Exponent®
Engineering & Scientific Consulting

Jan Swart, Ph.D., CFEI, CVFI

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Professional Profile

Dr. Swart applies engineering and science principals in the analysis, investigation, understanding, and prevention of automotive, industrial and consumer product failures. His vast failure analysis investigation experience helps his clients to quickly and efficiently understand failure modes, failure mechanisms and failure trends. This information is then used to evaluate safety risks as well as drive product design improvements.

Dr. Swart is also internationally recognized as a battery expert. Battery technology is complex and multidisciplinary. Due to his extensive background in electronic and electrical failure analysis, Dr. Swart is unique in that he can combine his battery design knowledge with his failure analysis knowledge and thus provide his client s with in-depth and unique technical consulting services.

Dr. Swart has successfully supported many clients by providing new technology battery system consulting support by assisting his clients to rapidly build a technology knowledgebase, evaluate their current designs against state of the art in the industry, develop robust specifications, provide manufacturing support through auditing manufacturing processes and evaluating vendor failure analysis capabilities and processes.

Dr. Swart offers his client's expertise in three areas, namely, failure analysis, safety design consulting and new technology consulting support.

He is currently providing consulting services to the Automotive industry, Electronic Nicotine Delivery System (ENDS devices or eCigarettes) Industry, Portable consumer product industry, Telecommunication Industry and Utility industry

Prior to joining Exponent, Dr. Swart presented lectures on Electronics and Control Systems in South Africa and served as a member of a tertiary College Executive Council. He spent two years in renewable energy research in South African and Germany. He has held various technical and research positions in South Africa, Germany and the USA.

Academic Credentials & Professional Honors

Ph.D., Engineering Management, California Coast University, 2011

Masters Diploma, Technology, Cape Peninsula University of Technology, South Africa, 1996

National Higher Diploma, Electrical Engineering, Cape Peninsula University of Technology, South Africa, 1992

National Diploma, Electrical Engineering, Cape Peninsula University of Technology, South Africa, 1991

Licenses and Certifications

Certified Fire and Explosion Investigator, CFEI

Certified Vehicle Fire Investigator, CVFI

Professional Affiliations

IEEE Senior Member - 2018

Patents

Six patents recognized at Dell Computers.

United States Patent Application United States Patent Application 20100065637: Testing protocols for extended functionality cards.

Publications

Books

Loznen S, Bolintineanu C, Swart J. Electrical Product Compliance and Safety Engineering. Artech House. ISBN 13:978-1-63081-011-5, 2017.

Book Chapters

Arora A, Medora NK, Livernois T, Swart J. Safety of lithium-ion batteries for hybrid electric vehicles. In: Electric and Hybrid Vehicles Overview Power Sources, Models, Sustainability, Infrastructures and the Market. Pistoia G (ed), Elsevier B.V., in press 2010.

Selected Publications

Swart J. Lithium Ion Batteries and Fires Investigations. International Symposium on Fire Investigation (ISFI), Itasca, Illinois, 2018.

Swart J, Harrington R, Rajamani V, Kingsley D. The quiet transformation of vehicles without computers, to computers on wheels. IEEE Symposium on Product Compliance Engineering, San Jose, CA, 2017.

Dalal S, Swart J, Pinnangudi B. IEEE 1625 and battery powered products. IEEE Symposium on Product Compliance Engineering, San Diego, CA, 2011.

Pinnangudi B, Dalal SB, Medora NK, Arora A, Swart J. Thermal shutdown characteristics of insulating materials used in lithium ion batteries. IEEE Symposium on product compliance engineering, Boston, MA, October 2010.

Dalal S, Swart J, Pinnangudi B. IEEE 1725 and battery powered products. IEEE Symposium on Product Compliance Engineering, Toronto, Canada, 2009.

Swart J, Slee D, Loud J. Arcing and fires — Case studies. IEEE Symposium on Product Compliance Engineering, Toronto, CA, 2009.

Slee D, Stepan J, Wei W, Swart J. Introduction to printed circuit board failures. IEEE Symposium on Product Compliance Engineering, Toronto, CA, 2009.

Swart J, Slee D. Failure analysis methodology for battery powered product incidents. IEEE Symposium on Product Compliance Engineering, Austin, TX, 2008.

Arora A, Medora N, Swart J. Failures of electrical/electronic components: Selected case studies. IEEE Symposium on Product Compliance Engineering, Longmont, CO, 2007.

Swart J, Edmonds J, Arora A, Dalal S. Case studies of electrical motor and generator failures. Failures 2007, South Africa, 2007.

Swart J, Arora A, Megerle M, Nilsson S. Methods for measuring the mechanical safety vent pressure of lithium ion cells. IEEE Symposium on Product Safety and Compliance Engineering, Irvine, CA, 2006.

Swart J, Arora A, Nilsson S, Ross B. Case studies of electrical component failures. Failures 2006, South Africa, 2006.

Swart J, Arora A, Nilsson S. Characterizing the performance of battery chemistries used to power a single-person vehicle. 6th International Advanced Automotive Battery and Ultracapacitor Conference, Baltimore, MD, 2006.

Swart J, Arora A, Nilsson S, Xu Y. Going beyond industry standards in critically evaluating Lithium-ion batteries. Advancements in Battery Charging, Monitoring and Testing, Vancouver, Canada, 2005.

Swart J, Arora A, Nilsson S, Xu Y. Characterizing the vent operation of Lithium-ion cells and battery packs. 5th International Advanced Automotive Battery (and Ultracapacitor) Conference, Hawaii, 2005.

Swart J, Arora A, Nilsson S, Xu Y. Lithium-ion batteries for hybrid electric vehicles. A safety perspective. 5th International Advanced Automotive Battery (and Ultracapacitor) Conference, Hawaii, 2005.

Swart J, Wu J, Zumwalt R, Birdsley J. Case studies of IR based rapid PC motherboard failure analysis. ISTFA, Phoenix, AZ, 2002.

Selected Posters and Presentations

Swart J. Lithium Ion Batteries and Fires Investigations. International Symposium on Fire Investigation (ISFI), Itasca, Illinois, 2018.

Swart J. Five good practices to minimize your lithium ion battery failure risks. Battery Power 2017, Dallas TX, 2017.

Swart J, Harrington R, Rajamani V, Kingsley D. The quiet transformation of vehicles without computers, to computers on wheels. IEEE Symposium on Product Compliance Engineering, San Jose, CA, 2017.

Swart J, Bourton D. Electronic cigarettes and battery standards. IEEE Symposium on Product Compliance Engineering, Anaheim, CA, 2016.

Swart J, Spray R. Float charging and its effects on lithium-ion cells - What can we learn? 18th International Meeting on Lithium Batteries, Chicago, 2016.

Swart J. Electronic Product Component Failure Mechanisms. IEEE EMC Society Symposium, Dresden, Germany, 2015.

Swart J, Spray R. Float Charging and its Effects on Lithium Ion Cells - What can we learn? Battery Power

2015, Denver CO, 2015

Swart J, Spray R. Latent defect characterization using Lithium ion cells. IEEE Symposium on Product Compliance Engineering, San Jose, CA, 2014.

Swart J. Lithium ion batteries 101 - What drives the safety design? Battery Power 2014, Denver CO, 2014.

Yount L, Swart J. The strive for Zero Defect — How to design fail safe control systems in critical subsystems. IEEE Symposium on Product Compliance Engineering, Austin, TX, 2013.

Swart J. Large format batteries and latent defect testing. Battery Congress 2012, Ann Arbor, MI, 2012.

Swart J. Lithium ion batteries and safety: What can we learn? MD&M West 2012, Conference, Anaheim, CA, 2012.

Swart J. Electric vehicles - A view from the past. IEEE Symposium on Product Compliance Engineering, Portland, OR, 2012.

Swart J. Battery failures: A perspective on battery system failures and test development. MD&M Minneapolis 2011 Conference, Minneapolis, MN, 2011.

Swart J, Dalal S, Pinnangudi B. Custom cell abuse tests. The Battery Show, Detroit, MI, 2011.

Swart J, Shkolnikov Y. Electrical shock and the electric powered vehicles — An introduction. IEEE Symposium on Product Compliance Engineering, San Diego, CA, 2011.

Swart J. Battery failures: A perspective on battery system failures and test development. 8th MIT Workshop on Fracture Mechanics and Battery Modeling, MIT Cambridge, MA, 2011.

Swart J, Dalal S. Custom cell abuse testing — How were the tests performed? Advanced Automotive Battery Conference, Mainz, Germany, June, 2011.

Swart J. Panel 2: Emerging battery technologies and stationary applications. 15th Annual Battcon ® 2011 International Battery Conference, Orlando, FL, 2011.

Swart J. The electrification of vehicles: An introduction into Lithium ion batteries. IEEE PSES Symposium, Boston, MA, October, 2010.

Swart J. The battery in your product failed — What now? The Battery Show, San Jose, CA, October, 2010.

Dalal SB, Swart J. Your product's battery failed — What now? Battery Power Conference 2010, Dallas, TX, October, 2010.

Swart J, Dalal S, Pinnangudi B, Medora NK, Arora A. Lithium ion battery standards. 10th Annual International Advanced Automotive Battery Conference and Symposia, Orlando Florida, May 17-21, 2010.

Stewart S, Horn Q, Budiansky N, White K, Mikolajczak C, Wu M, Swart J. Optimizing design, charging algorithm and predicting useful life by electrochemical modeling. AABC 09 - Advanced Automotive Battery & EC Capacitor Conference, Long Beach CA, 2009.

Swart J, Arora A. Characterizing regenerative braking in a micro hybrid vehicle. AABC 09 - Advanced Automotive Battery & EC Capacitor Conference, Long Beach CA, 2009.

Arora A, Medora N, Swart J. Arc faults in hybrid and high voltage automotive electrical systems. AABC 09 - Advanced Automotive Battery & EC Capacitor Conference, Long Beach CA, 2009.

Swart J, Slee D. Failure analysis methodology for battery powered product incidents. IEEE Symposium on Product Compliance Engineering, Austin, TX, 2008.

Swart J. Constraint based product component safety evaluation. IEEE Symposium on Product Compliance Engineering, Longmont, CO, 2007.

Arora A, Swart J. Design review of a lithium-ion battery powered product. IEEE Symposium on Product Compliance Engineering, Longmont, CO, 2007.

BenKinney M, Arora A, Swart J. The influence of regulatory changes on unique product designs. IEEE Symposium on Product Compliance Engineering, Longmont, CO, 2007.

Swart J, Edmonds J, Arora A, Dalal S. Case studies of electrical motor and generator failures. Failures 2007, South Africa, 2007.

Swart J, Arora A, Nilsson S. Lithium ion batteries for micro photovoltaic power systems. Lithium Mobile Power, San Diego, CA, 2007.

Arora A, Megerle M, Swart J, Nilsson S. Methods for measuring the mechanical safety vent pressure of lithium ion cells. IEEE Symposium on Product Safety and Compliance Engineering, Irvine, CA, 2006.

Swart J, Arora A, Nilsson S, Ross B. Case studies of electrical component failures. Failures 2006, South Africa, 2006.

Swart J, Arora A. Is lithium ion chemistry viable as a renewable energy storage medium in a micro photovoltaic power system? Advancements in Battery Charging, Monitoring and Testing, Chicago, IL, 2006.

Swart J, Arora A, Nilsson S, Xu Y. Lithium-ion batteries for hybrid electric vehicles: A safety perspective. 5th International Advanced Automotive Battery (and Ultracapacitor) Conference, Hawaii, 2005.

Swart J, Arora A, Nilsson S, Xu Y. Going beyond industry standards in critically evaluating lithium-ion batteries. Advancements in Battery Charging, Monitoring and Testing, Vancouver, Canada, 2005.

Arora A, Swart J, Nilsson S, Xu Y. Characterizing the vent operation of lithium-ion cells and battery packs. 5th International Advanced Automotive Battery (and Ultracapacitor) Conference, Hawaii, 2005.

Swart J, Wu J, Zumwalt R, Birdsley J. Case studies of IR based rapid PC motherboard failure analysis. ISTFA, Phoenix, AZ, 2002.

Swart J. The unexploited low-heat hydro power in Germany using existing weirs. Karlsruhe University, Germany, 1994.

Project Experience

Vehicle sensor failure investigations.

Electric vehicle fire investigations.

Defense Advanced Research Projects Agency, Tactical Technology Office, Solicitation Number: BAA-15-27. Title: Portable/Automotive Lithium Ion Battery Fire Virus.

Consumer product and hybrid vehicle battery consulting and failure analysis.

Cell, battery, and system safety testing of Lithium ion cells and battery packs.

Development of safety testing protocols of pre-production lithium ion cells and lithium ion battery packs.

Development of thermal chamber thermo electric heat pumps.

Development of safety testing protocols for pre-production power supplies, i.e. switch mode, fly-back, DC-DC.

Safety testing and analysis of pre-production power supplies, i.e. switch mode, fly-back, DC-DC.

Electronic component failures and circuit board combustion failure analysis.

Electrical house fire investigations; household electrical product fire investigations.

Electrical outdoor fire investigations.

Power supply testing and failure analysis.

Computer equipment testing and failure analysis.

Laboratory inspections of failed products and equipment.

Power failure investigations.

Stray Voltage, shock, and electrocution investigations.

Chiller fire investigations.

CPSC investigations - product safety testing and evaluation.

MIL STD 217-stress analysis on electronic components.

Design of specialized electronic testing and measuring equipment.

Evaluating and writing specifications and safety specifications for products.

CTIA BCRO and CATL Battery testing.

IEEE 1725 and IEEE 1625 conformance testing.

UN (section 38.3 - Lithium Batteries) compliance testing.