



Richard C. Snogren

Curriculum Vitae

Education

BS in Chemistry and Biology – Western Michigan University 1961

Professional Experience

Richard Snogren, co-founder and former President and Chairman of **SAS Circuits Inc.**, has been president of several state-of-the-art printed wiring board corporations. Richard was previously with **Martin Marietta Denver-Aerospace** as Manager of the Electronic Product Design organization, including electronic packaging, printed wiring board design, and materials engineering.

In addition to his business and management background, Richard has been a materials engineer working with **North American Aviation** (North American Rockwell), **Hughes Aircraft Company** (Boeing), and **TRW Systems** (Northrup Gruman). He has authored numerous technical publications and presentations, as well as a book, *Handbook of Surface Preparation*, on surface technology. He also holds a patent on ablative materials. Richard is the recipient of the "Silver Snoopy" award from NASA for his outstanding contributions to the Apollo mission.

After the merger of SAS into the Coretec family, Richard worked as a senior technical staff member focusing on the development and implementation of

Richard C. Snogren
6575 S. Webster Steet Littleton, CO 80123
Voice: 303.972.4721
email: richard@bristleconellc.com

embedded passives and high reliability Printed Circuit Board (PCB) applications in the aerospace and satellite markets. Richard retired from Coretec at the end of 2004 and has become an independent technical consultant operating as Bristlecone LLC.

Snogren was an active member of the recent Advanced Embedded Passive Technology (AEPT) Research Consortia, an interdisciplinary research project funded by National Institute of Standards and Technology (NIST). Also, in recent years, Richard has published over 40 papers and trade articles on embedded passives technology, as well as conducted over 150 technical seminars and workshops. He has written a chapter on Organic Printed Circuit Boards for IEEE's recently released second edition of *Advanced Electronic Packaging*.

Since early 2005, Richard has provided ongoing technical leadership and support to the Naval Surface Warfare Center (NSWC) Crane Emerging Critical Interconnect Technology (ECIT) embedded passives technology program. He is also a certified interconnect designer (CID) instructor, and develops programs and workshops for the IPC (Association Connecting Electronics Industries).

Following is a summary of Richard's years in the industry:

Aerospace – 20 years combined with North American Aviation, Hughes Space and Communications, TRW Systems, and Martin Marietta (coincidentally these OEMs are now North American Rockwell, Boeing Satellite Systems, Northrop, and Lockheed Martin respectively).

Circuit Boards – 25 years combined with General Components, Reliable Circuit Systems, SAS Circuits, and Coretec

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Circuit Board Details

- 1973 – 1978** President of General Components Inc (GCI) Largo Florida, a small Military and Aerospace PCB manufacturer
- 1979 – 1981** Co-founder of Reliable Circuits Inc, Largo Florida. A small start-up Military and Aerospace PCB manufacturer. Snogren was president and responsible for procuring all facilities, equipment and staffing.
- 1982 – 1983** Provided start-up consulting service for CompuDesign Inc., a design service company that expanded into the PCB manufacturing market as CompuFab Inc. Snogren was responsible for all facilities, equipment and staffing.
- 1984 – 2000** Co-founder and president of SAS Circuits, Littleton Colorado. This was a start up operation and Snogren was responsible for procuring all facilities, equipment and staffing. Snogren maintained ownership and management of SAS until it sold to Coretec Inc in 2000.
- 2001 – 2004** Richard served on the Technical Staff for Coretec Inc. In addition to numerous embedded passive workshops in the US, Snogren presented a 3 day workshop for the Hong Kong Productivity Council (HKPC) in Dongguan, China.

Richard also participated as a presenter for *Small Business Challenges in the Manufacturing Trends in Printed Circuit Technology Workshop* and study program conducted by the National Academies of Science. This study program resulted in recommendations to Congress and ultimately the formation of an Executive Agent Organization that was assigned to NSWC Crane in 2009 to assure domestic availability of printed circuit boards and technology to support current and future US Military needs.

2005 – Current Richard conducted a 2 day workshop on embedded passives for Zuken in Cologne, Germany.

Snogren provides ongoing technical leadership and support to the NSWCrane ECIT embedded passives technology program. This has included developing and demonstrating a manufacturing capability for all domestic embedded passive materials, resistors and capacitors. Further, creating and producing test vehicles to evaluate high frequency performance of the materials as well as the affects of extreme environments. Product emulators were also redesigned to incorporate embedded passives and compare their performance to the heritage designs.

During this period, Snogren also supports the NSWCrane ECIT staff in development and execution of a series of “hands-on” workshops covering embedded passive technology, fundamentals of printed circuit boards, inner layer materials and processing, outer layer materials and processing, flex and rigid flex circuit technology, and high density interconnect (HDI) technology.

Richard continues to provide technical support to other industry clients including the development and production of test vehicles to demonstrate new material performance characteristics.