

## STEVEN R. RODGERS

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### RANGE OF EXPERIENCE:

I have over thirty years of experience in the Advanced Materials and Composites industry. My experience ranges from hands-on process development to the successful growth and management of a diverse engineering team. Most recently I have operated as Director of Corporate Research and Development in Advanced Composites and Nanotechnology with responsibility for Market Development. As a recent International President of the Society for the Advancement of Material and Process Engineering (SAMPE) I have an overview of materials and their impact on technology development that has given me great advantage in the realm of advanced materials development. I also serve on the Advisory Board of the National Graphene Association (See "Professional Recognition", below)

### PERSONAL STRENGTHS:

IDEATION – I see and express a fresh perspective on familiar challenges.

STRATEGIC – I see patterns emerge where others simply see random complexity.

INPUT - Facts, data and things: The world is exciting because of its seemingly infinite variety.

MAXIMIZER - Excellence, not average, is the measure of success.

CONNECTEDNESS - All things are ultimately connected as parts of the bigger whole. Understanding those connections provides the key to comprehending the whole.

## WORK HISTORY

**EmergenTek LLC** (May 2011 to Present)

### Principal / Consultant

I formed EmergenTek LLC to improve clients' business positions by leveraging emergent, differentiating and disruptive technologies to create a unique technological niche. This is accomplished by making use of my extensive contact list among academia, industry, government and finance to form collaborative teaming arrangements that benefit all parties. Activities include:

- ✓ Currently involved in establishing a Composites Training Center in Tianjin, China. Targeted opening in the second quarter of 2012.
- ✓ Working with a client with specialties in functionalization of nanomaterials to establish teaming relationships in aerospace, automotive, energy, high-technology sporting equipment and advanced electronics.
- ✓ Working with a client who has a new, innovative therapy for HIV in order to insure immediate viability of the company while forming long-term growth strategies.
- ✓ Involved with strategizing new surveillance and communication products with a company involved in corporate security.
- ✓ Bringing together technical resources to aid a client in creating new products to aid the modern-day war fighter.
- ✓ Subject Matter Expert (SME) on three technology focus groups with the Utah Governor's Office of Economic Development (GOED).
- ✓ Representing esoteric technologies in RF shielding.
- ✓ Funded by the State of Utah through Weber State University to manage the Utah Cluster Acceleration Partnership for Aerospace and Defense.
- ✓ 2011 recipient of the Utah Governor's Medal for Science and Technology (See "Professional Recognition", below).

- ✓ To date, EmergenTek clients have included:
  - The US Department of Energy (DoE)
  - The Us Department of Defense (DoD)
  - Logistic Specialties, Inc. (LSI)
  - National Institute of Standards and Technology (NIST)
  - The Utah Governor's Office of Economic Development (GOED)
  - The Utah Advanced Materials Manufacturing Initiative (UAMMI)
  - The Institute for Advanced Composites Manufacturing Innovation (IACMI)
  - Cluster Aeroespacial de Baja California
  - Mercedes Petronas Formula 1 team
  - CFOAM Ltd.
  - Alliance for the Development of Additive Processing Technologies (ADAPT)
  - Colorado School of Mines
  - Brigham Young University (BYU)
  - Weber State University
  - The University of Utah
  - Utah Manufacturing Extension Partnership (MEP)d
  - L2 Aerospace
  - Abaris Composite Training
  - Oak Ridge National Laboratory (ORNL)
  - Matrix Composites
  - Cornerstone Research Group (CRG)
  - Nlign Analytics
  - Composite Vehicle Research Center (CVRC)
  - Nanosource, Inc.
  - Society for the Advancement of Material and Process Engineering (SAMPE)
  - Technology Marketing Inc. (TMI)
  - Touchstone Research Laboratory (TRL)
  - Sierra Nevada Corporation (SNC)
  - Sorenson Capital
  - Composite Solutions
  - NONA Resins
  - Applied Nanotech Holdings, Inc.
  - Fiber Materials Inc. (FMI)
  - Conductive Composites
  - MTN Capital Partners
  - Allcomp
  - Delos Aerospace
  - Washington State Department of Commerce
  - G-Cover
  - Delos Aerospace
  - American Composites Manufacturers Association (ACMA)
  - Highland composites
  - Etegent Technologies
  - Citius Composites
  - Boyce Components
  - Patterned Fiber Composites
  - Simplure
  - Breakthrough Development Technology, Inc.

**ITT Integrated Structures** – Formerly EDO Fiber Science, (1996 to May 2011)

**During my 15 years in upper management, the division grew at a CAGR of 19.8% while returning 16-18% pre-tax profits.**

**Director of Technology Market Development** (2010 to May 2011)

Quickly stepped in to assume the position of Market Development when a key employee left the company.

- ✓ Responsible for developing opportunities to leverage the experience of Fiber Innovations (acquired by EDO in 2005 and moved to Salt Lake City in 2010) in Braided Resin-Infused structures.
- ✓ Responsible for cultivating collaborative relationships to capitalize on proprietary conductive composite technologies developed at ITT/EDO.
- ✓ In all of these efforts, the network established through global work with SAMPE has proven to be an effective door opener.

**Director of R&D** (2006 to 2010)

As the Director of R&D for four divisions of ITT, I identified a need for and initiated cross-divisional efforts to create niche market capabilities by improving the thermal and electrical conductivity of Carbon Fiber-Reinforced Composites for electronic applications. I also managed the Stage Gate process for all for divisions.

- ✓ The sole holder of a pending patent on technology to enhance laminate z-axis thermal conductivity.
  - Initial proof-of-concept panels improved thermal conductivity by a factor of 30 in the z axis and a factor of 45 in plane while retaining much of their original strength.
  - Can replace aluminum as a heat sink at a 30% to 40% weight saving.
  - Material has demonstrated integral EM Shielding capabilities similar to aluminum.
- ✓ Co-developer of nano constituent-filled ESD coating for military composite hardware. Product was developed, qualified and approved by the customer in less than 45 days.
  - The paint performed an order of magnitude better than silver-filled paint at one-third the wet-film thickness.
  - Cost was competitive with silver-filled paint and carbon-filled paint.
  - Product had superior surface finish and dimensional control.

**Engineering Manager** (1996 to 2006)

I directed the growth of the Engineering Department to support aggressive internal divisional growth of 360% while instilling a strong sense of leadership, vision and teamwork.

- ✓ Assembled a small, nimble and talented team of Engineers who covered the full range of engineering disciplines: R&D, Design, Analysis, Materials & Processes, Materials Lab, Producibility, Quality Engineering, Lean Manufacturing, Configuration Management and Project Management.
  - Our team routinely functioned within Federal, Commercial and Military regulatory environments, including DoD, DoC, ITAR, FAA and FDA regulatory agencies.
- ✓ Sold and managed EDO's first Composites medical device program while managing Engineering.
  - Led our team in designing and qualifying three filament wound fiberglass tank configurations to be integrated into our customer's in-home dialysis system in the United States and Japan.
    - I supplied several manufacturing and design improvements that were adopted by the customer yielding ultimate cost savings of >80%.
  - We worked with our customer to meet all FDA material and performance standards in this life-critical device.

- Customer-funded development (including the design of a second tank concept that was licensed for use overseas) led to low-rate initial production for a total contract value that exceeded \$1.1M.
- ✓ Our team quantified the needs and coordinated Engineering support for the selection, installation and implementation of strategic capital expenditures to enable dramatic divisional growth into the high value-added military composites sector.

### **Boeing Defense & Space Group, (1991-1996)**

#### **Manufacturing Research and Development**

I led a variety of research and development programs involving composite and metal manufacturing process improvements.

- ✓ Was the primary process investigator for the “liquid shim” development program supporting the manufacturing of the 777 Empennage, at that time one of the largest composite assemblies ever used on a commercial aircraft.
- ✓ Was a key strategist on the management-appointed “Re-Engineering Operations Technology” ad hoc task force.
- ✓ Was the primary technical focal for the installation and programming of the \$11M fully-automated titanium Chemical Process Line at Boeing’s new \$30 million state-of-the-art chemical process facility in Kent, Washington.
- ✓ Coordinated the installation of a \$1.7 million Chemical Process Laboratory to be used for process development by Operations Technology. I interacted regularly with OSHA and the EPA to maintain compliance.
- ✓ Was the Boeing-appointed mentor in Engineering and Science at Rainier High School in the International Baccalaureate program.

### **Russian Horizons, (1992-1994, Concurrent with Boeing service)**

#### **Director**

A group of private investors were exploring business opportunities in the newly-opened former Soviet Union. I led two teams in Russia investigating opportunities in Moscow, Kimry, Kazan and Astrakhan.

### **Ciba/Heath Tecna, (1986-1990)**

#### **Chemically Bonded Ceramic Tooling Product Specialist (1988-1990)**

I led the technology transfer and facility process design of CBC tooling facility.

- ✓ As a result of this work real fabrication hours were reduced by 62% while reducing projected initial scrap rates by 83%.
- ✓ Provided extensive support to Market Development through the use of personal industry contacts to arrange high-level engineering meetings and by presenting numerous technical presentations. Developed a tooling customer database for CBC Tooling.
- ✓ Worked closely with advertising agencies on concepts, layout and technical content of brochures and magazine advertisements with demonstrated brand recognition.

#### **M&P Engineering (1986-1988)**

- ✓ Was brought in as a troubleshooter on the troubled D-5 program, lowering an 83% rejection rate to 6% in the first month.
- ✓ As Project Engineer for the V-22 Longeron program, supported the fabrication of some of the largest room-temperature/high-temperature carbon fiber tooling built up to that time (40 feet in length).

## **Lockheed Missiles and Space Company, (1984-1986)**

### **Producibility Engineer**

I implemented Engineering improvements and cost savings programs for composites manufacturing including the development of innovative tooling concepts and process techniques.

- ✓ Conceptualized and was funded for design improvements for a composite solar array that failed structural tests in the first thermal cycle. The effort delivered a component that was successfully qualified while demonstrating a net reduction in fabrication cost of 30%, reduced manufacturing flow by 35% and saved over 24 pounds in weight.
- ✓ Reduced program rejection rates from 97% to <5% on one program and from 40% to 0% on another.
- ✓ Developed a reliable, producible method of bonding truss structures that were released to manufacturing from the designer with no viable manufacturing method identified.
- ✓ Received the "Zero Defects" award for \$110k cost savings in the first six months.

## **Boeing Aerospace, (1978-1984)**

### **Experimental Plastics Fabricator, Composites and Elastomers**

As Experimental Plastics Fabricator I was involved in the early hands-on fabrication of advanced composite and elastomeric materials for programs such as the Hubble Space Telescope metering truss, The Air Launched Cruise Missile (ALCM), The Ground Support Rocket System (GSRS), Peacekeeper (D-5), Sea Lance (ASW-SOW) and the E3A.

- ✓ Received a citation from Boeing Engineering as the first to establish a viable method for splicing and repairing large cross-section parts made of EPDM rubber.
- ✓ Submitted a cost savings suggestion that was evaluated by Boeing Engineering as saving more than \$1million for rapid production of custom-prototyped circuit boards.

I have an AA Degree from Foothill College in Los Altos Hills, California

## **PATENTS**

**US Patent #8,199,045 – Nickel Nanostrand ESD Conductive Coating or Composite**

**US Patent #8,309,225 – Thermally Conductive Structural Composite Material and Method**

## **PROFESSIONAL RECOGNITION**

**The National Graphene Association – Advisory Board Member (Inaugural Board)**

**The Society for the Advancement of Material and Process Engineering (SAMPE) Service Award (2013)**

Awarded in appreciation for contributions made to SAMPE Globalization.

**DATC Appreciation Award for 2012 (2013) – In appreciation of support for Davis Applied Technology College and 30 years of Advanced Materials Development.**

**Recognized for being in the top 1% "most viewed profiles" on LinkedIn in 2012 (2013)**

**The Utah Governor's Medal for Science and Technology for 2011 (awarded in January 2012)**  
Awarded for contributions to the state of Utah's composites technology cluster.

**Academic Speech Award (2011) – SAMPE China 2011, Tianjin, China**

**FIRST Robotics Challenge, Utah Region /Executive Advisory Board – (2011 to Present)**

**The Society for the Advancement of Material and Process Engineering (SAMPE) Service Award (2011)**

Awarded for outstanding service to the society.

**The Society for the Advancement of Material and Process Engineering (SAMPE) – Positions Held:**

**Director of the México Chapter (2017 to Present)**

**Director on the Global Board of Directors (FY 2014 to Present)**

**SAMPE Technical Excellence Committee (FY 2015 to Present) – Additive Manufacturing**

**SAMPE North America Road Mapping Committee (FY 2016 to Present) – Committee Member**

**SAMPE North America Emerging Technologies Taskforce (2016 to Present) – Vice Chair**

**Trustee on the American Regional Board of Directors (FY 2014 to Present)**

**Trustee on the International Board of Directors (FY 2012 to FY 2013)**

**International Past President (FY 2011)**

- ✓ Future Technologies – A unanimous vote of the International Board of Directors funded the first “SAMPE Materials Forecast Forum”. A total of 19 high-level strategic technologists (most of whom were unfamiliar with SAMPE prior to the Forum) gathered in Washington, D. C. to discuss the future of materials development in support of new, emergent technologies. The input provided by them will be used by SAMPE to expand her technology base.
- ✓ Membership continued to accelerate with 12% annual growth.
- ✓ The Global Governance Initiative was funded nearly unanimously by the International Board of Directors with \$75K to move forward to a detailed plan.
- ✓ Financial performance continued to exceed expectations.

**International President (FY 2010)**

- ✓ Hosted SAMPE Asia 2010 in Kuala Lumpur, Malaysia.
  - Our second global Asian conference was much better attended than Bangkok in 2008.
  - Gave welcome address, introduced keynote speakers, session chairs and presenters.
  - Managed two technical sessions.
  - Through a series of meetings with the Malaysian Industry-Government Group for High Technology (MIGHT) in both Malaysia and in the United States it was agreed to partner together to present SAMPE Asia 2012 in Kuala Lumpur a second time.
- ✓ Sponsored three initiatives for the future growth of SAMPE

- Membership – As a continuation of work begun in FY 2008 and 2009, membership benefits continued to increase and membership grew by 6% in 2010 and 10% in 2011.
- Future Technologies – SAMPE had become typecast as a composites-focused society and had a need to become less myopic. The Future Technologies initiative was designed to identify what materials classes would impact future technology platforms in the next five to twenty years so that SAMPE can create a game plan to grow into those technologies.
- Global Governance – While SAMPE has been an international society since the addition of the first Canadian member, the current status is one of a society wherein >30% of the membership is international but existing under American leadership. The Ad Hoc Global Governance Subcommittee was initiated to seek to redesign SAMPE as a global organization. The mantra, “Global Parity with Regional Autonomy” was adopted and a model is now emerging that will lead to a dynamic global organization that meets the specific needs of emerging regions.
- ✓ An aggressive budget was exceeded by >400%, yielding some of the highest revenues in excess of expenses in the 64-year history of the society.
- ✓ Staff head count remained unchanged while adding significant new member benefits.
- ✓ Established a new 2-day Seminar Series that brought in \$30K in unbudgeted revenues and >20 new members.

#### **International Executive Vice President (FY 2009)**

- ✓ SAMPE was financially impacted by the ravages of the Great Recession.
  - Expenditures were controlled to 2% below budget.
  - Revenue was down 17%, about half of what other related societies experienced during this time.
  - There was no staff reduction. Instead, the staff was redirected during times of underutilization to go seek job-specific training and update the society’s internal systems to prepare for a surge in activity at the end of the recession.
- ✓ Membership grew by 2.8% as opposed to the membership loss of most other related societies.

#### **International Senior Vice President (FY 2008)**

- ✓ Technical Chair of SAMPE Asia 2008 in Bangkok, Thailand, SAMPE’s first global Asian conference.
- ✓ Membership – The International Board of Directors voted unanimously to fund a professional survey of members, non-members and those who are in the industries SAMPE serves who have never been members. This survey served as the basis for addressing member needs and increasing the membership through the Great Recession.

#### **International Vice President (FY 2007)**

#### **International Secretary (FY 2005 and 2006)**

#### **International Conference Co-Chair (2004)**

- ✓ The most profitable SAMPE International Conference since 1992
- ✓ Revenues were 35% above budget.
- ✓ Expenses were 3% below budget.
- ✓ 354 papers were presented in 57 sessions, an SAMPE all-time record.

### **Utah Chapter Chairman (2003 to 2005)**

#### **In the first year:**

- ✓ Membership increased by 180%.
- ✓ Average meeting attendance more than doubled.
- ✓ Established the “Wasatch Front Materials Expo” as an annual networking event modeled after the PSME in Seattle in 2006.

### **Utah Chapter Advisor (FY 2011 to Present)**

- ✓ Wasatch Front Materials Expo Chairman (2016)

### **Seattle Chapter Chairman (1987 to 1989)**

#### **In the First year:**

- ✓ Meeting attendance increased 115%.
- ✓ Chapter Sponsorship increased 2000%.
- ✓ Membership increased 57%.
- ✓ The newly-launched Seattle Chapter Newsletter received International SAMPE recognition.
- ✓ Established the “Puget Sound Materials Expo” as an annual event for networking that has been the blueprint for many similar chapter events in other regions.

### **Seattle Chapter Director (1989 to 1994)**

### **Utah Governor’s Office of Economic Development (GOED) (2006 to Present)**

- ✓ Subject Matter Expert (SME) on three technology cluster groups: Composites, Aerospace and Unmanned Air Vehicles.
- ✓ Catalyst in the efforts to form a new cluster with emphasis in Advanced Materials to support the other technology clusters.
- ✓ I was informed that I helped create 9,400 jobs in the state of Utah from 2006 to 2012 through these efforts.

### **Mentor in Engineering and Science in the International Baccalaureate program (1994 to 1996)**

- ✓ Appointed by Boeing to provide program support to the program at Rainier High School in Des Moines, Washington.
- ✓ Reviewed student projects in engineering and science, providing suggestions, insight and advice.
- ✓ Aided in manufacturing student inventions, suggesting materials, processes and available resources.
- ✓ Helped judge and grade student projects for originality, conceptualization and execution.

## **INVITED ADVISOR**

Lexus Advisory Panel (2011 to 2013)– As a Lexus owner I advise the Lexus technical staff on the incorporation of design improvements and new technologies into future product offerings.

MIT Technology Review Research Panel Member (2013 to Present) – Provide feedback on direction of research being reported by MIT Technology Review.

McKinsey Executive Panel Member (2013 to Present) – Contribute to discussions and surveys exploring and forecasting global technical and economic trends.



## **INVITED SPEAKER**

**SAMPE Tooling Technologies for Composites** (2017) – A two-day teaching and hands-on seminar and workshop held at the University of Southern California (USC) – Presentation titled, “Tooling: Driving Your Manufacturing” – A study of how tooling material choices can increase manufacturing throughput and boost profitability.

**CAMX 2014** – Prepared three days of content for 3D Printing and Additive Manufacturing for this premier event sponsored by SAMPE and the ACMA.

**Invited Speaker, Utah SAMPE Chapter** (2014) – “The Promise of Additive Manufacturing and 3D Printing Comes Together One Layer At A Time” – A broad overview of the potential for manufacturing applications of Additive Manufacturing and 3D Printing, especially in the areas of advanced medicine, advanced design, food and nutrition and fiber-reinforced plastic structures.

**Invited Lecturer, Brigham Young University** (2013-2014) – Taught advanced manufacturing and plastics technology courses at the invitation of BYU Professor Andy George.

**Invited Speaker, Ogden Breakfast Exchange Club** (2013) – “Nanotechnology: Understanding the Big Picture” – A shorter version of the basics of Nanotechnology, updated and shortened for a non-technical audience.

**Commencement Speaker, Davis Applied Technology College** (2013) – “I’m Not Normal, and Neither Are You” – Spoke of the power of Perspective, Passion and Persistence in creating a successful and rewarding career.

**Invited Speaker, AIAA Utah Chapter** (2013) – “Nanotechnology 101: Understanding How Big a Thing It Really Is”  
Updated information on where the world of nanotechnology is headed.

**Invited Speaker, Utah SAMPE Chapter** (2012) – “Nanotechnology: A Tiny Package That Holds a World Full of Promise

**ASME Invited Guest Lecturer – University of Utah** (2012)

First speaker in the ASME “Distinguished Speaker Seminar Series” with a presentation titled, “The Role of Advanced and Engineered materials in Fueling the Economic Engine”

**SAMPE China 2011 – Tianjin, China**

Welcome Address

Invited Plenary Speaker – “Nanotechnology: A Tiny Package That Holds a World Full of Promise”.  
Received the Academic Speech Award.

**The SAMPE Materials Forecast Forum** (2011) – Organizer, Co-Chair and Participant

**Invited Speaker, Great Lakes SAMPE Chapter** (2011) – “SAMPE and the Advanced Materials Revolution”

**Invited Speaker, The Persh Conference** (2009) – Kick-off Speaker and Panelist. (The Persh Conference is limited to 80 participants and participation is by invitation only. It is sponsored by DoD, ARL, AFRL, ONR, MDA, DTRA and DARPA.)  
“New Materials on the Horizon”

**Nanotechnology for Defense** (2009) – AFRL-invited Panelist, “Overcoming The Challenges of Nanoscale Research and Development.”

**International SAMPE European Conference “SEICO”** (2009) – Session Chair; two sessions representing research from four continents

**Northern Utah Economic Summit** (2008) – Invited Speaker. “Understanding The Economic Impact of the Composites Industry on the State of Utah”

**ASME OCTE/OMAE conference in New Orleans** (2000) – Session Chair. “Applications of Composites in Offshore Oil”

**International SAMPE Symposium and Exhibition** (1991) – Technical Session Chair. “Innovations in Composite Tooling”

**SME Tooling for Composites** (1990) – General Conference Chair

**International SAMPE European Fall Conference “SETEC”** (1990) – “Improved Reliability With Chemically Bonded Ceramic Tooling”

**International SAMPE Symposium and Exhibition** (1989). – Technical Session Chair. “Tooling for Composites”

**SME Tooling for Composites** (1989) – Technical Advisor

**SME Tooling for Composites** (1988) – Technical Presenter. “A New Test Method for Rapid Characterization of Composite Tooling Materials”

## **GUEST JUDGE**

**SAMPE European Student Seminar (Competition)** – Amiens, France; 2015. This competition represents the best award-winning Ph.D. research in Material and Process Engineering from each of the regional European SAMPE competitions.

**SAMPE International Conference Student Ph.D. (Competition)** – Long Beach, California; 2013. This competition represents the best award-winning Ph.D. research in Material and Process Engineering from the United States and Canada in Material and Process Engineering.

**SAMPE European Student Seminar (Competition)** – Paris, France; 2013. This competition represents the best award-winning Ph.D. research in Material and Process Engineering from each of the regional European SAMPE competitions.

**SAMPE European Student Seminar (Competition)** – Paris, France; 2012. This competition represents the best award-winning Ph.D. research in Material and Process Engineering from each of the regional European SAMPE competitions.

**SAMPE Asian Student Posters (Competition)** – Kuala Lumpur, Malaysia; 2012. This competition showcases poster presentations of the best student research in Southeast Asia.

**SAMPE European Student Seminar (Competition)** – Paris, France; 2011. This competition represents the best award-winning Ph.D. research in Material and Process Engineering from each of the regional European SAMPE competitions.

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## **AUTHOR**

### **High-Performance Composites**

**“Turning Data Into Gold: The New Alchemy”** – (October 2014) – The advanced composites industry occupies a data-rich environment. We collect data on material certifications, autoclave runs, CMM dimensional data, Non-destructive Inspection and more: The list goes on and on. However, we gather the data to meet customer specification requirements then lock them away in a vault, often for decades. But given the right tools we can analyze that data and develop predictive trend analysis that can save tremendous amounts of money by avoiding problems before they occur.

### **The SAMPE Journal**

**“The Constant of Change”** (July-August 2009, President’s Column) – Addressed the dichotomy between the reluctance to embrace change and the need to do so. Established my vision for the future of SAMPE.

**“The Hundred-Percent Solution”** (September-October 2009, President’s Column) – Introduced the recognition that SAMPE is more than simply an information source; SAMPE provides solutions to industry challenges and the network to enable those solutions.

**“Garbage Out, Garbage In”** – (November-December 2009, President’s Column) – As in the world of finance, one’s career is grown by the investments one makes. This article provided an encouragement to reap rewards in one’s career by making smart investments: Investments in other people.

**“Mentor / Protégé: The Other M & P”** – (January-February 2010, President’s Column) – A follow-on article to the November-December column exploring the importance of mentoring others, both to SAMPE and to one’s career.

**“Tea, Earl Grey, Hot”** – (March-April 2010, President’s Column) – Looking for the next Gene Roddenberry. Expressed the need for creativity and vision in the advanced materials/engineering community.

**“Time’s fun when you’re having flies!”** – (May-June 2010, President’s Column) – Beginning with a quote from Kermit the Frog, this article looked back on the challenges and successes of SAMPE in coming out of the Great Recession. In looking at the successes, it shared the roadmap for dramatic industry growth to be expected as a result.

**“Bueller? . . . Bueller?”** – (May-June 2011), Invited guest author of President’s Column) – Beginning with a quote from the iconic movie “Ferris Bueller’s Day Off”, this article celebrated the outstanding accomplishments of SAMPE in the last decade. Beginning with the history of the organization it examines the industry downturn in the early 1990s, the struggle for survival in the early years of the new millennium and the management teams that have contributed to SAMPE emerging from the Great Recession of 2008 with dramatically improved cash reserves, increased member services and double-digit membership growth.

**“SAMPE Materials Forecast Forum: Final Report”** – (September-October 2011, Contributing Editor) – Being concerned with SAMPE’s continuing focus on composite materials, often to the exclusion of other advanced materials, I petitioned the SAMPE Board of Directors for funds to support the SAMPE Materials Forecast Forum. The goal: to explore what the world of advanced materials might look like in 5 to 20 years. The Forum was held on February 22-24, 2011 in Washington, D. C. This is the final report to the membership.

**“Perspectives”** – A recurring column in *The SAMPE Journal* designed to stimulate thought outside the SAMPE box.

**“The World of the Future: What is SAMPE’s Material Contribution? (Part One)”** – (January-February 2012) – This article lays down the foundation for a discussion of SAMPE’s potential contribution to the energy industry by identifying the four critical areas of development: Energy Creation, Energy Transportation, Energy Storage and Energy Conservation.

**“The World of the Future: What is SAMPE’s Material Contribution? (Part Two)”** – (March-April 2012) – This continuation of the January-February article applies material contributions that SAMPE can make that are far away from our normal consideration of Advanced Composites into other, more far-reaching areas of the Advanced Materials industry.

**“It’s All Material: Identifying and Anticipating the Needs of the Next Age”** – (May-June 2012) – This exploration of governmental recognition and support of Advanced and Engineered material development shares information on the Joint Technology Initiatives (JTIs) in the European Commission and the Materials Genome Initiative (MGI) in the United States, paving the way for a comprehensive discussion of these

initiatives by a Keynote speaker and two panel discussion at SAMPE Baltimore in 2012.

**“The Art of a Well-Crafted BHAG”** – (July-August 2012) – Beginning with the recent commercial docking of the SpaceX Dragon spacecraft this article looks at the last effects of a Big, Hairy, Audacious Goal (BHAG) in shaping a nation’s technical and economic future.

**“Taking Material Science To The Next Frontier: Models Of Past Material Innovations And How They May Impact The 21<sup>st</sup> Century”** – (September-October 2012) – Co-written with Dr. Sanford Moskowitz this article explores the development models of the past, how they have changed in recent history and how they might best evolve to meet the challenges of the coming century. The article concludes with hope for the successful impact of the Joint Technology Initiatives (JTIs) in Europe and the Materials Genome Initiative (MGI) in the United States.

**“The Most Important Element”** – (November-December 2012) – What is the most important element in materials research? Is it Carbon? Oxygen? Or is it something more exotic? The answer to this question is designed to surprise you.

**“Stop and Look Around”** – (January-February 2013) – Have you ever felt constricted by your technology space? If you consciously make an effort to extend your interests you may find new, exciting applications surprisingly close to what you already do. Such as using nano-scale carbon to transform healthcare.

**“I’ll Second That E(V)Motion”** – (March-April 2013) – Sometimes the big, splashy solution is not the best approach to a problem. Sometimes it is the application of something that already exists, done in a slightly different, more appropriate way.

**“Little Thoughts About Nano Safety”** – (May-June 2013) – I am concerned when I see the technical press sensationalize health and safety studies on nanomaterials for the sake of “selling papers”. Here I address my reaction to a specific article and why I think it was written in an irresponsible manner.

**“Li-Ions and NiCads and NiMHs! OH MY!”** – (July-August 2013) – Inspired by headlines stretching from the aerospace industry to automotive, this article explores the bigger issues of energy storage. Beginning with the need for more efficient and reliable batteries the discussion quickly extends to examine other energy storage strategies in which advanced materials will play a prominent role.

**“The Heart of the Next Big Business Revolution”** – (September-October 2013) – Sometimes it is helpful to remind ourselves of lessons that are so well entrenched that we forget to remember them. Simple reminders about the nature of innovation and teamwork will form the foundation for effective competition in the future.

**“Driving in the Rearview Mirror”** – (November-December 2013) – Working off the title for the column (Perspectives) this column talks about the need for a healthy perspective based on historical context and peripheral observation to help us avoid deleterious unintended circumstances. Following the analogy of taking a drive, the circuitous route brings us to responsibly addressing the need for effective recycling of composite structures.

**“A few of my Favorite Things . . .”** – (January-February 2014) – This compilation of ten of my favorite technology articles of 2013 contained such divergent topics as the first SEM micrographs of a chemical reaction at the atomic level (which looks oddly familiar to those of us who have studied organic chemistry) to the Burrito Bomber.

**“Tea, Earl Grey, Hot, Part 2”** – (March-April 2014) – An overview of 3D printing and Additive Manufacturing, this column looked at the reality vs. the hype and how I almost allowed my early misconceptions to blind me to the real potential of the technology.

**“Headlong Into the Future”** – (May-June 2014) – This article examines the impact that SAMPE might have on the greater Advanced Materials community based on the special niche that SAMPE occupies: SAMPE connects researchers with those who build and sell products better than any technical society or trade association I know. Properly leveraging this strength could yield tremendous results for the society, its members and the technologies that depend upon new materials to enable them.

**“Are We Stuck With Drones?”** – (July-August 2014) – An exploration of the origins of the word “drone” (a mindless follower) leads to discovery of the varied and sophisticated roles that our current Unmanned Systems are being asked to play. At the end is a short list of appropriate uses of the use of the word “drone”.

**“The Sincerest Form of Flattery”** – (September-October 2014) – Observing and imitating the natural world around us has inspired great engineering since the beginning. Now the exploding field of Biomimetics is being employed more than ever in the world of materials science with some astounding results.

**“What Goes Around Sticks Around”** – (November-December 2014) – Often what was once old becomes new. The headlines of today often reflect the material advances of yesterday and sometimes our current technology sounds an awful lot like a story we have already heard. As we approach renewable materials, they have striking similarity to the simpler materials from which today’s materials originally grew.

**“The Magic Of The Unanticipated”** – (January-February 2015) – A look at “unintended consequences” and how the natural evolution of modern language is rendering it an inadequate term. I suggest the more universally applicable phrase, “unanticipated outcomes”.

**“What Box? I Can’t Find The Box!”** – (March-April 2015) – Looking at two creative solutions to wasting energy in datacenters by thinking way outside the box.

**“Optimism, Skepticism And The Spirit Of Criticism”** – (May-June 2015) – A look at three seemingly disparate personality types and why we need them desperately in the greater technology marketplace. Also, a mini-guide on how they can best work together.

**“Pushing Toward The Goal”** – (July-August 2015) – Observes the fact that there are many advances in technology that are announced with some fanfare, then simply

forgotten without achieving the wide-spread promise, then transitions into a study on the importance of “shameless promotion.

**“You Say Tomato And I Say Pimento”** – (September-October 2015) – A cry to make our reviews and assessments based on common denominators, not by stacking irrelevant facts against each other.

**“Do You Believe In Magic?”** – (November-December 2015) – The description of a grisly murder scene turns out to be a crime perpetrated on an experimental robot. This gives way to an exploration of humanity’s visceral mistrust of technology.

**“The Relentless Pursuit Of Perfection – A Quixotic Look At The New Year”** – (January-February 2016) – Reverse-engineering an advertising tagline gives an interesting perspective on the ultimate goals of the engineering mindset.

**“How To Protect Your Baby”** – (March-April 2016) – Intellectual Property protection can be a complex and variable field, which often falls back on the traditional engineering answer – “It depends.” Here are a few of the considerations that can help determine an IP course of action.

**“Accelerating Technology: Full STEAM Ahead”** – (May-June 2016) – Engineers are often portrayed as “geeks”, pocket protector- and calculator-equipped dealers in facts and tables. So how important is creativity to a person with glasses held together by scotch tape?

**“Accelerating Technology: Full STEAM Ahead, Episode 2”** – (July-August 2016) – The last column on creativity brought up the deeper question of what is creativity and how will we know it when we see it.

**“The Inevitability Of End-Of-Life Issues”** – (September-October 2016) – Death is a part of life. As it is in the natural world, so it is in materials science.

**“Looking Over My Shoulder”** – (November-December 2016) – A look back at past columns and a view of how some of the topics and technologies have progressed since their initial appearance in “Perspectives”.

**“7 Reasons I Hate Numbered Lists”** – (January-February 2017) – Numbered lists are becoming ubiquitous in business literature and magazines. Are they real or are they arbitrary, designed to frame an author’s attempts at self-aggrandizement? Here are seven reasons I hate numbered lists, but it could just have easily been five. Or ten.

**“Continuous Improvement”** – (March-April 2017) – We often see the phrase, “standing on the shoulders of giants” used to illustrate how we got to where we are today. It is good to stop and realize how one accomplishment can build on those that preceded it and the synergies contributed by surrounding events.

**“Continuous Improvement?”** – (May-June 2017) – After writing the last column I began to think about ways in which, while improving, we remain very much the same. Sometimes old ways are best.

**“How Ugly Is Your Baby?”** – (July-August 2017) – Is your invention really the best thing since sliced bread, or are you attached to it simply because it is yours? This humorous examination of honestly evaluating your invention concludes with an impassioned plea: “Please seek professional help!”

### **Advanced Materials and Processes Magazine**

**“The Effects of Z-Axis Thermal Expansion on Tool Longevity”** – This was a follow-up to the first article to explore the impact that z-axis thermal expansion has on laminated tooling materials over time. (See “Material Options for Composite Tooling”, below.) The more radical a contour is, the faster the tool will break down. This concept is now widespread understanding within the composite tooling community.

**Often quoted as an “Industry Source”** – After half a decade of writing and contributing to articles in trade and technical magazines and journals, I worked for a company that had too long an approval cycle to meet those publications’ deadlines, so my expertise was simply attributed to “an industry source”.

### **Materials Engineering Magazine**

**“Material Options for Composite Tooling”** – Contains the first publication of the contribution of z-axis CTE on an anisotropic tooling structure. (September 1989)

**“Reducing Tooling Failure With Chemically Bonded Ceramic Tooling”** – A case study performed on a radically different approach to tooling for composites demonstrated some dramatic reduction in tool repair and replacement – under specific conditions.

### **Advanced Composites Magazine**

**“Tooling for Composites: The Blue-Collar Trade Moves Up”** Content contributor and quoted industry source. (November/December 1989)