

Exponent®
Engineering & Scientific Consulting

May Yen, Ph.D., P.E., CFEI

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Professional Profile

Dr. Yen is a mechanical engineer in Exponent's Thermal Science Practice with a background in combustion, heat transfer, thermodynamics, and fluid dynamics. She specializes in multidimensional modeling and computational analysis of complex systems including industrial equipment, combustion system and fluid & heat transfer equipment with focus on failure analysis and fire and explosion investigations.

Dr. Yen has experience on consequence analysis associated with flammable releases and vapor cloud explosions in Oil & Gas facilities including performing facility evaluations for permitting and planning purposes. She specializes in computational modeling, using computational tools including FLACS, StarCCM+, and Ansys Fluent.

Dr. Yen has performed proactive burn injury hazard analysis for wearables, consumer electronics, and biomedical devices. She is also experienced in the analysis and investigation of scalds, burn injuries, and frostbite.

Dr. Yen regularly performs computational fluid dynamics(CFD) for biological flows such as heart pumps, specialized catheters, IV infusion devices, and blood oxygenators.

Dr. Yen has extensive experience in turbulent diffusion flames, soot formation for direct injection engine applications and performance and emission evaluations of diesel engines in test cells. She is proficient at coding in Fortran, C, Python, and MATLAB as well as parallelizing code with MPI (Message Passing Interface) and OpenMP. Dr. Yen regularly utilizes CAD software (Solidworks, Catia, ProE, Spaceclaim).

Prior to joining Exponent, Dr. Yen was a manager at a contract manufacturing company specializing in CNC machining of large engine components such as cylinder blocks, heads, main bearing caps, and connecting rods. Dr. Yen performed her PhD research at Purdue University where she conducted multidimensional modeling of turbulent diffusion flames for diesel engine applications. She assessed the effect of exhaust gas recirculation, combustion chamber temperature, and injection pressure on fuel-air mixing and soot formation under direct injection engine conditions. Dr. Yen's work focused on evaluating and developing soot models that were experimentally validated across several regimes and fuels types. Additionally, she has experience in evaluating performance and emissions of diesel engines in test cells.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Purdue University, 2017

B.S., Mechanical Engineering, Purdue University, 2011

Pi Tau Sigma – National Mechanical Engineering Honorary

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Tau Beta Pi Engineering Honor Society

Purdue University Presidential Scholarship

Best Paper Award. 2023 IEEE Symposium on Product Compliance Engineering

Honorable Mention for Best Paper Award. 2023 39th SEMI-THERM Semiconductor Thermal Measurement, Modeling and Management Symposium

Best Paper Award. 2020 IEEE Symposium on Product Compliance Engineering

Licenses and Certifications

Professional Engineer Metallurgical and Mechanical, Alabama, #PE54897

Professional Engineer Mechanical, California, #41289

Professional Engineer Metallurgical and Mechanical, Nebraska, #E21006

Certified Fire and Explosion Investigator (CFEI)

Certified Vehicle Fire Investigator (CVFI)

Professional Affiliations

National Association of Fire Investigators—NAFI (Member)

National Fire Protection Association—NFPA (Member)

Combustion Institute

Society of Automotive Engineers (SAE)

American Society of Mechanical Engineers (ASME)

Technical Advisory Group for IEC-62368-1 (Audio/video, information and communication technology equipment – Part 1: Safety requirements)

Technical Committee for UL 8400 (Standard for Safety for Virtual Reality, Augmented Reality and Mixed Reality Technology Equipment)

Publications

Yen, M., Ibarreta A., Hashad K., Myers T., Methods for the Analysis of Gas Explosions, International Symposium on Fire Investigation Science and Technology (ISFI), September 2024.

Yen, M., Kossolapov A., Colella F., Thermal Runaway Energy Release as a Function of the State of Charge, In Compliance Magazine, May 2024.

Yen, M., Colella, F., Kossolapov, A., & Mendoza, S. (2023). Fractional Thermal Runaway Calorimetry: A novel tool to assess battery thermal runaway energy (No. 2023-01-0510). SAE Technical Paper.

Yen, M., Kossolapov, A., Colella, F., Thermal Runaway Energy Release as a Function of the State of

Charge, IEEE International Symposium on Product Compliance Engineering, ISPCE 2023.

Watson J., Yen, M., Colella, F., Reduced-Order Modeling for Thermal Dose Forecasting in Wearable Devices, SEMI-THERM 39th Semiconductor Thermal Measurement, Modeling and Management Symposium, 2023.

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Yen, M., Colella, F., Kytomaa H., Allin B., Ockfen A., Contact Burn Injuries Part II: The influence of object shape, size, contact resistance, and applied heat flux, In Compliance Magazine, May 2022.

Yen, M., Colella, F, Kytomaa H, Allin B, Ockfen A, Contact Burn Injuries: The influence of object thermal mass, In Compliance Magazine, May 2021.

Colella F., Yen, M., “Contact Burn Injuries – Analytical Assessment of Thermal Damage in a Perfused Tissue”, IEEE International Symposium on Product Compliance Engineering, ISPCE 2021

Yen M, Colella F, Kytomaa H, Allin B, Ockfen A, "Contact Burn Injuries Part I: The influence of object thermal mass", Proceedings of the 2020 IEEE Symposium on Product Compliance Engineering (SPCE 2020), November 2020, Portland, WA.

Yen M, Colella F, Kytomaa H, Allin B, Ockfen A, "Contact Burn Injuries Part II: The influence of object shape, size, contact resistance, and applied heat flux", Proceedings of the 2020 IEEE Symposium on Product Compliance Engineering (SPCE 2020), November 2020, Portland, WA.

Myers TJ, Yen M, Mendoza S, Ibarreta AF. Mitigating the hazards of battery systems. Chemical Engineering Progress, May 2020.

Colella F., Ibarreta A., Hart R., Morrison T., Watson H., Yen M. Jet Fire Consequence Analysis, Offshore Technology Conference 2020.

Ibarreta AF, Colella F, Wolf MI, Yen, M, O'Hern SC, Myers TJ. Modeling of explosion venting fireballs. Proceedings, Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Colella, F., Hart, R., Ibarreta, A., Watson, H., Yen, M., Jet Fire Consequence Analysis, Gastech 2019, September 17-19, 2019, Houston, Texas.

Yen, M., Magi, V., Abraham, J. Modeling the effects of hydrogen and nitrogen addition on soot formation in laminar ethylene jet diffusion flames. Chemical Engineering Science, 196, 2019, pgs. 116-129.

Yen, M., Magi, V., Abraham, J. Modeling Soot Formation in Turbulent Jet Flames at Atmospheric and High-Pressure Conditions. Energy & Fuels 2018, 32(8), pgs. 8857-8867.

Yen, M., Magi, V., Abraham, J. Comparisons of Computed and Measured Soot Distribution in Ethylene/Hydrogen/Nitrogen Laminar Diffusion Flames, 10th U.S. National Combustion Meeting, 2017.

Cai, G., Yen, M., & Abraham, J. On formulating a simplified soot model for diesel and biodiesel combustion. Chemical Engineering Science, 144, 2016, pgs. 249–259.

Yen, M., & Abraham, J. (2015). Soot and nitric oxide modeling in reacting diesel jets with an unsteady flamelet progress variable model. Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering, 230, 2015.

Yen, M. and Abraham, J., Computations of Soot and NO in Lifted Flames under Diesel Conditions, SAE

Technical Paper 2014-01-1128, 2014.

Cai, G., Yen, M., Motheau, E., Abraham, J. Computations of Soot/NO in Reacting Diesel and Biodiesel Jets. 19th Australasian Fluid Mechanics Conference, 2014.

Yen, M., Abraham, J. Computational Studies Exploring the Relationship between Flame Lift-off Height and Soot Formation in Diesel Jets. Proceedings of the Australian Combustion Symposium, 2013.

Yen, M., Abraham, J. Modeling Lifted Diesel Jets: Insights into the Correlation between Flame Lift-Off Height and Soot Concentration. 8th U.S. National Combustion Meeting, 2013.

Ameen, M., Bajaj, C., Yen, M., Abraham, J. Inferences about the mechanism of flame stabilization in the near-field of diesel jets. 18th Australasian Fluid Mechanics Conference, 2012.

Colella F., Yen, M., “Contact Burn Injuries – Analytical Assessment of Thermal Damage in a Perfused Tissue”, IEEE International Symposium on Product Compliance Engineering, ISPCE 2021

Yen M, Colella F, Kytomaa H, Allin B, Ockfen A, "Contact Burn Injuries Part I: The influence of object thermal mass", Proceedings of the 2020 IEEE Symposium on Product Compliance Engineering (SPCE 2020), November 2020, Portland, WA.

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Yen, M. and Abraham, J., Computations of Soot and NO in Lifted Flames under Diesel Conditions, SAE Technical Paper 2014-01-1128, 2014.

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