investigation Report- Presentation to Eva Air/GE

February 2010

### Failure Evaluation of Stage 3 JT-8D LPT Blades

Presentation to Chromalloy Corporation – December 2010

### Failure Analysis of JT8D Stage 1 LPT PMA Blades

Presentation to Chromalloy Corporation -August 2011

### Failure Analysis - JT8D Stage 1 PMA Blades

Report to American Airlines – August 2011

*Approximately 25 additional proprietary presentation/reports to clients on HPT/LPT/IGV failures*

## Government Reports in Composite Failure Analysis

- Kar, R.J., "Failure Mechanisms in Armor Composites with Ballistic Damage
- US Army Contract DAAA15-93-C-0081 Progress Reports No.1 through 7, Department of the Army, U.S. Army Chemical and Biological Defense Agency, Aberdeen Proving Ground, Maryland, November 1994 through May 1995.
- Kar, R.J., "Failure Mechanisms in Armor Composites with Ballistic Damage" Final Report, US Army SBIR Contract DAAA15-93-C-0081, U.S. Army Chemical and Biological Defense Agency, Aberdeen Proving Ground, Maryland, September 1995.

## Courses Taught

- Failure Analysis of Composites, 1990, 1991
- Failure Analysis of Engineering Materials, 1993, 1994 Fractography of Engineering Materials, ISTFA 1989, 1990, 1991 Failure Analysis of Aerospace Materials, AEROMAT 1991, 1992
- Adjunct Faculty Instructor: UCLA Extension Program.
- Adjunct Faculty Member, Materials Engineering Institute of ASM International - 1989 to date

## Professional Affiliations/Honors

### ASM International

- Member, ASM Counsel of Fellows, 1995 - current
- Chairman, ASM European Failure Analysis Conference, Brussels
- Chairman, Orange Coast Chapter, 1992 - 1993
- Chairman, ISTFA Conferences, 1987 – 1991

#### ASM International (cont)

- Chairman, Los Angeles Chapter, 1987 – 1988
- Vice-Chairman, MEI Seminar Committee, 1991 – 1992
- Executive Committee Member
- Chairman, Westec, 1986
- Elected Fellow, 1990
- Regents of The University of California Fellow, 1974 – 1975

### **Professional Affiliations/Honors(cont.)**

#### **American Society for Testing & Materials**

- Member

#### **Regents of The University of California**

- Fellow, 1974 – 1975