David Brookstein, Sc.D.
Professor of Mechanical Engineering
Senior Associate Dean
Temple University College of Engineering

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Education:

- Doctor of Science in the field of Mechanical Engineering, Minor Studies in Management from Sloan School of Management, Massachusetts Institute of Technology, 1976.
- Master of Science in Textile Technology, Massachusetts Institute of Technology, 1973.
- Bachelor of Textile Engineering, Georgia Tech, 1971.
- Harvard Business School Summer Program on Research Management, 1990.
- Harvard University Graduate School of Education MLE Program, 1998.
- Massachusetts Institute of Technology Professional Institute - Data and Models in Engineering, Science and Business, 2006
- Harvard University Graduate School of Education Institute for Education Management, 2007.
- Massachusetts Institute of Technology Professional Institute - Nanomaterials for Biological and Pharmaceutical Technologies – 2008
- MIT Sloan School Executive Education Program "Product Design, Development, and Management" – 2009
- MIT Professional Institute, "From Technology to Innovation: Putting Ideas to Work" - 2010
- MIT Professional Institute, "Mastering Innovation and Design Thinking" - 2019

Fellow of the American Society of Mechanical Engineers
Fellow of the Textile Institute (United Kingdom)

Professional Experience:

Temple University College of Engineering

2014-present Professor of Mechanical Engineering and Senior Associate Dean
Responsible for the Senior Design Capstone Courses for all engineering students
Responsible for engineering program accreditation from the Accreditation Board forEngineering and Technology (ABET)

Brookstein Consulting LLC

2000-present Engineering and Litigation Consultant in Fields of Textiles, Mechanical Assemblies made from Textile Materials, Garment Systems, Fibers, Fabrics and Composites

ICF Mercantile

2013-2014 Director of Market Development
Responsible for Technical and Market Development of antimicrobial, antifungal and flame-resistant textile fabrics. Development of new fabric systems for flame-resistant garments.

Montgomery County Community College (PA)

2012-2013 Dean for Science, Technology, Engineering and Mathematics (STEM)
Chief Academic Officer for all A.S. and A.A.S. programs in engineering, physical sciences, biological science and computer sciences

Philadelphia University (formerly Philadelphia College of Textiles and Science)

2010 – 2012 Executive Dean for University Research and Professor of Mechanical Engineering

1994 – 2010 Dean and Professor of Mechanical Engineering
School of Engineering & Textiles

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2007	Executive Director of Institute for Textile and Apparel Product Safety
2008	Executive Director of Pennsylvania Advanced Textile Research and Innovation Center including Biomedical Textile Structures Laboratory
2005	Executive Director of Research for Philadelphia University
2004-2012	Principal Investigator – DoD Funded program – Laboratory for Engineered Human Protection (LEHP) – program focused on working with US Army to develop new garment-based soldier protection systems. The research and development program was to design, develop and produce prototype chemically protective garments with the required comfort using the latest materials produced in collaboration with selected suppliers.

MAG Industrial Automation Systems

2009-2012	Engineering consultant to worldwide manufacturer of engineered automation systems for the aerospace industry

Harvard University

2002 – 2003	Visiting Scholar (sabbatical) Harvard University Center for Textile and Apparel Research (Division of Engineering and Applied Sciences and Harvard Business School) – Studied trends in patent applications involving textile structures

Albany International Research Co. - Mansfield, MA

1992 - 1994 Associate Director

1983 - 1992 Assistant Director

1980 - 1982 Senior Research Associate

Directed all activities of the professional engineering group responsible for contract research, development, and manufacture of advanced composite materials and technical polymeric materials and fabrics. Accomplishments include the working with NASA to develop new garment systems for astronauts, working with Rockwell International on textile-based thermal insulation for Space Shuttle, invention of braided fiberglass sucker rods, invention and development of the multilayer interlock braiding system for producing three-dimensionally reinforced fibrous preforms for aerospace structures, the development of implantable biomedical devices such as sutures, vascular prostheses, orthopedic implants (knitted and woven) and the development of unique textile-based civil engineering structures. Engineering innovations led to 12 US patents and many other inventions protected by trade secret. Member of the senior management staff of the organization.

Northeastern University - Boston, MA

1981-1983 Adjunct Professor in Mechanical Engineering

Taught undergraduate courses in statics, dynamics, and mechanics of deformable bodies and material science.

Georgia Institute of Technology, College of Engineering

1975 - 1980 Assistant Professor of Textile Engineering

Taught and conducted research in the fields of textile and composites engineering with special emphasis on improving the energy efficiency of manufacturing systems. Obtained substantial funding from US DOE and US DOD. Active participant in College of Engineering co-op undergraduate programs.

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Also, during period as professor at Georgia Tech served as:

- Technical consultant for Levi Strauss (garment design in area of comfort);
- Union Carbide (melt blown carbon fiber manufacturing);
- Carborundum (boron fiber manufacturing; and
- Eastman Kodak (textured polyester stretch yarns)

Also. while at Temple University I have consulted for Edwards LifeSciences (textile-based cardiac prostheses)

Outside Professional Activities:

- Founding Member of the Greater Philadelphia University Council of Engineering Deans
- Chairman of the National Textile Center (NTC) Operating Board (20062007). NTC is a federally funded research consortium consisting of Georgia Tech, North Carolina State, Auburn, Clemson, Cornell, UMASS-Dartmouth, UC Davis and Philadelphia University.
- Advisory Board of the College of Engineering, Georgia Tech (19901995).
- President, The Fiber Society (1996)
- Chairman, Textile Engineering Division-American Society of Mechanical Engineers (1994-1996)

Memberships:

- American Society for Engineering Education (member of Engineering Deans Council)
- Institute of Industrial Engineers
- ASME - Textile Engineering Division, Chairman, 1980, 1994
- American Conference of Academic Deans
- The Fiber Society - Fiber Society Lecturer, 1986-1987, 1993-1994, President 1996
- SAMPE - Society for Advanced Materials and Process
- The Textile Institute (United Kingdom)

Awards and Honors:

- American Society of Mechanical Engineers (ASME) – Fellow, 1995
- ASME - Textile Engineering Division, Chairman, 1980, 1994
- The Fiber Society - Fiber Society Lecturer, 1986-1987, 1993-1994, President, 1996
- The Textile Institute (United Kingdom) – Fellow, 1992
- Georgia Tech Academy of Distinguished Engineering Alumni, 1999
- Techtextil Innovation Prize for Exemplary Development in the Field of Technical Textiles and Textile Reinforced Materials, 1993 (Germany)
- ASTM Harold Dewitt Smith Award, 1998 - for outstanding developments in textile fiber utilization in the design and development of three-dimensional fibrous composites for aerospace applications, biomedical implants, and oil extraction systems

Publications and Reports:

"Deductions about the False-Twist Process from Observations of the Variation of Torque on Detwisting at Heat Set Yarn," with Backer, S., and Thwaites, J.J., Journal of the Textile Institute, 67, p. 183-186, 1976.

"Transient Threadline Behavior in False-Twist Texturing," with Thwaites, J.J., and Backer, S., Journal of the Textile Institute, 67, 1976.

"Mechanics of Texturing Thermoplastic Yarns: Part III. Experimental Observations of Torsional Behavior of the Texturing Threadline for Pre-Drawn PET Yarns," with Backer, S., Textile Research Journal, 46, pp. 802-908, 1976.

"Mechanics of Texturing Thermoplastic Yarns: Part V. Steady State Mechanics of Drawing Texturing," Textile Research Journal, 47, p. 256-266, 1977

"Material-Process Interactions During False-Twist Texturing," with Backer, S., Journal of Applied Polymer Science: Applied Polymer Symposium, 31, p. 6382, 1977.

"Mechanics of Texturing Thermoplastic Yarns: Part VI. Transient Mechanics of Draw Texturing," with Backer, S., Textile Research Journal, 48, p. 198-218, 1978.

"On the Mechanics of Draw Texturing," Journal of Applied Polymer Science:
Applied Polymer Symposium, 33, p. 197-202, 1978

"Energy Consumption and Conservation: Textile Drying," ACS Symposium Series, 107/17, 1979

"All That Glitters is Not Gold," Textile World, October 1979

"Energy Conservation in the Textile Industry," ERDA - Phase I Report, DOE, April, 1977, Quarterly Reports, 1976 to 1977

"Energy Conservation in the Textile Industry, Department of Energy Phase II - Report, April 1978

"Processing of Pitch-Based Staple Carbon Fiber," Union Carbide Corporation, November 1977, Final Report.

"Low Thermal Conductivity of PAN-Based Carbon Fiber, Hercules, Inc., Monthly Reports and Final Report

"Development and Demonstration of Energy-Conserving Drying Modifications to Textile Processes Final Report. November 1979

"Optimization of Sucker Rod Pumping Using Novel Material-Systems Concepts," with Skelton, J. and Dent, R., Proceedings of the Sixth Symposium of Engineering Applications of Mechanics, Petroleum Society of CIM, 1982

"Mechanical Characterization of Braided Cylinder," with Tsiang, T.H., and Dent, J., Proceedings of the 29th SAMPE Meeting, 1984.

"Design and Development of a High Stability Truss Chord," with Helmke, R., and Kominos, C., Proceedings of the 30th SAMPE Meeting, 1985.

"Load-Deformation Behavior of Composite Cylinders with Integrally-Formed Braided and Machined Circular Holes," with Tsiang, T.H., Journal of Composite Materials, 19, September 1985.

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"Braided Composites: Attachment Considerations, Proceedings of the Composites in Manufacturing, Los Angeles, CA, January 1986.

"Foam Assisted Drying,: with Skelton, J., Petterson, D.R., and Lauchenauer, F.,
Proceedings of the International Drying Symposium, Cambridge, MA, August 1986

"Joining Methods of Advanced Braided Composites," Composite Structures, 6, p. 87-95, 1986

"Structural Applications of Advanced Braided Composites," Proceedings of the SPE Advanced Polymers Composites Division, November 1988.

"Processing Advanced Braided Composite Structures," Proceedings of the WAM of ASME, Materials Division, November 1988.

"Interlocked Fiber Architecture: Braided and Woven," Proceedings of the 35th SAMPE Meeting, April, 1990.

"Evolution of Fabric Preforms for Composites," Journal of Applied Polymer Science: Applied Polymer Symposium, 47, p. 487-500, 1991.

"A Comparison of Multilayer Interlocked Braided Composites with Other 3-D Braided Composites," 3rd International Techtextil Symposium, 14-16, May 1991, Frankfurt.

"On the Mechanical Behavior of 3-D Multilayer Interlock Braided Composites," with Preller, T., and Brandt, J., DASA-Deutsche Aerospace, Proceedings of NASA Fiber-Tex '92.

"The Evolution of 3-D Composites," Fifth European Conference on Composite Materials," 7-10 April 1992, Bordeaux.

"The Solid Section Multilayer Interlock Braiding System," 4th International Techtextil Symposium, 4 June 1992, Frankfurt.

"On the Mechanical Properties of Three-Dimensional Multilayer Interlock Braided Composites, TECHTEXTIL Symposium, 1993, Frankfurt.

"3-D Braided Composites-Design and Applications," Sixth European Conference on Composite Materials," 20-24 September 1993, Bordeaux

"Concurrent Engineering of 3-D Textile Preforms for Composites," International Journal of Materials and Product Technology, Vol. 9, Nos 1/2/3, 1994.

"Advanced Textile Airbeams for Temporary Shelters, 6th TECHTEXTIL Symposium, 1994, Frankfurt.

"Physical Properties of Twisted Structures" with Ning Pan, Physical Properties of Twisted Structures II Industrial yarns, cords and ropes, Journal of Applied Polymer Science, V 83, 610-630.

"A New Multidisciplinary Engineering Education Initiative", with Govindaraj, M and Tovia, F, American Society of Engineering Education, AC 2007-1064, 2007.

"Multi-component Multiple-layer Woven Textiles for Electronic Applications."Govindaraj, Muthu, and Brookstein, David. Ambience 08 Smart Textiles-Technology and Design. Proc. of Ambience 08 International Scientific Conference. Boras, Sweden: The Swedish School of Textiles, University College of Boras, 2008. 72-78.

"On Current Research Associated with Textile and Apparel Product Safety", with Govindaraj, M and Pierantozzi, J , Proceedings of the 86th Textile Institute World Conference, Hong Kong 2008.

Written testimony to the US Senate Subcommittee of Consumer Protection, Product Safety and Insurance – "Formaldehyde in Textiles and Consumer Products", April 28, 2009

"Factors Associated with Textile Pattern Dermatitis Due to Contact Allergy to Dyes, Finishes, Foams and Preservatives" , Dermatologic Clinics, July 2009. "Textile-Templated Electrospun Anisotropic Scaffolds for Tissue Engineering and Regenerative Medicine", Institute of Electrical and Electronic Engineers, Engineering in Medicine and Biology Society Annual Conference, Buenos Aires, September 2010.

"Creating an Infrastructure for Compressed Natural Gas Delivery for Automotive Transportation" - Industry Studies Association of the Alfred P. Sloan Foundation, Pittsburgh, May 2012

"Textile-templated electrospun anisotropic scaffolds for regenerative cardiac tissue engineering", Biomaterials 35 (2014) , pp. 8540-8552
H, Gözde Şenel Ayaz, Anat Perets, Hasan Ayaz, Kyle D. Gilroy, Muthu Govindaraj, David Brookstein and Peter I. Lelkes

"Shaping New Student Identity as Creatives" in the 21st Century Global Economy "with Keya Sadeghipour, American Society of Engineering Education, 2016

"Work in Progress: Rethinking How We Teach in Engineering Through a Course Redesign Initiative" with Shawn Fagan and Stephanie Fiore, American Society of Engineering Education, 2017

"Work in Progress: Introducing Design Thinking in First-Year Engineering Education" with Keya Sadeghipour, Shawn Fagan and Cory Budischack, American Society of Engineering Education, 2020.

"Design and Development of a Protective Face Mask to Mitigate Community Spread and Prevent Wearer Infection from COVID - 19 Using Design Thinking", COMMONHealth, December 2020

"Public Health Protection Against Bioterrorism via Respiratory Pathogenic Viral and Bacterial Agents using Protective Face Masks" COMMONHealth, April 2021

PATENTS Consisting of Original Contributions to field of mechanical engineering (Inventor or Co-Inventor):

1. U.S. Patent 4,290,170 "Device for Aligning and Attenuating Fiber Mats," A device for producing aligned carbon fiber webs for use in composites.

2. U.S. Patent 4,497,866 "Sucker Rod," An elliptical cross-section braided composite rod for pumping oil.

3. U.S. Patent 4,602,892 "Sucker Rod," A braided composite rod and coupling for pumping oil.

4. U.S. Patent 4,841,613 "Pressure Developer or Press Roll Containing Composite Material," A composite press roll with variation of radial stiffness.

5. U.S. Patent 4,909,127 "Braiders," A braider with non-circular braider tracks and a unique package carrier for use with braider.

6. U.S. Patent 5,004,474 "Prosthetic Anterior Cruciate Ligament Design," An artificial ligament device having a tubular woven ligament and being adapted for joining the ends of two bones.

7. U.S. Patent 5,357,839 "Solid Braid Structure" A 3-D system for producing braids.
8. U.S. Patent 5,358,758 "Structural Member" A fiber reinforced structural member produced from a complex woven fabric.

9. U.S. Patent 5,411,463 "Composite Roll and Method of Making" A fiber reinforced roll for papermaking.

10. U.S. Patent 5,501,133 "Apparatus for Making a Braid Structure" A novel manufacturing system for producing 3-D multilayer interlock braided textile and fiber reinforced composite structures.

11. U.S. Patent 5,697,969 "Vascular Prosthesis and Method for Implanting" A fibrous synthetic vascular graft with a combination of resorbable and non-resorbable layers.

12. U.S. Patent 7,144,830 B2 "Plural Layer Woven Electronic Textile, Article and Method"

13. U.S. Patent 9,668,846 "Textile-Templated Electro spun Anisotropic Scaffolds for Tissue Engineering and Regenerative Medicine"

<u>US and European Patent Applications</u>

1. US 2015/0292677 "Method of Manufacturing a Compressed Gas Cylinder"

2. EPO 0 647 751 A2 "Braided Airbeams and method of making the same

Non-patented trade secret inventions developed at Albany International Research Co.

1. Fiber-reinforced composite rocket igniter for Small ICBM and Pegasus Air Launched Vehicle
2. Specialty vascular grafts and bio-absorbable orthopedic implants
3. New method for drying paper during the papermaking process
4. Complex, reduced delamination rocket motor exit cones