



Exponent[®]
Engineering & Scientific Consulting

Jacques De Beer, Ph.D.

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Professional Profile

Dr. De Beer leverages his knowledge of fire protection engineering, fire dynamics, and material flammability principles to analyze fire protection and life safety systems and enclosure fire behavior, as well as to evaluate the burning behavior of various materials. Dr. De Beer has practical experience designing and performing fire experiments used to evaluate the pyrolysis, ignition, and flame spread behavior of a myriad of materials. He also has experience developing numerical pyrolysis models used to emulate the thermal decomposition and burning behavior of condensed-phase materials under a wide range of external heating conditions. Dr. De Beer has industry experience as a Fire Investigation Technician (IAAI-FIT), conducting origin-and-cause investigations for residential, commercial, and industrial fire and explosion events.

Dr. De Beer is familiar with large-, and bench-scale standardized fire tests such as those published by ASTM International (formerly American Society for Testing and Materials), International Organization for Standardization (ISO), and Underwriters Laboratories (UL). Dr. De Beer has experience conducting and analyzing cone calorimetry (ASTM E1354), microscale combustion calorimetry (ASTM D7309), and polymer flammability testing (UL 94). Dr. De Beer has experience using thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), milligram-scale flaming calorimetry (MFC), and controlled-atmosphere pyrolysis apparatus (CAPA II).

Prior to joining Exponent, Dr. De Beer conducted material flammability research at the University of Maryland in the Department of Fire Protection Engineering. Dr. De Beer's graduate research included the quantification and modeling of ignition of common Wildland-Urban Interface structural materials when exposed to piles of glowing firebrands. This research included the evaluation of the ignition susceptibility of lignocellulosic materials when exposed to firebrand piles, quantification of firebrand pile thermal exposure under wind using a custom-built bench-scale wind tunnel, as well as the development and validation of numerical pyrolysis models.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Maryland, College Park, 2023

M.S., Fire Protection Engineering, University of Maryland, College Park, 2020

B.Eng., Chemical Engineering, University of Pretoria, South Africa, 2017

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

Professional Affiliations

Society of Fire Protection Engineers (SFPE)

National Fire Protection Association (NFPA)

International Association of Arson Investigators (IAAI)

National Association of Fire Investigators (NAFI)

National Fire Sprinkler Association (NFSA)

Publications

De Beer, JA, Dietz, EL, Stoliarov, SI, Gollner, MJ, An Empirical Firebrand Pile Heat Flux Model, Fire Safety Journal, 141, 2023, 104004, doi.org/10.1016/j.firesaf.2023.104004.

Filkov, AI, Tihay-Felicelli, V, Masoudvazir, N, Rush, D, Valencia, A, Wang, Y, Blunck, DL, Valero, MM, Kempna, K, Smolka, J, De Beer, JA, Campbell-Lochrie, Z, Centeno, FR, Asim Ibrahim, M, Lemmertz, CK, Tam, WC, A review of thermal exposure and fire spread mechanisms in large outdoor fires and the built environment, Fire Safety Journal, 140, 2023, 103871, doi.org/10.1016/j.firesaf.2023.103871.

De Beer JA, Alascio JA, Stoliarov, SI, Gollner, MJ. Analysis of the Thermal Exposure and Ignition Propensity of a Lignocellulosic Building Material Subjected to a Controlled Deposition of Glowing Firebrands. Fire Safety Journal. 2022. 135, pp. 103720–103720, doi:10.1016/j.firesaf.2022.103720.

Wang, Y, Wadhwani, R, Suzuki, S, Theodori, M, Asimakopoulou, E, De Beer JA, Flores, N, Asim Ibrahim, M, Johanna, H, Kempna, K, Manzello, SL, Sharma, A, Smolka, J, Wickramasinghe, A, Wu, AC, Xia, T, Case studies of large outdoor fires involving evacuations Part 2, Emergency Management & Evacuation (EME) Subgroup, Large Outdoor Fires & the Built Environment (LOF&BE) Working Group of the International Association for Fire Safety Science, 2022 July. doi:10.5281/zenodo.6544760.

De Beer JA, Raffan-Montoya F, Stoliarov SI. A Milligram-scale Flame Calorimeter Pyrolyzer System used to Emulate Burning of Nonthermally Thin Solid Samples. Fire and Materials. 2021; 46(1) 302 – 312, doi:10.1002/fam.2996.

De Beer JA, Focke WW. Oxidative degradation of polyolefins in the presence of cupric and ferric stearate additives. Macromolecular Symposia. 2019, 384(1), doi:10.1002/masy.201800149.

Presentations

De Beer, JA, Dietz, E, Stoliarov, SI, Gollner, MJ. Development of a Novel Transient Firebrand Pile Heat Flux Model, FM Global CFD Modeling Workshop, 2023.

De Beer, JA, Raffan-Montoya, F, Stoliarov, SI. Novel Design of a Milligram-scale Pyrolyzer system used to Emulate the Burning Behavior Exhibited by Cone Calorimetry-Sized Samples, ACS Fire and Polymers, 2022.

De Beer, JA, Alascio, JA, Stoliarov, SI, Gollner, MJ. Thermal Quantification and Ignition Study of Firebrand Pile-Exposed Wildland-Urban Interface Decking Materials, Eastern States Section of the Combustion Institute, 2022.

De Beer, JA, Alascio, JA, Stoliarov, SI, Gollner, MJ. Thermal Characterization and Ignition Study of Decking Materials Exposed to Firebrand Attack, IAFSS LOF&BE Student Seminar Series (Virtual), 2022.

De Beer, JA, Raffan-Montoya, F, Stoliarov, SI. Design of a Milligram-scale Pyrolyzer System used to

Emulate the Burning Behavior Exhibited by Cone Calorimetry Samples, ASTM International Symposium on Obtaining Data for Fire Growth Models, 2021.

De Beer, JA, Alascio, JA, Stoliarov, SI, Gollner, MJ. Thermal Characterization and Ignition Study of Western Red Cedar Exposed to Firebrand Attack. Oral Presentation, 12th Asia-Oceania Symposium on Fire Science and Technology (Virtual), University of Queensland, Australia, 2021.

De Beer, JA, Raffan-Montoya, F, Stoliarov, SI. Novel Design of a Pyrolyzer System used to Emulate the Burning Behavior Exhibited by Cone Calorimetry-Sized Samples. Annual SFPE Chesapeake Chapter Meeting (Virtual), Maryland, 2021.

De Beer, JA, Raffan-Montoya, F, Stoliarov, SI. Novel Design of a Milligram-scale Flame Calorimetry Pyrolyzer System used to Emulate the Burning Behavior Exhibited by Cone Calorimetry-Sized Samples, 12th U.S. National Combustion Meeting (Virtual), Texas A&M University, Texas, 2021.

De Beer, JA, Raffan-Montoya, F, Stoliarov, SI. Milligram-scale Flame Calorimeter Pyrolyzer System: Emulation of Burning Behavior of Non-thermally Thin Solid Samples. Poster Presentation, 13th International Symposium of Fire Safety Science (Virtual), University of Waterloo, Canada, 2021.

De Beer, JA. Proof of Concept: Thermal Imaging as an Alternative Method for Depth of Calcination Analysis. Poster Presentation, International Association of Arson Investigators International Training Conference, Texas, 2018.

Peer Reviews

Technical Reviewer, Fire & Arson Investigator Journal Scientific Review Committee, International Association of Arson Investigators