

**Proceedings of ASME 2023  
ICE Forward Conference**

**(ICEF2023)**

**October 8–11, 2023  
Pittsburgh, Pennsylvania**

**Conference Sponsor**  
Internal Combustion  
Engine Division

**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS**

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# PROCEEDINGS OF ASME ICE FORWARD 2023

## WELCOME FROM THE ASME ICE FORWARD 2023 CONFERENCE CHAIRS



Welcome to the ASME ICE Forward 2023 conference website. After an exceptional ASME ICE Forward 2022 conference at which we celebrated the 100<sup>th</sup> year anniversary of the ASME Internal Combustion Engine Division (ICED), we are excited to build on that momentum with the ASME ICE Forward 2023 conference, which will be held October 8 through 11, 2023 in Pittsburgh, Pennsylvania, USA. The ICED executive committee, along with ASME staff, are working diligently to put together what promises to be an engaging and exciting event. ASME ICE Forward 2023 will begin with our traditional welcome reception, featuring a poster session along with networking opportunities, on Sunday, October 8. Keynote lectures, technical presentations, panel discussions, and the ASME ICED Distinguished Lecture are planned for Monday, October 9 and Tuesday, October 10. The annual Honors and Awards Banquet will be held on Monday evening. In addition, the annual undergraduate student research competition and the 4<sup>th</sup> Annual Early Career Networking Breakfast are planned on Monday and Tuesday. Finally, conference attendees may also participate in technical tour(s) of our local host, Wabtec, on Wednesday on a first-come first-served basis.

The ICE Forward conference has historically been a collegial forum for participants to discuss current and future trends, and to exchange information related to the science and engineering of internal combustion engines. This event is tailored to provide opportunities for experts and early-career researchers alike from industry, academia, and governmental agencies worldwide to share the latest technological developments and to network with peers and future collaborators. The conference program will be distributed into seven technical tracks with multiple concurrent sessions, usually spread over two days. The technical tracks cover a wide range of topics: (1) Off-Road Systems; (2) Fuels and Carbon Management; (3) Advanced Combustion; (4) Powertrains and Hybridization; (5) Emissions Control (CLEERS\* at ICE Forward); (6) Modeling and Simulation; and (7) Design, Lubrication, and Thermal Management. We are excited to note that, starting from ASME ICE Forward 2023, a new technical track (Track 5) has been planned with emissions control as the primary focus. This track will feature technical

papers and presentations from the CLEERS (Cross-Cut Lean Exhaust Emissions Reductions Simulations) research community, along with those of other emissions control researchers.

As always, we are grateful to the volunteers of the ASME ICE Forward conference who ensure the conference's high technical standards and engaging program. This conference is made possible by the contributions of our track and session chairs and organizers, technical reviewers, paper authors, attendees, and sponsors. We are thankful to all the speakers for participating and sharing their expertise and knowledge with the ICE community.

We are convinced that the internal combustion engine will have a strong, continuing presence as part of the future global energy and transportation portfolio. With increasing focus on higher efficiencies, cleaner fuels, hybridization, and advanced aftertreatment technologies for both on-road and off-road engines, it is evident that the ICE is indeed moving forward.

We hope to see you as an author, speaker, sponsor, or attendee at the ASME ICE Forward 2023 conference, which will be singularly focused on moving the ICE forward!

Sincerely,



**Sundar Rajan Krishnan, Ph.D.**

Professor of Mechanical Engineering, The University of Alabama  
Conference Chair

A handwritten signature in cursive script that reads "Sundar Rajan".



**Dustin Osborne**

Principal Engineer, Southwest Research Institute  
Conference Co-Chair

A handwritten signature in cursive script that reads "Dustin T. Osborne".

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# PROCEEDINGS OF ASME 2023 ICE FORWARD CONFERENCE (ICEF2023)

## TABLE OF CONTENTS

### Off-Road Systems

Biofuels and E-Fuels Used in a Multi-Fuel-Engine as Solution for Rapid Reduction of Greenhouse Gas Impacts of NRMM Engines <i>Matthias Thees, Michael Günthner, and Jonas Fuhrmeister</i>	<b>ICEF2023-109334</b>
Effect of Engine Speed and Biogas Composition on Performance of a Small Biogas-Diesel Dual-Fuel Generator <i>Austin Dahlseide, Shouvik Dev, David Stevenson, and Hongsheng Guo</i>	<b>ICEF2023-109342</b>
Effect of Gas Composition on the Oxidation of Gas Component Emissions of a Dual-Fuel Diesel-Natural Gas Engine at Low Load Conditions <i>Christopher Ulishney and Cosmin E. Dumitrescu</i>	<b>ICEF2023-109624</b>
Efficiency & Emissions Improvement Package for the 7FDL High-Power, Medium-Speed, Locomotive Diesel Engine <i>Matthew Hart, Taylor Gray, Jesse Brigden, Justin Brumberg, AJ Grayson, and Alex Shindledecker</i>	<b>ICEF2023-109814</b>
Alternative Spark Plug Electrode Materials for Economical, Reliable Engine Operation <i>Anton Tilz, Manuel Gruber, Walter Harrer, Michael Engelmayer, Wolfgang Fimml, and Andreas Wimmer</i>	<b>ICEF2023-109959</b>
Study of NO <sub>x</sub> Formation at Lean Conditions in a Prechamber-Ignited Two-Stroke Natural Gas Engine <i>Jacob Nowlin, Mark Patterson, and Timothy J. Jacobs</i>	<b>ICEF2023-109975</b>
Hot-Surface Pilot Ignition: A Novel Sustainable Aviation Fuel Agnostic Combustion Strategy <i>Harsh Sapra, Randy Hessel, Niranjana Miganakallu, Jacob Stafford, Eri Amezcua, David Rothamer, Kenneth Kim, C. M. Kweon, and Sage Kokjohn</i>	<b>ICEF2023-109999</b>
Large-Bore Locomotive Engines – Numerical Simulations of Natural Gas/Diesel Dual-Fuel Operation <i>Samuel J. Kazmouz, Sicong Wu, Adam Klingbeil, Thomas Lavertu, Vijayaselvan Jayakar, Pushkar Sheth, Sameera Wijeyakulasuriya, and Muhsin Ameen</i>	<b>ICEF2023-110164</b>
Cycle-by-Cycle Modeling of Integral Compressor Engines for Real-Time Emissions Control <i>Kevin Wallace and Timothy J. Jacobs</i>	<b>ICEF2023-110401</b>

The Development and Application of Advanced Sensor Solutions for Gaining New Insights Into Large Engines **ICEF2023-110623**  
*Ansel Higgs, Bernhard Rossegger, Anton Tilz, Martin Vareka, Michael Engelmayer, and Andreas Wimmer*

## Fuels and Carbon Management

The Effects of Intake Throttling With Hot and Cold EGR in a CNG/Diesel Dual Fuel Engine **ICEF2023-109529**  
*Srinibas Tripathy, Asish Kumar Sarangi, Vimal Kumar Patel, and Sheshadri Sreedhara*

Mixing-Controlled Compression Ignition With Exhaust Rebreath on a Heavy-Duty Engine – A CFD Modelling Investigation Comparing Diesel Fuel and Ethanol **ICEF2023-109548**  
*Tyler Johnston and Adam Dempsey*

Understanding Diesel-Pilot Assisted Methane Combustion in a Compression Ignition Engine **ICEF2023-109875**  
*Amanda Sima, Amir Hassan, Rodrigo Ristow Hadlich, Jason Loprete, Juan Pablo Trelles, Noah Van Dam, J. Hunter Mack, and Dimitris Assanis*

Predicting Diesel Engine Cetane Number and Similarity for Newer Commercial Sustainable Aviation Fuels **ICEF2023-109879**  
*Jim Cowart, Terrence Dickerson, and Dianne Luning Prak*

Investigation of the Laminar Burning Velocity and Exhaust Characteristics of Methane-Ammonia-Hydrogen Ternary Blends **ICEF2023-109918**  
*Md Nayer Nasim, Behlol Nawaz, Shubhra Kanti Das, Joshua Landis, Amr Shaalan, Noah Van Dam, Juan Pablo Trelles, Dimitris Assanis, and J. Hunter Mack*

Effect of Hydrogen Enrichment on Combustion and Emissions of a Heavy Duty Natural Gas - Diesel Dual Fuel Engine at Low and Medium Load Conditions **ICEF2023-109966**  
*Hongsheng Guo, Amin Yousefi, Shouvik Dev, Brian Liko, and Simon Lafrance*

The Application of Argon-Oxygen Atmosphere to Investigate the Formation and Evolution of Fuel Nitrogen Oxides During the Oxidation of Hydrogen-Ammonia Fuel Mixtures Under Representative Engine In-Cylinder Conditions **ICEF2023-110096**  
*Yuchao Yan, Ruomiao Yang, Juan Ou, Zhentao Liu, and Jinlong Liu*

Investigation of the Effect of Ammonia Addition on the Two-Stage Ignition Process of Dimethyl Ether Based on Chemical Kinetic Analysis **ICEF2023-110108**  
*Juan Ou, Ruomiao Yang, Yuchao Yan, Zhentao Liu, and Jinlong Liu*

Numerical Investigation of the Effect of Ammonia Addition on the Performance of a Stoichiometric Operated Natural Gas Spark Ignition Engine **ICEF2023-110115**  
*Ruomiao Yang, Yuchao Yan, Juan Ou, Zhentao Liu, and Jinlong Liu*

Combustion Research in Wide DCN Range Synthetic Aviation Fuels in a High Compression Ratio Engine **ICEF2023-110189**  
*Valentin Soloiu, Amanda Weaver, James Willis, Aidan Rowell, and Nicholas Dillon*

Propyl Oxymethylene Ether-Ignited Natural Gas Dual Fuel Low Temperature Combustion – a Low Carbon Pathway for High Efficiencies and Low Emissions  
*Abhinandhan Narayanan, Stephen Mundy, Hariraja Thothadri, Justin Gray, Yamini Baskara Babu, Stephen Lucas, Bret Windom, Kalyan Kumar Srinivasan, and Sundar Rajan Krishnan*

**ICEF2023-110454**

Performance and Emissions of an SI Engine Fueled With DME-Propane Blends  
*Hafiz Ahmad Hassan, King Ankobea-Ansah, David Wickman, William De Ojeda, and Carrie Hall*

**ICEF2023-110498**

Evaluation of the Performance and Exhaust Emissions of a 4 Cylinder CI Engine Operating With Dimethyl Ether (DME) and Propane Blends  
*King L. Ankobea-Ansah, Hafiz Ahmad Hassan, David D. Wickman, William De Ojeda, and Carrie M. Hall*

**ICEF2023-110517**

Experimental Investigation of a Butylcyclohexane / Propylcyclohexane Based Naphthenic Bio-Blendstock Surrogate Fuel for Use in a Compression Ignition Engine  
*Rodrigo Ristow Hadlich, Zhongnan Ran, Ruinan Yang, Ofei Mante, David Dayton, and Dimitris Assanis*

**ICEF2023-110527**

Combustion Performance and Emissions Characterization of Methane-Hydrogen Blends (Up to 50% by Vol.) in a Spark-Ignited CFR Engine  
*Jason Loprete, Rodrigo Ristow Hadlich, Amanda Sirna, Amr Shaalan, and Dimitris Assanis*

**ICEF2023-110538**

## Advanced Combustion

Effects of Hydrogen on Combustion in Ammonia–Diesel Dual Fuel Engine and Demonstration of Autothermal Catalyst to Reform Ammonia Into Hydrogen  
*Yoichi Niki, Koichi Hirata, Kazuyuki Kobayashi, and Yuki Shimizu*

**ICEF2023-109103**

Spark Plasma Stretching and Flame Propagation via High Frequency Pulsed Current Management  
*Linyan Wang, Xiao Yu, and Ming Zheng*

**ICEF2023-109853**

Data-Driven Detection and Prediction of Spray Collapse Characteristics for Multi-Component Fuel Mixtures  
*Fengnian Zhao, Ziming Zhou, Wensong Liu, and David L. S. Hung*

**ICEF2023-110017**

Investigation of Practical Delivery of Radical Species for Main Chamber Seeding Using a Radical-Generating Pre-Combustion Chamber  
*Kyle Beurlot, Timothy Jacobs, Greg Vieira, Daniel Olsen, and Mark Patterson*

**ICEF2023-110053**

Ignition Systems for SI-ICE Fueled by Alternative and Renewable Fuels  
*Jakob Ångeby, Johan Tidholm, Bert Gustafsson, and Anders Johnsson*

**ICEF2023-110153**

Cellular Instabilities in Spherically Expanding Hydrogen-Oxygen-Carbon Dioxide Flames  
*Behlol Nawaz, Md Nayer Nasim, Shubhra Kanti Das, and J. Hunter Mack*

**ICEF2023-110157**

Experimental Study and Analysis of Ultra-Low Temperature Fuel Spray With a Heavy-Duty Injector Under Vaporizing Conditions  
*Zhihao Zhao, Anqi Zhang, Henry Schmidt, William Atkinson, and Jeffrey Naber*

**ICEF2023-110171**

Experimental Study of the Impact of Ethanol Content on Partially Premixed Combustion With Ethanol-Gasoline Blends  
*Brian Gainey, John Gandolfo, and Benjamin Lawler*

**ICEF2023-110191**

Empirical Investigation of Reactivity-Controlled Compression Ignition Engine Fuelled by Ethanol and DME at Low Engine Load  
*Simon LeBlanc, Linyan Wang, Long Jin, Navjot Sandhu, Xiao Yu, and Ming Zheng*

**ICEF2023-110365**

Optimization of the Combustion Chamber Design of a Natural Gas-Diesel Dual Fuel Engine Running at Low Load  
*Francesco Scrignoli, Tommaso Savioli, and Carlo Alberto Rinaldini*

**ICEF2023-110482**

## Powertrains and Hybridization

Experimental Demonstration of a High-Power Density Electric Generator  
*Matthew Gore, Kaushik Nonavinakere Vinod, and Tiegang Fang*

**ICEF2023-110134**

48V High Power Hybrid Architecture for MHD Off-Road Applications  
*Ziming Yan, Nathan Peters, Rupert De Salis, and Michael Bunce*

**ICEF2023-110727**

## Emissions Control (CLEERS\* at ICE Forward)

Potential of H<sub>2</sub>-Assisted Light-Off of Oxidation Catalyst in H<sub>2</sub>-Diesel Dual-Fuel Engines  
*Pedro Piqueras, Joaquín de la Morena, Enrique José Sanchis, Carla Conde, José Martín Herreros, and Athanasios Tsolakis*

**ICEF2023-110095**

## Modeling and Simulation

Multi-Fidelity Neural Network Regression for Efficient Training of Energy-Assisted Diesel Engine Control System  
*Ari Nejadmalayeri, Sai Ranjeet Narayanan, Suo Yang, Zongxuan Sun, Harsh Darshan Sapra, Randy Hessel, Sage Kokjohn, Kenneth S. Kim, and Chol-Bum M. Kweon*

**ICEF2023-109750**

Validation of a 1D Modeling Technique to Predict Performance of Turbocharged Engines Including a Double Scroll Turbine With Connection Valve  
*Calogero Avola, Tetsu Suzuki, Ian May, Ali Tafreshi, Michihiko Tanigaki, Carnell Williams, Ken Briscoe, Bill Gray, Jon Trudeau, Georgios Iosifidis, Loic Durbiano, and Matt Delavan*

**ICEF2023-109866**

Quantitative Validation of a Computational Fluid Dynamics Methodology for Gasoline Sprays Under Cold Start Conditions  
*Dimitris Assanis, Joonsik Hwang, Gaurav Guleria, Dario Lopez-Pintor, Scott W. Wagnon, and Russel Whitesides*

**ICEF2023-110054**

Computational Investigation on the Effects of Pre-Chamber Volume in an Active Narrow-Throat Pre-Chamber Engine  
*Mickael Silva, Xinlei Liu, Ponnya Hlaing, Emre Cenker, Abdullah Al-Ramadan, James W. G. Turner, and Hong G. Im*

**ICEF2023-110084**

A Computational Analysis of Fuel Evaporation and Mixing in a Methanol Opposed-Piston Engine With a Passive Pre-Chamber  
*Rafael Menaca, Mickael Silva, Kevin Moreno-Cabezas, Giovanni Vorraro, James W. G. Turner, and Hong G. Im*

**ICEF2023-110099**

## **Design, Lubrication, and Thermal Management**

The Use of PD Patterns to Evaluate the Wear-Resistance and Manufacturing Quality to Estimate Expected Lifetime of Ignition Coils  
*Johan Tidholm, Martin Gordon, and Thomas Hammarström*

**ICEF2023-109962**

Design of a Novel Impulse Turbine for a Supercharged Single Cylinder Diesel Engine – A Simulation Approach  
*Ramkumar Jayaraman, Anand Krishnasamy, and Ramesh A.*

**ICEF2023-110004**

High-Performance Alloys for Conventional ICE and Hydrogen ICE Applications  
*Andreas Frehn, David Krus, and Steffen Mack*

**ICEF2023-110018**

Hydrogen Internal Combustion Engine Component Investigation and Development for Heavy Duty Truck Applications  
*Jason Bieneman, Fabio Araujo, and Nikhil Nachappa Iychodianda Kushalappa*

**ICEF2023-110098**

Novel Approaches to Improve the Performance of a Single Cylinder Engine by Turbocharging, Supercharging and Turbo-Compounding – A Comparative Study  
*Ramkumar Jayaraman, Anand Krishnasamy, and Ramesh A.*

**ICEF2023-110442**