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Dr. Fildes has extremely strong problem-solving and analytical skills, excellent communications abilities, and decades of experience of successfully conveying, with credibility and confidence, highly technical issues to laypeople. He successfully tackles challenging technical problems and often sees key issues and devises approaches, which others have missed, through a combination of vast experience, extensive technical knowledge, skilled use of analytics, creativity, an excellent understanding of testing and analysis, and strong project management.

Professional Technical Profile

- A doctoral scientist who has organized, written proposals, conducted, and managed $28 million in funded projects including research, development, litigation expert witness investigations, and collaborations involving Government labs, large defense companies, and leading universities with funding from the Army, Navy, Defense Advanced Research Projects Agency, Great Lakes Composites Consortium, Gas Research Institute, Electric Power Research Institute, First Alert, ABB, Westinghouse, Bell Helicopter, Illinois Technology Development Authority, State of Illinois, and others.
- An expert in materials science, advanced composite materials, materials processing including process sensors and controls, materials compatibility, materials selection, protective coatings and lubricants, decorative coatings, coatings fabrication, semiconductor materials, gas sensors, tribology (the science of friction and wear), materials property modeling, corrosion, statistics, and experimental design.
- A uniquely qualified litigation expert witness whose extensive scientific experience coupled with broad experience with product and process design processes, the conduct of research and development, and innovation management, provides comprehensive insight of both the technical issues and their relation to R&D and design issues; specialization throughout his career on the role that materials contribute to the limitations and failures of products and systems.

Areas of Expertise

Product Failures: Friction; Abrasive Wear, Adhesive Wear, Testing, Friction Measurement, Wear Prevention, Lubricants, Oil Quality Monitoring, Solid Lubricants, Hard Protective Coatings, Decorative Coatings, Paint, Electroplated Coatings, Corrosion, Electrochemical Corrosion Measurement, Ice Prevention; Gas Sensors, Carbon Monoxide Detectors; Product Design.

Materials and Materials Processing Including Composites for Aviation, Buildings and Others: Thermoset and Thermoplastic Resins and Adhesives, Design and Fabrication, Processing, Repair, Resin Transfer Molding, Vacuum Assisted Resin Transfer Molding, Autoclaving, Composites in Aircraft and the Infrastructure, Impedance Spectroscopy; Use of Composite Materials and Spray Foams Made On-Site In Building Construction, Roadways Chip Sealing, Intelligent Process Control.

Chemistry, Chemical Processes: Chemical Spills And Accidents; Prediction Of Materials Properties, Stability, And Compatibility; Chemical Exposure; Chemical Process Equipment Failures.

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R&D and Industrial Experience

Tribology (Friction, Wear, Corrosion, and Materials Compatibility)

Dr. Fildes offers clients the ability to see problems in ways other have missed based on experience that spans broad knowledge of materials (metals, plastics, composites, ceramics, coatings), the relationship between materials processing and properties and performance, industrial problem solving and failure analysis, testing, product development and design.

- Served as the principal investigator for a multimillion-dollar, multi-year project funded by the U.S. Army to analyze the failures of weapons due to abrasive wear and to evaluate coatings and lubricants and develop new friction and wear test methods for improving the functioning of weapons.
- Conducts failure analysis and diagnostics of the underlying basis for materials related performance issues with machinery and weapons systems.
- Led the failure analysis of a bearing failure in a power plant.
- Tests materials and equipment performance relative to friction, wear, and corrosion behavior.
- Developed superior methods and equipment to screen the friction, wear, and corrosion behavior of materials, coatings, lubricants, and fuels.
- Determined the reason adhesive wear testing was producing results contrary to expectations based on materials science and helped a process equipment supplier revise the test protocol and establish performance data to support a product introduction.
- Helped a client understand the reasons for galling of stainless-steel components in a product fabrication machine and identified alternative materials and coatings to prevent the problem.
- Conducted R&D in plasma-assisted CVD and fabrication of diamond-like and organometallic coatings for tribological applications.
- Developed patented cutting tool wear monitors, led the automation and statistical analysis activities for a tribology lab, and conducted tribology evaluations, many technology reviews, product evaluations, and R&D strategy assessments for industrial customers and trade associations.

Composite Materials

Dr. Fildes' offers clients a comprehensive experience of composites, including fundamental properties, the relationship between processing and properties, R&D, structure design and fabrication.

- Developed advanced composite materials and their processing methods and equipment under funding from the U.S. Navy and The Great Lakes Composites Consortium and the Navy.
- Designed and demonstrated complex structures that incorporate advanced materials and model-based design methods under funding from the Special Operations Command.

- Conducted R&D on control systems for composites fabrication that incorporate artificial intelligence technology, transducers, and measurement instrumentation under funding from the Great Lakes Composites Consortium, the Army, and the Navy.
- Conducted R&D in surface science including coatings and modeling methods.
- Established and co-directed Northwestern University's federally-funded Advanced Composite Materials Intelligent Processing Center. The Center was a highly successful collaboration involving University staff and professors, Packer Technologies International, McDonnell Douglas (now part of Boeing), Production Products (a St. Louis DoD Manufacturer), the Office of Naval Research, the Naval Air Warfare Center, and the Naval Sea Warfare Center.
- Led the equipment, sensors and controls, and processing activities of the Great Lakes Composites Consortium's (GLCC) teaching factory, and oversight of GLCC's composites repair training program at the Great Lakes Naval Training Center.
- Demonstrated the use of composites in infrastructure applications under funding from the Defense Advanced Research Projects Agency in the Technology Reinvestment Program, in which only 3% of proposals were funded. Dr. Fildes organized and managed a collaboration involving Northwestern University, the University of Kentucky, and several companies to design and fabricate a composite pedestrian bridge and lift-bridge composite sidewalk panels.
- Applied inorganic resin composites for structural use under industrial funding.
- Conceived of and developed innovative composite materials approaches to ballistic armor, and as alternatives to high strength concrete.

Semiconductor Materials and Devices, Sensors, and Measurement Technology

Dr. Fildes offers clients a strong knowledge of the physics and chemistry of materials used in sensors and electronic devices, semiconductor device physics and characterization, measurement science, sensor device design, and signal processing including statistics, fuzzy logic, and neural networks.

- Co-invented with Northwestern University's Feinberg Cardiovascular Institute and Medical School of methods and instrumentation to monitor, control, and improve balloon angioplasty under industrial funding.
- Prepared the Gas Research Institute's (GRI) R&D plan for control of combustion and industrial processes, and the plan's recommendations were reflected in GRI's R&D solicitations. As part of this activity, Dr. Fildes organized an industry workshop, identified emerging technology, and established industry issues and priorities.
- Developed innovative semiconductor gas sensors under funding from The Gas Research Institute, the Electric Power Research Institute, and First Alert.

Product Design and Research and Development

Dr, Fildes offers clients experience with developing and leading design processes for structures, products, and processes, and with combining science with engineering and modern model-based design methods including use of finite element analysis.

- Led the start-up of the not-for-profit research institute that has conducted millions of dollars of highly successful Government funded projects.
- Led the startup of a model-based product design business that established a customer base of inventors, start-up product companies, and several large established companies, and established a run rate of $3 million in revenues within the first six months of operation.
- Managed a multiyear, multimillion-dollar collaboration of Northern Illinois University, the Falex Corporation, the U.S. Army's TACOOM (Detroit, Michigan), the Army's Armament Research, Development and Engineering Center (ARDEC, Picatinny Arsenal), the Army's Benet Weapons Laboratory, PM Solider Weapon, other Army program offices, and the small arms industry that led to a thrust to establish an Army Center of Excellence in friction and wear of weapons.
- Led a group of 28 scientists (most with advanced degrees) at Northwestern University that conducted about $3 million annually of Government and industry funded research and consulting. Oversaw the group's involvement in Northwestern University's federally funded Infrastructure Technology Institute, which included several collaborations with various state Departments of Transportation and the development of an automated pothole repair vehicle.
- Managed the design of a combustible gas analyzer.

Expert Witness Investigations

Dr. Fildes' litigation-related scientific consulting and investigations based on the fusion of analytics and physical chemistry encompass failures, accidents, and IP in all types (buildings, roadway, aviation medical, etc.) of materials, materials processing, chemical and industrial processes, thermodynamics and process heating equipment, chemical reactivity and kinetics, chemical compatibility, water treatment, and electrochemistry and corrosion.

- Investigated several different issues related to possible FTC actions and potential recalls, including Li-ion battery electrochemistry and failures, overheating failures of crimp connectors, unexpected ignition of matches, and false alarms by carbon monoxide detectors in an incident that received much publicity.
- Investigated complex multidisciplinary scientific issues related to a several millions dollars of loss potential case involving the residuals produced by a water treatment process that involved applying analytics to determine exposure risk, modeling the treatment process chemistry to assess the adequacy of regulatory testing, and testing of the residual's physical properties to determine its potential for release to the environment. Settlement was initiated by the other side after submission of my report.
- Investigated complex multidisciplinary scientific issues related to a tens of millions dollars of loss potential case involving the structural failure of a 100 foot long high temperature

kiln, which involved modeling the thermodynamics of the kiln and the thermodynamics of the burners' dependence on the composition of the natural gas feed, modeling the composition changes of the natural gas as it transited the distribution system, and establishing the performance of the refractory brick at high temperatures. This case settled on the basis of my report without need for a deposition.

- Investigated complex multidisciplinary scientific issues related to a several millions dollars of loss potential case involving the aggregates and asphalt involved in failure of a road resurfacing material on tens of miles of roadway and of investigation of its installation process that involved applying experience with composite materials to establish the responsibility of various parties, data analytics and data modeling to establish the impact of the aggregate's gradation, analysis of patent literature to establish the chemical properties and compatibility of a proprietary asphalt binder, and application of chemical principles to establish the cause and origin of the failure. Was the only expert for the defense and I provided deposition and trial testimony with the jury finding for the defense.
- Investigated issues related to the volatility of lubricants. Provided deposition testimony. My report and depositions have resulted in the settlement of numerous related cases.
- Investigated complex multidisciplinary scientific issues related to a several millions dollars of loss potential case involving the the chemistry of the reprocessing of PCB containing transformer oil and the stress corrosion cracking of stainless-steel equipment used in the process. Provided deposition testimony for the defendant in a business to business dispute that led to the plaintiff asking to settle the matter.
- Investigated the chemistry, processing, and measurement of properties of spray polyurethane foam (SPF) relative to odors and flammability. Conducted extensive testing involving foam installation, chemistry, odor, and flammability, which was used in part relative to a class action.
- Investigated the expansion and contraction properties of an engineered wood building product, modeled the performance of the product under the prevailing conditions, and provided a report and presentation in a mediation.
- Investigated several cases involving determination of the cause of delamination of composite helicopter blades due to manufacturing issues and thermally induced damage to an adhesive from a repair procedure. Reviewed manufacturing logs and identified deviations from specified procedures, conducted field inspections, performed instrumented laboratory simulations of a repair procedure coupled with FEA thermal modeling, and provided deposition testimony.
- Investigated the cause of the failure of a composite glider wing. Conducted a complex inspection of the severely damaged wreckage and identified the cause of the failure.
- Investigated various corrosion incidents involving aircraft structures and brakes.
- Investigated issues related to the performance of aggregates, asphalt, and concrete used in a recreation facility floor. Provided deposition testimony.
- Investigated the chemistry of cleaning products, and their use and relationship to an accident. Provided deposition testimony.

- Investigated issues related to equipment failure in a steel process.
- Investigated issues relative to the failure of plumbing components.
- Provided deposition testimony on statistical methods and sampling required to meet the Daubert standard for expert witness testimony in a condo unit repair case. Served as a consulting expert on statistical sampling and analysis methods for a case involving mediation.
- Investigated patent infringement issues involving a medical respiration device. Determined the way the alleged infringing device operated, instrumented both devices, and performed sophisticated testing that clearly established the similarities and differences in an easy to understand and compelling manner.
- Served as a designated expert on a case involving a trade secret chemical formulation.
- Investigated the design process for determining if a steel beam saw conformed to specifications and acceptance criteria. Provided deposition testimony.
- Investigated the design process and determined why a carbon monoxide detector failed to alarm.

Professional Business Profile

- A CEO who has led established for-profit companies, startups, and a not-for-profit institute.
  - **CEO** of an $18 million professional engineering firm (Packer Engineering) with over 130 staff members, having taken this company through the $10 million barrier and more than doubling revenues in three years; **President** of a not-for-profit institute (Institute of tribology and Coatings) **and founder and leader** of its for-profit scientific and engineering consulting subsidiary (ITC Experts), having taken these organizations from concept to annual revenues of over $6 million and a staff of over 25, and complying with professional licensing requirements, Government FARS and audits, and insurance industry reporting requirements; **Leader** of a startup product design firm (Packer Technologies Inc.), having merged two companies to achieve a run rate of $3.5 million within six months; **A leader** of a $10 million contract research laboratory at Northwestern University; **A senior professional** in the Roy C. Ingersol Corporate Research Center of the $4.5 billion Borg-Warner Corporation.
- A doctoral-level scientist with superior business analytical skills and extensive experience who understands the numbers and what is behind them. A unique and deep experience with handling litigation related issues. 50 published papers, reports, and presentations, and three patents.
- A top-notch proposal developer, grant writer, and project manager, and an expert on multi-disciplinary collaborations.
  - Originated, wrote the proposals and grants, organized the teams, and managed over $27.5 million in projects including collaborations involving Government labs, large

defense companies, and leading universities with funding from Government agencies, trade associations, and companies.

- Expert at bridging organizational and geographic barriers, having developed effective processes and tools to adapt Procter & Gamble's "Connect and Develop" strategy as the collaborative operational model that took a not-for-profit institute and its for-profit subsidiary from a concept to over $6 million in annual revenues, over 25 staff members, and hundreds of projects annually.

Employment

- **Fildes Scientific Consulting.** *Science-based technical investigations for litigators, insurers, and R&D in materials, chemistry, processes, product failures, accidents, and IP*,
- **Solution Engineering Group**. Litigation-related technical projects.
- **Spotlight Business Consulting LLC**, founder and President. Litigation-related technical projects conducted through the Solution Engineering Group or Falex Technical Investigations. Business consulting focused on execution.
- The **Institute of Tribology and Coatings** (a 501(c)3 not-for-profit materials science research institute), 2005 to 2015, President. **ITC Experts** (a for profit science and engineering services firm), founder and President, 2007 – 2015.
- **The Packer Group/Packer Engineering**, 1997 to 2005, CEO, COO, Chief Scientist.
- **Northwestern University, Basic Industries Research Lab**, 1991 to 1997, Group Manager – Materials Processes, Manufacturing, Sensors, and Controls; Senior Research Scientist.
- **IIT Research Institute**, Director of Sensor Technology, Senior Program Manager, Senior Science Advisor.
- **The Roy C. Ingersol Research Center of the Borg-Warner Corporation**, Corporate Scientist, Senior Research Scientist, Senior Chemist.

Education

- **Virginia Polytechnic Institute and State University:** Postdoctoral Research Associate, Chemical Engineering.
- **Virginia Polytechnic Institute and State University:** Ph.D., Chemistry (Physical).
- **Georgetown University:** B.S., Chemistry.
- **Texas Instruments Learning Institute**, Design for Six Sigma Manufacturability.
- **Borg-Warner Corporation**, Research, Development, and Engineering Management Program.
- **The American Supplier Institute**, Five Day Course in Quality Engineering, Methodology, and Application, Based on the Work of Dr. Genichi Taguchi.
- **Massachusetts Institute of Technology**, Special Summer Program in Microsensors.

- **Battelle Memorial Institute**, Course in Advanced Management Practices.
- **Battelle Memorial Institute**, Course in Engineer as Manger.
- **American Vacuum Society**, Certificate of Training in An Overview of Thin Film Deposition and Etching Processes.

Other Background

- Served as a reviewer and on-site visit panels in manufacturing technology for the National Science Foundation in the Engineering Research Centers Program.
- Workshop panel member for the National Materials Advisory Board.
- Invited speaker at DARPA and SAMPE workshops.
- Over 50 published (or in process) papers, reports, and presentations, and three patents.

Publications

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A. Nagaraj, J.M. Fildes, C.J. Davidson, L. Mockros, D.D. McPherson, “Characterization of Vascular Acoustic Emission During Angioplasty Using Catheter-Based Sensor,” U.S. Patent 5,957,950, September 28, 1999.

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