

Alan J. Watts, Ph.D

DOB: September 2, 1943.

Marital Status: Married.

Education: B.Sc. 1965, Ph.D., 1969, Honors Physics, Exeter University, England (Ph.D. studies: Electron Spin Resonance and Nuclear Magnetic Resonance).

Experience: Forty-two (42) years' experience in force analysis, shock physics, impact damage effects, explosions, and weapon design; including theory, research, development, and testing. Expert in material and system behavior response due to stress, thermal, hydrodynamic, and radiation exposure. Eighteen (18) years experience in Accident Reconstruction and Biomechanics.

Expert Witness:

- Dr. Watts, a Ph.D. Physicist, is a qualified expert witness. He has eighteen (18) years experience, with traffic accident impact dynamics and with forces on bodies, and body motions and injury mechanisms (biomechanics); in the District Courts of: Bernalillo County (Albuquerque), Las Cruces, Los Lunas, Las Vegas, Truth or Consequences, Taos, Tierra Amarilla, Clayton, Crownpoint, Roswell, Carlsbad, Silver City, Farmington, Lovington, Santa Rosa, Portales and Santa Fe; New Mexico. Dr. Watts is also a qualified expert in the District Courts of: El Paso, Texas; Phoenix and Tucson, Arizona; Lafayette, Abbeville and New Iberia, Louisiana; Jacksonville, St. Petersburg, Tampa and Vero Beach, Florida; Missoula, Montana; Buffalo, New York; Tulsa, Oklahoma; and San Luis, Colorado. He is also qualified in Federal Courts for biomechanics (including gunshot wounds and blood spatter, and mechanical failure of equipment leading to injury) and accident reconstruction.

Book Authorship:

Watts, A.J., Atkinson, D., Hennessy, C.J., *Low Speed Automobile Accidents - Accident Reconstruction and Occupant Kinematics, Dynamics and Biomechanics*, Lawyers & Judges Publishing Company Inc., Tucson, Arizona, 1996 (first edition), and 1999 (second edition).

Third edition, January 2003.

Work History and Presentations:

- Adjunct Professor for the Union Institute and University, Cincinnati, Ohio (as of April 2002) peer reviewing graduate studies leading to the Ph.D.
- Owner/President of Watts-Co, Albuquerque, NM, consultant expert witness on vehicular accidents, mechanical failure modes and human injury modes (April 2000 - present).
- Chief Scientist at Permacharge Corporation, Rio Rancho, NM (April 2000 – September 2001), specializing in the application of electrostatic techniques.
- Chief Scientist at POD Associates, Inc., Albuquerque, NM (January 1991 – April 2000), performing defense-related work for the United States DOE, DOD and NASA, and also Accident Reconstruction and Biomechanics (starting 1993).
- Senior Staff Scientist at KTECH Corporation, Albuquerque (March 1979 – January 1991), performing defense-related contract work for the United States DOE, DOD and the Defense Nuclear Agency.
- Principal Scientific Officer at the British Government Atomic Weapons Research Establishment (AWRE, now AWE) near Reading, England (January 1969 – March 1979) performing defence-related work for the British Ministry of Defence.
- Speaker/Course presenter at the 16th Annual National Law Enforcement Conference, hosted by the Institute for Law Enforcement Education (ILEE), Seven Springs Mountain Resort, PA, April, 2004.
- Speaker/Course presenter at the Accident Reconstruction Seminar, hosted by: Lawyers & Judges Publishing in Anaheim, Ca., February, 2001.
- Speaker/Course presenter at the Accident Reconstruction Seminar, hosted by: Lawyers & Judges Publishing, in Washington, D.C., August, 2000
- Speaker/Course presenter at the Low Speed Reconstruction Seminar, hosted by: Lawyers & Judges Publishing, in Scottsdale, Arizona, October, 1999. (Topic: Low Speed Accidents).
- Speaker at the Connecticut Trial Lawyers Association, Trumbull, Connecticut, in October, 1999.
- Speaker/Course presenter at the Institute of Police & Technology Management (IPTM) in Jacksonville, Florida, April, 1999 (Topic: Low Speed Accidents)

- Speaker at the Accident Reconstruction Seminar, hosted by Lawyers & Judges Publishing Tucson, Arizona, November 1998, (Topic: Low Speed Accidents)
- Speaker for August 1998 San Antonio, Texas Trial Lawyers Association seminar (Topic: Low Speed Accidents)
- Speaker for October 1997 New Mexico Defense Lawyers Association seminar (Topic: Low Speed Accidents)
- Published *Low Speed Automobile Accidents: Accident Reconstruction and Occupant Kinematics, Dynamics and Biomechanics*, Lawyers and Judges Publishing, Tucson, AZ, August 1996, Alan J. Watts, Dale R. Atkinson and Corey J. Hennessy.
- Published *Low Speed Automobile Accidents: Accident Reconstruction and Occupant Kinematics, Dynamics and Biomechanics*, Second (2nd) edition, Lawyers & Judges Publishing, Tucson, AZ, September 1999, Alan J. Watts, Dale R. Atkinson and Corey Hennessey.
- Published *Low Speed Automobile Accidents: Accident Reconstruction and Occupant Kinematics, Dynamics and Biomechanics*, Third (3rd) edition, Lawyers & Judges Publishing, Tucson, AZ, January 2003, Alan J. Watts.
- Attended 40th STAPP Car Crash Conference, November 4-6, 1996, Albuquerque, NM.
- Attended 39th STAPP Car Crash Conference, November 8-10, 1995, San Diego, CA.
- Developed the physics-based Watts Model for predicting vehicle crush for low and high velocity collisions (1994).
- Developed the physics-based biomechanics Model for predicting body force for low and high velocity collisions (1994)
- Lead scientist at POD Associates, Inc. in accident investigation, analysis and reconstruction for automobile accidents using time and motion, energy and body force analysis for various clients (July 1993- April 2000).
- Lead scientist in analysis of high energy impulse and damage due to explosions, for DOE while at POD Associates, Inc. (1993 – 2000) and KTECH Corporation (1979-93).
- Lead scientist at POD Associates, Inc. in product failure assessment primarily due to dynamic and static stress loading and fatigue, including some corrosion effects, primarily for NASA (1991-2000).

- Expert in shock wave, spallation and blow-off impulse response of rapidly heated materials; work has been done for numerous US and foreign Government agencies and includes theory development, test design, testing and data analysis for AWRE (Great Britain), KTECH and POD (1969-1993).
- Developed physics-based scaling laws at POD governing impact cratering and perforation damage describing the transition from low velocity to hypervelocity impacts for NASA and USAF (1991 - 1993).
- Program Manager at POD Associates Inc. and while at KTECH Corp. for government research and development on analysis of optical coating and substrate damage under high energy and impulsive loading for DOE, DNA, and USAF (1979-93).
- Experimentally determined the equations of state and Gruneisen material property parameters for multiple material types in work done for US and foreign Government agencies for AWRE (UK), POD and KTECH (1969-92).
- Developed the PUFF-TFT and PRONTO-TFT hydrodynamics codes while at KTECH for the US Air Force; Codes calculate radiation, thermal and hydrodynamic stress and shock damage response of material surfaces to high energy loading (e.g., radiation, collision shocks, lasers, etc.) (1985-90).
- Designed and developed a durable bremsstrahlung radiation converter/shield that survives high energy impulsive loading on materials and structures for the PRONTO II test facility at Sandia National Laboratories, Albuquerque, while at POD (1993).
- Designed and developed stress and momentum gauges for the British Government's Atomic Weapons Research Establishment (AWRE) for atomic explosion research (1969-79).
- Designed and developed deformation gauges (stress and strain) for space power test specimens for use at the SATURN facility at Sandia National Laboratories, Albuquerque, while at POD and KTECH (1979-1993).
- Program Manager at KTECH Corp. to the Defense Nuclear Agency (DNA) on the thermomechanical susceptibility of military spacecraft to rapid energy deposition due to high impulse explosions (1985-90).

- Designed and developed instrumentation and test fixtures while at KTECH and POD for thermomechanical response testing for underground nuclear response tests at the Nevada Test Site (1985-1992).
- Researched and reported on the phenomenology associated with the use of high-energy explosives for plate impacts and implosion systems for the British AWRE (1969-79).

Professional Affiliations and Honors: Letter of Commendation from Dr. Ullrich, Deputy Director of the Defense Nuclear Agency (1990) (now called the Defense Threat Reduction Agency); Member, American Association for the Advancement of Science (AAAS); Member, National Association of Professional Accident Reconstruction Specialists, Inc. (N.A.P.A.R.S.); Member, ARC Network; Member, Society of Automotive Engineers (SAE).

Publications:

The reports written at AWRE are classified under UK regulations. However, the following topics were covered with the approximate numbers of reports written:

X-ray and electron beam deposition effects - 15 papers.

Impulse gauge design, development and usage - 10 papers.

UGT assessment reports - 10 papers.

Pen-aid, RV design - 10 papers.

Implosion studies - 10 papers.

General theoretical aspects (EOS, energy flow) - 8 papers.

Watts, A.J., D.V. Keller, J. Powe, "Joint Electron Beam Commonality Experiments on Blackjack 3 and 3 Prime," Ktech TR-79-11, Dec 1979.

Watts, A.J., "Commonality Experiments on Cermets Using Hermes," Ktech TR-80-09, Feb 1981.

Watts, A.J., D.V. Keller, J. Powe, T.J. Roemer, D.A. Rice, "Commonality Experiments on a Cermet, Aluminum and Tantalum Using the Rehyd Accelerator," Ktech TR-80-10, 1980.

Watts, A.J., K.J. Ojanen, "Long Stroke Dynamic Displacement Detector Progress Report," Ktech TR-81-25, FEB 81 - Oct 1981.

Watts, A.J., D.V. Keller, L.M. Lee, T.J. Roemer, D.W. Caudle, S.E. Burke, "DNA Antenna Window Program Status Report," Ktech TR-82-1, 1982.

Watts, A.J., "DNA/Ktech Antenna Window Vulnerability Studies Using Relativistic Electron Beams," Ktech TR-82-13, March 1983.

Watts, A.J., "Converter and Bremsstrahlung Debris Shield Design: Theoretical Considerations," Ktech TR-84/15, Feb 1985.

Watts, A.J., "Antenna Window Testing on HERMES : TFS Button Window Assemblies," Interim Report DNA, July 1986.

Watts, A.J., P. Kochendorfer (PDA), "Advanced Antenna Window Performance and Requirements Definition Program: HERMES Electron Beam Tests," Joint Ktech/PDA Report, PDA-TR-5919-07-23, July 1986.

Watts, A.J., P. Kochendorfer (PDA), "Advanced Antenna Window Performance and Requirements Definition Program: HERMES Electron Beam Tests," Joint Ktech/PDA Report, PDA-TR-5919-07-23, July 1986.

Watts, A.J., E. Young, S. Sauer, "A Report on Computer Codes Tested and Analyzed for BRVAD Analysis," Ktech Report TR-86-12, Oct 1986.

Watts, A.J., E. Young, S. Falvey, "Antenna Window AGT/UGT Correlation (U)," DNA-TR-85-347 - April 1985.

Watts, A.J., S. Falvey, S. Richter, E. Young J. Spates, "Profile Matching AGT/UGT Validation Experiment for MIGHTY OAK," Ktech TR-87-03, - 1988.

Watts, A.J., F. Smith, B. Mann, A. Smith, "IR Seeker NWE Study, Final Report," Ktech TR-87-10 - for Texas Instruments, 1987.

Watts, A.J., C. Breen, S. Sauer, "MIGHTY OAK Thin Film Energy Sharing: PUFF-TFT Code Validation," Ktech TR-88-01, 1988.

Watts, A.J., C. Breen, S. Sauer, F. Smith, "Thin Film Transport (PUFF-TFT) Computer Code Development," AFWL-TR-88-66, Parts I and II, June 1988.

Watts, A.J., D.V. Keller, "AGT/UGT Validation Program," DNA-TR-88-131, June 1988.

Watts, A.J., "NPB Damage Possibilities: A Feasibility Study," - unpublished report for AFWL - 1988.

Watts, A.J., T. Roemer, "OPUS Final Report," Ktech TR-88-0831, for AWE(A), England, August 1988.

Watts, A.J., T. Roemer, S. Richter, "OPUS-2D Gauge Testing and Evaluation: Mid-Term Status Report," UK-TR-88-0201, for AWE(A), England, Feb 1988.

Watts, A.J., S. Richter, "Antenna Window Technology Program," Ktech TR-88-14 - April 1989.

Watts, A.J., "PUFF-TFT Computer Code Development, Addendum: Cryogenic Updates," Ktech TR-90-14, September 1990.

Watts, A.J., "PRONTO-TFT Two-Dimensional Thin Film Transport Code Development," Ktech TR-90/19 - for AFWL, January 1991.

Watts, A.J. et al., "Spacecraft Microparticle Impact Flux Definition", UCRL-CR-108788, LLNL Purchase Order B157288, August 1991.

Watts A.J. et al., "Baffle Blow-off Transport Mechanisms", UCRL-CR-108787, LLNL, Purchase Order B157288, August 1991.

Watts A.J. et al., "Damage Areas on Selected LDEF Aluminum Surfaces", for W.J. Schafer Associates, Inc., under Prime Contract to SDIO, No. SC-89W-26-11, SDIO-89-C-0034, August 1992.

Watts A.J., Atkinson D., Coombs C., Crowell L., and Black M., "Optical Scatter due to Impact Effects", Proceedings of the 1992 SPIE Conference, Vol. 1761, July 1992.

Watts A.J. et al., "LDEF Data: Comparisons with Existing Models", for Lockheed ESC/NASA Johnson Space Center, Contract No. 960-12-171, SC 02N0165768, September 1992.

Watts, A.J., D. Atkinson and S. Rieco, "Dimensional Scaling for Impact Cratering and Perforation", NCR-188259, Lockheed ESC/NASA Johnson Space Center, Contract No. NAS9-17900, P.O. 02N0171219 (available from LDEF Science Office, NASA Langley Research Center), March 1993.

Watts A.J., Lapin S. and Shoultz R., "Calculation of Orbital Debris Impact Fluxes for a Range of Orbital Parameters", for the Brilliant Eyes program contractors, Subcontract No. 29-920005-72, on Prime Contract No. F29601-91-C-0071 (Phillips Laboratory), June 1993.

Watts A.J., Lapin S., and Shoultz R., "An Assessment of Micrometeoroid Impact Damage to Topaz", prepared for the Johns Hopkins University, Applied Physics Laboratory, July 1993.

Watts A.J., Shoultz R., Lapin S., Wagner J., and Atkinson D., "Quantified Uncertainties Concerning the Space Man-made Debris Environment for BE System Design", prepared for SAIC under Subcontract No. 29-920005-72, on Prime Contract No. F29601-91-C-0071 (Phillips Laboratory), July 1993.

Atkinson D., Watts A.J., Mulholland J.D., Lapin S., and Wagner J., "Meteoroid and Debris Monitoring: an Industry Summary", prepared for the Jet Propulsion Laboratory, July 1993.

Watts A.J., Lapin S., Shoultz R., and Rieco S., "Potential Impact Damage Effects for Solar Cells/Arrays", prepared for SAIC under Subcontract No. 29-920005-72 under Prime Contract No. F29601-91-C-0071 (Phillips Laboratory), August 1993.

Bloemker C., Rensner G., Kemp W., Watts A.J. and Rieco S., "LDEF Optics Handbook", prepared by SAIC/POD on Prime Contract No. F29601-91-C-0071 on behalf of the Phillips Laboratory, August 1993.

Watts A.J., Atkinson D., Crowell L., Tritz B., and Rieco S., "Impact Effects on Optics Survivability", Parts I, II and III, Subcontract No. 29-920005-72, on Prime Contract (SAIC) F29601-91-C0071 (Phillips Laboratory), December 1993.

Watts, A.J., and Atkinson, D. "Dimensional Scaling for Ductile Material Perforation Diameter," Final Report (1 of 2), Prepared for Lockheed Engineering & Sciences Co., Houston Texas, Subcontract 02N0100756, September 1994.

- Atkinson, D., Lapin, S.N., and Watts A.J., "Potential Impact Damage Effects for Short Mission Spacecraft in a Highly Elliptical Orbit," Final Report (2 of 2), Prepared for Lockheed Engineering & Sciences Co., Houston, TX, Subcontract 02N0100756, October 1994.
- Atkinson, D., Watts, A.J., and Hennessy, C.J. "The NCAP Program: Recommendations for A New Data Normalization and Analysis Model," Submitted to the Director, National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C., January 1995.