

Spencer B. Graves

Summary: Professional Engineer with a PhD in Statistics, three patents, a book published in July 2009 and multiple other publications. Strong interest, experience and publications in real time monitoring, designing industrial experiments and extracting information from data.

Work history:

2009-present: President and Chief Technical Officer with Structure Inspection and Monitoring, Inc. (structuremonitoring.com), with offices in Colorado, Connecticut, California, and Switzerland.

2001-2009: Senior Statistician and Staff Engineer with PDF Solutions, San José, CA, developing new ways to extract more useful information from available data, teaching and consulting in engineering statistics in the US, Japan and China, to increase the rate at which PDF clients improve their manufacturing processes and profitability.

1996-2000: Co-principal investigator on contract research at the University of Wisconsin and the University of St. Gallen, Switzerland, in methods for designing on-board diagnostics to detect malfunctions in vehicular emissions controls. This included the development of a one-day workshop in this area organized under the auspices of the Society of Automotive Engineers and taught to seven audiences from Turin, Italy to Pasadena, CA.

1990-1996: Principal at Productive Systems Engineering (prodsyse.com), consulting and teaching in improving productivity and quality for organizations world wide.

1991-1993: Lecturer in Industrial and Systems Engineering at San José State University on experimental design, engineering statistics and productivity and quality improvement.

1982-1991: Statistician in Hewlett Packard Company, teaching and consulting in statistics and managing for improvement in areas ranging from manufacturing to accounting to marketing.

1976-1982: Graduate student in Statistics at the University of Wisconsin, Madison.

1973-1976: Operations Analyst with Midwest Research Institute in Kansas City, MO.

1967-1973: Officer in the US Air Force working as an industrial engineer and office manager.

Prior to 1965: Raised on a farm gaining substantial experience repairing mechanical equipment including arc welding, black smithing, and custom fabrication of replacement parts.

Professional Qualification: Professional Engineer, Missouri license number 015720, Feb. 11, 1974.

Education:

1983: PhD, Mathematical Statistics, University of Wisconsin Madison.

1975: MA, Mathematics, University of Missouri at Kansas City.

1972: MS, Industrial Engineering, University of Pittsburgh (Pennsylvania).

1967: BS, Aerospace Engineering, University of Colorado, Boulder.

Patents: Co-inventor on three patents issued since 2008 plus a fourth that is still pending:

Spencer B. Graves, Sam Kovnat and James C. Elliott, "Software to Facilitate Design, Data Flow Management, Data Analysis and Decision Support in Structural Health Monitoring Systems" (US utility patent application number 13/343,340, Jan. 4, 2012)

Anand Inani, Brian E. Stine, Marci Yi-Ting Liao, Senthil Arthanari, Michael V. Williamson, Spencer B. Graves, Guanyuan M. Yu, "Identifying yield-relevant process parameters in integrated circuit device", US Patent number: 7494893, issued: Feb 24, 2009.

Richard Burch, Paul Lin, Spencer Graves, and Eric Antonissen, "Method and System for Failure Signal Detection Analysis", US Patent number: 7415386, issued: August 19, 2008.

Guanyuan Yu, Michael Williamson, and Spencer Graves, "Monitoring and control of integrated circuit device fabrication processes", US Patent Application 20080312875, published December 18, 2008.

Books:

James Ramsay, Giles Hooker and Spencer Graves (2009) *Functional Data Analysis with R and Matlab* (Springer).

Spencer Graves and Elio Maldonado (1987) *Calidad y Productividad* (Productive Systems Engineering, San José, CA).

R Packages Freely Downloadable from the Comprehensive R Archive Network (CRAN):

Spencer Graves, Sundar Dorai-Raj and Romain François (2009) `sos`: Quick search of available R packages returned as a data.frame of class 'findFn'.

James Ramsay, Hadley Wickham, Spencer Graves and Giles Hooker (2009) `fda`: Functional Data Analysis.

Sundar Dorai-Raj and Spencer Graves (2009) `DierckxSpline`: Companion to Dierckx (1995) *Curve & Surface Fitting with Splines* (Oxford).

Spencer Graves (2007) `FinTS`: companion to Tsay (2005) *Analysis of Financial Time Series*, 2nd ed. (Wiley).

Spencer Graves, Hans-Peter Piepho, and Sundar Dorai-Raj (2006) `multicompView`: visualizing multiple comparisons.

Articles:

- Spencer Graves, Kevin Rens, and Fred Rutz (2011) "A 9-Step Process for Developing a Structural Health Monitoring System" in Fu-Kuo Chang, *Structural Health Monitoring 2011: Condition-Based Maintenance and Intelligent Structures* (DEStech Publications, http://structuremonitoring.com/DCSoftware/Graves-Rens-Rutz_-SHMprocess20110502f.pdf, accessed 2011.10.01).
- Spencer Graves (2011) "Off-Line Data Analysis and Real-Time Fault Detection and Isolation with Distributed Processing and State Space Compression", *Proceedings of the 2011 Joint Statistical Meetings* (American Statistical Association).
- Spencer Graves, Sundar Dorai-Raj, and Romain François (2009) "sos: Searching Help Pages of R Packages", *The R Journal*, 1(2) 56-59.
- A. Inani, V. Koldyaev and S. Graves (2007) "Accelerated testing for time dependent dielectric breakdown (TDDB) evaluation of embedded DRAM capacitors using tantalum pentoxide", *Microelectronics Reliability*, 47(9-11): pp. 1429-1433.
- Spencer Graves (2007) "Bayes' Rule of Information and Monitoring in Manufacturing Integrated Circuits", ch. 7 in Bianca M. Colosimo and Enrique del Castillo, *Bayesian Process Monitoring, Control and Optimization* (Chapman and Hall).
- Spencer Graves, Søren Bisgaard, Murat Kulahci, John Van Gilder, John James, Ken Marko, Hal Zatorski, Tom Ting, Cuiping Wu (2006) "Accelerated testing of on-board diagnostics", *Quality and Reliability Engineering International*, 23(2): 189-201.
- M. Ershov, S. Saxena, S. Minehane, P. Clifton, M. Redford, R. Lindley, H. Karbasi, S. Graves and S. Winters (2005) "Degradation dynamics, recovery, and characterization of negative bias temperature instability", *Microelectronics Reliability*, 45 (12) 1953-1968.
- George Box, Søren Bisgaard, Spencer Graves, Murat Kulahci, Ken Marko, John James, John Van Gilder, Tom Ting, Hal Zatorski, Cuiping Wu (2003) "Performance Evaluation of Dynamic Monitoring Systems: The Waterfall Chart", *Quality Engineering*, 16(2): 183 191.
- Spencer Graves (2002) "Six Sigma Rolled Throughput Yield (RTY)", *Quality Engineering*, 14(2): 257-266.
- Spencer Graves (2001) "Tolerance Analysis Tailored to Your Organization", *Journal of Quality Technology*, 33(3): 293-303.
- Søren Bisgaard, Spencer Graves, and Garrick Shin (2000) "Tolerancing Mechanical Assemblies Using Computer Aided Design and Experimental Design", *Journal of Quality Technology*, 32(3): 231-240.
- Spencer Graves and Søren Bisgaard (2000), "Five ways statistical tolerancing can fail and what to do about them", *Quality Engineering*, 13: 85-93.
- G. Box, S. Graves, S. Bisgaard, J. Van Gilder, K. Marko, J. James, M. Seifer, M. Poublon, and F. Fodale (2000) "Detecting Malfunctions in Dynamic Systems", *Proceedings of the 2000 SAE World Congress & Exposition* (SAE Technical Paper Series number 2000-01-0363).
- Spencer Graves (2000) "Why Do We Need International Standards?" *Quality Progress*, 33(6): 138-139.

- Spencer Graves and Søren Bisgaard (1999) "Integrated Tolerance Management", in F. van Houten and H. Kals (eds.) *Global Consistency of Tolerances* (Dordrecht, Netherlands: Kluwer Academic Publishers, 1999, pp. 385-394).
- Spencer Graves (1999) "A Total Cost Comparison of Alternative Tolerancing Formulae", *Journal of Manufacturing Sciences and Engineering*, 121(4): 720-726.
- Ron Kenett and Spencer Graves (1998) "The Global Village of Quality", *Quality Progress*, 31(6): 93.
- Søren Bisgaard, Spencer Graves and Rene Valverde (1998) "The Impact of Measurement Error on Specifications", *Quality Engineering*, 11(2): 331-335.
- Spencer Graves (1998) "Statistical Quality Control of a Multistep Production Process Using Total Process Yield", *Quality Engineering*, 11(2): 187-195.
- Søren Bisgaard and Graves, S. (1997) "Negative Process Capability Index from Assembling Good Components? A Problem in Statistical Tolerancing", *Quality Engineering*, 10(2): 409-414.
- C. A. Cox, S. Graves, S. Morris, and A. Bolaños (1997) "Quick Start, Quick Results Total Quality", ch. 4 in J. S. Ahluwalia (ed.) *Total Quality Management* (New Delhi, India: Tata McGraw-Hill, pp. 35-45).
- Spencer Graves and Tom Menten (1996) "Designing Experiments to Measure and Improve Reliability", ch. 11 in Ireson, Coombs and Moss, *Handbook of Reliability Engineering and Management*, 2nd ed. (Wiley)
- Spencer Graves (1995) "Common Principles of Quality Management and Development Economics", *Quality Management Journal*, Winter 1995, pp. 65-79.
- Spencer Graves and Ernest Unwin (1993) "Statistics, Engineering and TQM", *1993 ASEE Annual Conference Proceedings* (Washington, DC: American Society for Engineering Education, pp. 1399-1405).
- Spencer Graves (1993) "Compensation, HR Policies, and Profitability", *Transactions of the 47th Annual Quality Congress* (Milwaukee, WI: ASQC, pp. 314-320)
- Spencer Graves (1992) "Political Platform for Quality Improvement", *Transactions of the 46th Annual Quality Congress* (Milwaukee, WI: ASQC, 1992, pp. 332-338)
- Spencer Graves (1992) "Compensation Systems and Other Human-Resource Policies to Promote Quality and Productivity Improvement", *International Productivity Journal*, II (Summer): 17-30.
- Spencer Graves, William Carmichael, Douglas Daetz, and Edith Wilson (1991) "Improving the Product Development Process", *Hewlett-Packard Journal*, June, pp. 71-76.
- Spencer Graves, S. (1991) Quién Necesita del Capital Extranjero? ("Who Needs Foreign Capital?" in Spanish) *Encuentro con Calidad*, Feb/Abr, 1991, p. 13-21
- Hugh Nicholas, Spencer Graves and S. Brenner (1983) "Clustering of transfer RNAs by cell type and amino acid specificity", *Journal of Molecular Biology*, 171(2) 111-118.
- Spencer Graves (1978) "On the Neyman-Pearson Theory of Testing", *British Journal for the Philosophy of Science*, 29:1-23, March 1978.

National Science Foundation Grant: 8 of these articles were prepared with help from Søren Bisgaard and Spencer Graves, "Theoretical Foundations of Mechanical Tolerancing", DMI 9500140, 1995-07-01 to 1999-06-30, \$225,000 (<http://www.sciencestorm.com/award/9500140.html>, accessed 2010.09.04)

Foreign Languages: Spanish, French and German. I have taught, consulted and published articles and a book in Spanish, and I regularly read news and other material in all three languages.

Professional Services

2009-2010: Vice President for General Applications of the San Francisco chapter of the American Statistical Association

1997-2004: Contributing Editor to *Quality Progress* for World View

1991-1993: Member of the Editorial Council of *Encuentro con Calidad*.

Professional Membership

American Society of Civil Engineers (2010-present)

American Statistical Association (1973-present)

American Society for Quality (1984-2004)

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