



Exponent[®]
Engineering & Scientific Consulting

Meghna Dhanji, Ph.D., CFEI

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Professional Profile

Dr. Dhanji focuses on applying the fundamentals of mechanical and aerospace engineering to investigations of incidents involving mechanical and combustion equipment failures, fires, explosions, and consumer products. She has expertise in heat transfer characterization, droplets atomization, combustion performance, and multi-phase flow physics. She has experience in the design, installation, and commissioning of experimental laboratories that include engine dynamometers, high-pressure systems, fuel injectors, programmable logic controls (PLCs), monitoring and data acquisition systems, and the design standards and regulations that are applicable to these systems. Her project experiences include collaborations with US Department of Energy, automotive and injector manufacturers, and fuel suppliers. She performed extensive experimental and CFD studies to understand the effects of fuel injection on droplets' distributions, fuel-air mixing processes, heat transfer of fuel films impinging on surfaces, fuel film evaporation rate, and flame and soot characterization.

Dr. Dhanji received a Ph.D. in Mechanical Engineering from Brunel University, London, as well as MEng (integrated Bachelors and Masters degree) in Aerospace Engineering also from Brunel University, London. Prior to joining Exponent, Dr. Dhanji was a Post-Doctoral Appointee at Sandia National Laboratories, where she worked on sustainable fuels for Aviation and Automotive applications, focusing on fuel injection and combustion performance using a range of thermal and optical diagnostics. She has setup high-speed telemetry system with fast response Thermocouple arrays to obtain high spatially and temporally resolved temperature and heat flux trends of fuel impinging on surfaces. She has performed a series of optical diagnostic techniques ranging from low-coherence interferometry (LCI) for film thickness quantification, Diffused-Backlight Illumination (DBI) for simultaneous soot characterisation and high-speed visualization, Laser Induced Fluorescence (LIF), particle image velocimetry (PIV) and laser Doppler velocimetry (LDV) for fuel spray, atomization and in-cylinder flow studies. She has conducted extensive analysis on health and safety risks, written reports, and designed appropriate systems to mitigate these risks in lab-based environments containing high pressure and temperature vessels, mixed chemicals and Class 3 and 4 lasers. She has also designed and tested prototype boilers during her internship at Worcester Bosch Thermotechnology.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Brunel University, UK, 2021

M.E., Aerospace Engineering, Brunel University, UK, 2016

W. R. Marshall Award for best overall conference paper, ILASS Americas 2024

STEM Masterclass Speaker at Royal Institution

Vice-Chancellor's travel prize for Postgraduate research students

Mechanical Engineering Student Ambassador Award

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER) (FL)

Certified Fire and Explosion Investigator (CFEI)

Academic Appointments

Postdoctoral Appointee, Sandia National Laboratories, 2021 - 2023

Graduate Teaching Assistant, Mechanical and Automotive Engineering, Brunel University, 2016 - 2018

Prior Experience

Associate in Thermal Sciences, Exponent, 2023 - present

R&D Design and Testing Intern, Worcester Bosch Thermotechnology, 2013 - 2014

Professional Affiliations

National Association of Fire Investigators (NAFI)

The American Society of Mechanical Engineers, Transportation Systems Division (ASME TSD) – Executive Committee, Student & Early Career Lead

Publications

Dhanji, M., Nguyen, T., Luna, S., Buen, Z., Soriano, B., Pickett, L., Manin, J. 'Spray-wall Interactions: a Study of Impinging Sprays on Transient Thermal Loading and Fuel Film Deposition', ILASS Europe 2023, 32nd Conference on Liquid Atomization and Spray Systems, 4-7 Sept 2023, Napoli, Italy

Dhanji, M., Buen, Z., White, L., Pickett, L., Manin, J. 'A Study of Impinging Spray G on Transient Thermal Loading and Fuel Film Deposition', ILASS Americas 33rd Annual Conference on Liquid Atomization and Spray Systems, May 22-25, 2022

Dhanji, M., White, L., Nguyen, T., Pickett, L., Manin, J. 'A Study of Thermal Characteristics and Fuel Film Evaporation of Fuel Sprays Impinging on a Surface', ILASS Americas 32nd Annual Conference on Liquid Atomization and Spray Systems, May 22-25, 2022

Tagliente, F., Nguyen, T., Dhanji, M., Sim, H., Pickett, L., Manin, J., Kukkadapu G., Whitesides, R., Wan, K. 'The role of cool-flame fluctuations in high pressure spray flames, studied using high-speed optical diagnostics and Large-Eddy Simulations', PROCI-D-22-01227, The 39th International Symposium on Combustion

Dhanji, M. and Zhao, H. 'Studies of a Split Injection Strategy in a GDI Engine via Cycle-resolved PIV Measurements', SAE International Journal of Fuel and Lubricants; Warrendale Vol 14, Iss. 2, 2021

Dhanji, M. and Zhao, H. 'Investigations of Split Injection Properties on the Spray Characteristics Using a Solenoid High-pressure Injector', IJER-20-0211

Dhanji, M. and Zhao, H. 'Effect of a Split-injections Strategy on the Atomisation Rate for Charge

Stratification using a High-pressure Gasoline Multi-hole Injector', SAE Technical Paper 2020-01-0322, 2020.

Presentations

Dhanji, M., Buen, Z., White, L., Pickett, L., Manin, J. 'A Study of Impinging Spray G on Transient Thermal Loading and Fuel Film Deposition', ILASS Americas 33rd Annual Conference on Liquid Atomization and Spray Systems, Albuquerque, NM, May 22-25, 2022

Dhanji, M., White, L., Nguyen, T., Pickett, L., Manin, J. 'A Study of Thermal Characteristics and Fuel Film Evaporation of Fuel Sprays Impinging on a Surface', ILASS Americas 32nd Annual Conference on Liquid Atomization and Spray Systems, Madison, WI, May 22-25, 2022

Dhanji, M., White, L., Nguyen, T., Pickett, L., Manin, J. 'Spray-wall Interactions: Thermal Characteristics of Fuel Sprays Impinging on a Surface', Engine Combustion Network, Detroit, April 2022,

Dhanji, M. and Zhao, H. 'Spray Characterisation of a Split-injection Strategy using a High-pressure Gasoline DI Injector', Powertrains, Fuel and Lubricants, JSAE, Kyoto, Japan, 2019.

Project Experience

Undertook a combined experimental and CFD simulations campaign funded by US Department of Energy and collaborating US National Laboratories. This was to study, and subsequently simulate, the effects of fuel injection during engine cold starts on the fuel mixing process, heat transfer of fuel films impinging on in-cylinder surfaces, fuel film evaporation rate, and flame and soot characterization.

Peer Reviews

Society of Automotive Engineers (SAE)

International Journal of Engines Research (IJER)