EXHIBIT 1003

MAHDI SHAHBAKHTI, Ph.D., P.Eng.

5-281 DICE Building, Mech. Eng. Dept.
University of Alberta, Edmonton, AB T6G 1H9
Tel: (780) 492-8409
E-mail: mahdi@ualberta.ca
URL: https://sites.ualberta.ca/~mahdi/
Linkedin: mahdi-shahbakhti-a5457816/

Summary/Highlights

Litigation Experience

- IPR/Patents: Completed eight cases in different areas of Mechanical Engineering systems including vehicles, engines, powertrains, heating ventilation air conditioning (HVAC) systems, buildings, ...
- ITC: Two cases in the area of Mechanical Engineering systems
- Depositions: 8 including serving plaintiff/complainant (3), defense/respondent (5)
- Expert Report/Declaration: 9 reports

Professional Work

- Registered Professional Engineer (PEng) in Alberta
- Academic: Professor, Associate Professor, Assistant Professor of Mechanical Engineering, 2012 – now
- Industry: Engine (3.5 years), Robotics (1 year) industries, HVAC (2.5 years)

Internal Combustion Engine Experience

- Have worked 25 years in the area of engine and engine control including dual fuel engines
- Have taught internal combustion engine courses many times since 2008 in different academic institutions in US and Canada
- Have supervised more 50 undergraduate and graduate students for the research in the area of engine and engine controls
- Have tested various dual fuel engines for different applications. These include small (< 0.5 liter) to large scale engines (e.g., 15 liter)
- Have studied engines running with a variety of fuels including but not limited to gasoline, diesel, ethanol, n-heptane, iso-octane, gaseous fuels (natural gas, butane, hydrogen, …), and biofuels.
- Have worked with engines with carburetor, throttle body injection (TBI), port fuel injection (PFI), direct injection (DI) systems, and mixer systems for gaseous fuels
- Have studied various engine types including spark ignition, compression ignition, lean burn, low temperature combustion (HCCI, PPCI, RCCI) engines, and their exhaust aftertreatment systems
- Have led national level engine research programs in the US and Canada in the past 10 years
- Served on review panels for US Department of Energy Engine and Fuel Technology programs, and also rUS National Science Foundation (NSF) panels for grant proposals in the area of internal combustion engines design and controls
- Have been director of Energy Mechatronics Laboratory at Michigan Tech and University of Alberta for design and control of combustion engines

Professional Recognition

- Publications: 255 peer-reviewed publications including 113 journal papers, 138 peer-reviewed conference proceeding papers, and 4 book chapters. These publications center on mechanical engineering systems. Many of these publications are in the field of engines including dual fuel engines.
- Citations: Google Scholar shows total citations of 6204 from more than 80 different countries in Europe, Australia, Africa, Asia, North America, and South America; h-index: 41, i10-index: 144 (as of 2025-04-28).

- Reviews: Served on the United States NSF and DOE grant proposal review panels in the areas of mechanical engineering systems; Reviewer for international grant proposals from Canada, Croatia, France, Germany, and Netherlands; Reviewer for 24 international journals in the area of mechanical engineering systems.
- Editorship:
  - Technical Editor, ASME/IEEE Transactions on "Mechatronics", 2025 -
  - Associate editor, American Society of Mechanical Engineers (ASME) Journal of Dynamic Systems, Measurement, and Controls, 2017 – 2023
  - Guest Editor for Special Issue on "Optimal Design and Operation of Energy Systems", *Int. Journal of Optimal Control Applications and Methods* (Wiley Publisher), 2020 – 2022
  - Associate Editor, *Int. Journal of Powertrains* (Inderscience Publishers), 2014 – 2020
  - Guest Editor for two Special Issues on Advanced Powertrain Engineering, *Int. Journal of Powertrains*, 2016 – 2020
- Technical Committees (TC): Chair of Energy Systems TC in ASME-DSCD, 2018-2020; Chair of Automotive and Transportation Systems TC in ASME Dynamic Systems Control Division (DSCD), 2020-2022. The Automotive TC and Energy Systems TC have over 210 and 180 members respectively from academia, and industry from countries North America, Europe, Asia, and Australia. Secretory of ASME – DSCD Executive Committee, 2023 – now
- Funding/Grants: PI of over $6M USD, co-PI of over $9M USD, and $591K USD equipment support from federal, provincial, industry, and international funding sources for proposals in the area of mechanical systems. These include highly competitive (success rate ≤ 15%) grants from US National Science Foundation, and US Department of Energy.
- Organizing International Technical Sessions: Organized/co-organized 78 invited technical sessions, special sessions, industry sessions in the area of modeling, estimation, optimization, and control of mechanical systems in ASME-DSCC, MECC, AIM, ACC, IEEE-CCTA, SAE and IFAC international conferences during 2012-2024.
- Chairing International Technical Sessions: Chaired/co-chaired 47 technical sessions in the area of modeling, diagnosis and control of mechanical systems in ASME-DSCC, ACC, MECC, SAE international conferences during 2012-2024.

Teaching

- Teaching Experience: Taught in mechanical engineering departments at three academic institutions from 2004 to 2025 as a primary instructor for more than 25 academic semesters and as a teaching assistant for eight academic semesters. The size of the classes ranged from 5 to 123 students for undergraduate and graduate level courses. These courses include Combustion Engines and Alternative Fuels, Thermodynamics, Fluid Mechanics, Energy Thermo-Fluids (ETF), Machine Learning Control, Model Predictive Control, etc.

Membership

- SAE (Society of Automotive Engineers), Member for about 20 years
- ASME (American Society of Mechanical Engineers), Member for about 13 years

Exhibit 1003, Page 488
Petitioner MWE Investments, LLC, et al.

Academic Appointments

University of Alberta - Department of Mechanical Engineering
Professor (2024 - now), Associate Professor (2019-2024), Canada
Director of Energy Mechatronics Lab (EML)

- Research interests: Energy Mechatronics, Combustion Engines, Vehicles, Thermodynamics, HVAC, Fuel Cells, Buildings

Michigan Tech. University - Department of Mechanical Engineering - Engineering Mechanics
Adjunct Professor (2020 - now), Research Associate Professor (2019-2020), Associate Professor (2017-2019), Assistant Professor (2012-2017), USA

University of California Berkeley - Department of Mechanical Engineering
Post-doctoral Scholar, 2010 – 2012, USA

Education

Ph.D. in Mechanical Engineering, University of Alberta, Edmonton, Canada, 2004 – 2009
Thesis: Modeling and Experimental Study of an HCCI Engine for Combustion Timing Control

M.Sc. in Mechanical Engineering *(Summa Cum Laude)*, KNT University of Tech., Tehran, Iran, 2000 – 2003
Thesis: Dynamic Modeling of MPFI Engines for AFR Control during Cold Start and Warm up Conditions and Investigation of Factors Influencing Mixture Preparation and Pollutant Formation in these Conditions

B.Sc. in Mechanical Engineering *(Summa Cum Laude)*, KNT University of Tech., Tehran, Iran, 1996 – 2000

Industry Experience

R&D Engineer, IPCO, Tehran, Iran, Mar. 2001 – Aug. 2004
Iran Khodro Powertrain Company (www.ip-co.com), the largest powertrain manufacturer in the Middle East

- Dynamic modeling of gasoline engines and longitudinal vehicle dynamics
- Calibration of engines and design of control strategies for CNG-gasoline engine control units
- On-vehicle testing of powertrain controllers
- Benchmarking of Peugeot 206 engine - a mutual project with FEV® carried out in Aachen, Germany

R&D Engineer, Advanced Robotics Automatic Systems (ARAS), Tehran, Iran, 2000 - 2001

Engineering Intern, Yekta Tahvieh Arvand Air Conditioning Industries, Iran, 1998 - 2000

Consulting

- Law firms, Expert witness for patent/IP/ITC applications, 2018 – present
  - Ice Miller (Chicago, Indianapolis), DOAR (New York, NY): Expert witness for four Inter Partes Reviews (IPRs) cases in the area of internal combustion engines, 2025 - now
  - Kirkland & Ellis LLP (Chicago, Boston), DOAR (New York, NY): Expert witness for one International Trade Commission (ITC) case in the Mechanical Engineering area, Included one deposition, 2024
  - Fish & Richardson (Washington DC), DOAR (New York, NY): Expert witness for three IPRs in the Vehicles/Mechanical Engineering area, Included two depositions, 2020-2021
  - Maxwell Goss PLLC (Birmingham, MI): Expert witness for three IPRs in the area of Vehicles/Mechanical Engineering, Included two depositions, 2020
  - Latham & Watkins, LLP (Los Angeles, CA), DOAR (New York, NY): Expert witness for one International Trade Commission (ITC) case in the HVAC area, 2020
  - Finnegan, Henderson, Farabow, Garret & Dunner, LLP (Washington DC): Expert witness for two IPRs in the Vehicles/Mechanical Engineering area; Included three depositions, 2018 - 2019

Professional Affiliations

- American Society of Mechanical Engineers (ASME)
- Canadian Society of Mechanical Engineers (CSME)
- Society of Automotive Engineers (SAE)
- International Federation of Automatic Control (IFAC)
- Renewable Fuel Association (RFA)
- The Combustion Institute
- The New York Academy of Sciences (NYAS)

Professional Development

- Certificate of "Ingenuity - Innovation for Researchers" from THECIS (The Centre for Innovation Studies), a three-month course to advance understanding the use of innovation as a subject of both study and practice, 2008, AB, Canada.

Selected Awards

Research/Academic

- Transport Canada 2023 Technology Achievement Award Finalist, 2023
- Best Student Paper Award Finalists (top 6 papers), selected ***three times*** in 2012, 2013, 2016 ASME Dynamic System Control (DSC) Conferences, USA. Submissions to these conferences ranged from 233 to 406 papers.
- Best Paper Award, ASME Automotive and Transportation Systems Technical Committee – DSCC, 2015
- 2018 MARQUIS Who's Who in the World ("top 3% of the professionals in the world")
- Best Presentation in the Session, American Control Conference (ACC), 2012, 2015, 2016
- Best Presentation Award, SAE Int. Powertrain, Fuels & Lubricants Conference, Baltimore, MD, USA, 2016
- Research Excellence Fund, Michigan Tech University, 2013, 2014
- Best Paper Award, ASME Automotive and Transportation Systems Technical Committee – DSCC, 2012
- Canada NSERC (Natural Science and Engineering Research Council) Postdoctoral Fellowship, 2010 - 2012
- Andrew Stewart Memorial Graduate Prize, University of Alberta, 2009
- Prairie Mines & Royalty Ltd. Scholarship in Environments Engineering, University of Alberta, 2008
- THECIS - Ingenuity Scholarship, THECIS (The Center for Innovation Studies), Canada, 2008
- Queen Elizabeth II Graduate Scholarship - Doctoral Level, University of Alberta, 2008
- Lehigh Inland Cement Graduate Scholarship in Environmental Studies, University of Alberta, 2007
- Winning Team (first prize) of a Total of 66 Research Teams from 26 Canadian Universities, Canada Automotive21 High Qualified Personnel Competition, Windsor, Canada, June 11-13, 2007
- Chevron Graduate Scholarship in Natural Gas Engineering, University of Alberta, 2005
- Best Paper Award in 3rd International Conference on Internal Combustion Engines, Tehran, Iran, 2004
- Summa Cum Laude (ranked first among graduates) in both MSc Mech Eng – Powertrain (2003) and BSc Mech Eng – Thermofluids (2000), K. N. Toosi University of Technology, Tehran, Iran.

Teaching

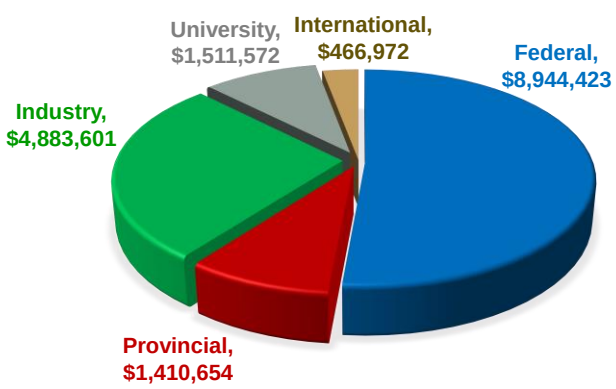
- SAE Ralph R. Teetor Educational Award, 2016
- Provost's List, Top 10% instructors among over 1050 evaluated sections/instructors university-wide, Michigan Tech University, Selected ***four times*** in Fall 2015, Fall 2016, Fall 2017, Spring 2018
- Zita and John Rosen Teaching Excellence Award for Principal Instructor, University of Alberta, 2009

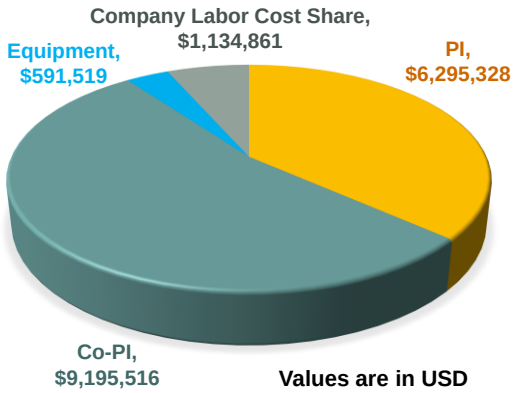
  Only one award across the university is granted annually to give special recognition to a graduate student principal instructor who is an especially skilled and dedicated teacher.

Leadership and Service

- Province of Alberta Graduate Citizenship Award for Student Leadership, Canada, 2009
- Award for Outstanding Contribution for "Most Youth Reached" in National Let's Talk Science Program, Canada, 2007-2008
- Alan Wharmby Memorial Graduate Award in Mechanical Engineering, University of Alberta, 2008

Grants/Funding





Awarded

51- C. R. Koch, D. Gordon, M. Shahbakhti (co-PI), " Machine Learning Control for Hydrogen integration in Heavy-duty Engines ", 1,140,000 CAD, including 760,000 CAD from NSERC Alliance Grant and 340,000 CAD from Diesel Tech Industries (DTI) and 40,000 CAD from City of Edmonton, 2025 – 2029.

50- M. Shahbakhti (PI), C. R. Koch, " Alberta Zero-Emissions Fleet Fueling (AZEFF) ", 208,000 CAD, City of Edmonton via Emission Reduction Alberta (ERA), 2024 – 2027.

49- M. Shahbakhti (PI), C. R. Koch, " Hydrogen fueled combined heat and power (CHP) for commercial and residential buildings, and municipal applications ", 950,000 CAD, Alberta Innovates, 2024 – 2026.

48- M. Shahbakhti (PI), C. R. Koch, " Zero Emission Trucking Testbed ", 264,750 CAD, Alberta Motor Transport Association (AMTA), 2024 – 2028.

47- M. Shahbakhti (PI), C. R. Koch, A. Khajehoddin, " Machine Learning Control and Diagnostics of Solid Oxide Fuel Cell Stack to Optimize Performance and Minimize Degradation ", 1,450,887 CAD, including 898,887 CAD from NSERC Alliance Grant and 552,000 CAD from Cummins Inc., 2024 – 2027.

46- M. Shahbakhti (PI), G. McTaggart-Cowan (Simon Fraser Univ.), S. Munshi (Westport Inc.), " Assessment and Optimization of CleanTech Hydrogen-Fueled Commercial Vehicles for Zero Tailpipe Greenhouse Gas Emissions ", 265,000 CAD including 170,000 CAD from Mitacs Accelerate Program and 95,000 CAD from Westport Inc., 2024-2026.

45- M. Shahbakhti (PI), C. R. Koch, " Development of High-Performance Solid Oxide Fuel Cell Stack with Low

Degradation Rate and Fault Tolerance for Commercial Applications", 363,600 CAD, University of Alberta Future Energy Systems (FES) – Canada First Research Excellence Fund, 2023 – 2026.

44- M. Shahbakhti (PI), C. R. Koch, J. Laverty " Intelligent and Sustainable Management Tool for UAlberta Fleet Vehicles: Operational Cost Reduction, GHG Reduction, and Campus Air Quality Improvement ", 128,942 CAD, Campus Sustainability Grant - University of Alberta, 2023 – 2025.

43- M. Shahbakhti (PI), C. R. Koch, " Hydrogen truck Performance Analysis and Technology Assessment ", 288,200 CAD, Alberta Motor Transport Association (AMTA), 2023 – 2026.

42- M. Shahbakhti (PI), C. R. Koch, " Performance Analysis of Alberta Zero Emissions Hydrogen Transit (AZEHT) Project Transit Buses ", 155,000 CAD, The Transition Accelerator, 2022 – 2025.

41- M. Shahbakhti (PI), C. R. Koch, " Scalable and Reconfigurable Powertrain Control Methods via Artificial Intelligence and Model Predictive Control ", 240,000 USD, Cummins Inc., 2022 – 2026.

40- C. R. Koch, V. Hosseini, M. Shahbakhti (co-PI), " Urban Transportation Emissions and GHGs; Technologies and Behavioral Shifts Towards Zero Emissions ", 498,750 CAD, Environment & Climate Change Canada, 2022 – 2027.

39- M. Shahbakhti (PI), C. R. Koch, " Fault Isolation of Solid Oxides Fuel Cell using Machine Learning ", 300,000 USD, Cummins Inc., 2021 – 2025.

38- A. Nouri, M. Shahbakhti (co-PI), " A Robust and Low-cost Technology for Risk Mitigation of Pathogenic Infection in HVAC Systems ", 733,000 CAD, including 373,000 CAD from NSERC Alliance Grant and 360,000 CAD from Engineered Air, 2022 – 2026.

37- M. Shahbakhti (PI), C. R. Koch, " Artificial Intelligence and Machine Learning for Engine Modeling and Virtual Field Calibration and Assessment of Heavy-Duty Engines ", 41,775 CAD, IAV GmbH, 2021 – 2022.

36- C. R. Koch, V. Hosseini, M. Shahbakhti (co-PI), " Blue hydrogen - Diesel Dual-Fuel Engine Technology Development for a Transition to a Hydrogen Economy ", 827,425 CAD, Alberta Innovates, 2021 – 2023.

35- M. Shahbakhti (PI), C. R. Koch, " Cooperative Truck Platooning System (CTPS) ", 245,936 CAD, Alberta Motor Transport Association (AMTA) – Transport Canada, 2021 – 2023.

34- M. Shahbakhti (PI), C. R. Koch, " Artificial Intelligence and Model Predictive Control Applications for Engine Control and Calibration ", 37,532 CAD, Cummins Inc., 2020 – 2022.

33- M. Shahbakhti (PI), G. McTaggart-Cowan (Simon Fraser Univ.), S. Munshi (Westport Inc.), " Optimum high-efficient hybrid electric natural gas powertrain designs towards economically viable low emission trucks", 179,750 CAD, NSERC Alliance Grant, 2021 – 2024.

32- M. Shahbakhti (PI), " Intelligent Control of Connected and Automated Vehicles and Powertrains for Cold Climates ", 273,000 CAD, NSERC Discovery Grant, 2020 – 2027.

31- M. Shahbakhti (PI), C. R. Koch, V. Hosseini, " Intelligent and Sustainable Management Tool for UAlberta Fleet Vehicles: Operational Cost Reduction, GHG Reduction, and Campus Air Quality Improvement ", 145,709 CAD, EMSO - University of Alberta, 2020 – 2022.

30- M. Shahbakhti (PI), C. R. Koch, " Artificial Intelligence and Machine Learning for Engine Modeling and Virtual Field Calibration and Assessment of Heavy-Duty Engines ", 76,904 CAD, IAV GmbH, 2019 – 2021.

29- M. Shahbakhti (PI), A. O. Vargas, C. R. Koch, V. Hosseini, " Urban Carrying Capacity under Cold Climate for Transportation Generated Air Pollution and Public Exposure ", 50,000 CAD, Social Sciences and Humanities Research Council of Canada (SSHRC) Grant, 2020 – 2021.

28- M. Shahbakhti (PI), " Exergy-Wise Predictive Control of Building and Automotive Energy Systems ", 27,000 CAD, NSERC Discovery Grant, 2019 – 2020.

27- J. Naber, M. Shahbakhti (co-PI), Y. Ra, J. Worm, S. Munshi (Westport Fuel Systems Inc.), " A Compression Ignition Mono-Fueled NG High-Efficiency, High-Output Engine for Medium and Heavy-Duty Applications ", 1,786,494 USD including 1,156,042 USD from US Department of Energy, 450,000 USD from Westport and 180,452 USD Michigan Tech cost share, 2019 – 2022.

26- J. Naber, Y. Ra, S.-Y. Lee, M. Shahbakhti (co-PI), J. Worm, " Co-optimized PPCI-SI Engine System Demonstrator to Improve Fuel Economy while Meeting LEV III Emissions ", 1,161,130 USD including 899,372 USD from US Department of Energy and 261,758 USD for MTU cost share, 2019 – 2022.

25- M. Shahbakhti (lead PI), J. Naber, J. Mohammadpour (Univ. of Georgia), A. Borhan (Cummins Inc.), " GOALI: Collaborative Research: Control-oriented Modeling and Predictive Control of High Efficiency Low-Emission Natural Gas Engines ", 561,422 USD including 499,976 USD from US National Science

Foundation and 61,446 USD from MTU, 2018 – 2021.

24- A. Barnard, M. Shahbakhti (co-PI), " Application of Carbon Nanotubes (CNT) for Heating Aftertreatment Systems in Vehicles ", 18,525 USD, Faurecia Automobile Company, 2018.

23- M. Shahbakhti (PI), D. Robinette J. Blough, " Improved Driveline Torque Shaping: Controls and Calibration ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.

22- J. Naber, M. Shahbakhti (co-PI), C. Morgan, " Development, Validation, and Integration Support for a Hardware-In-the-Loop (HIL) VD&PT Vehicle Model ", 59,600 USD, Hitachi America Ltd., 2018.

21- D. Robinette J. Blough, M. Shahbakhti (co-PI), " Improved Clunk Parameterization and Rig Development ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.

20- J. Naber, M. Shahbakhti (co-PI), " High Engine Speed Cranking and Individual Combustion Control for Reduced Cold Start Emissions ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.

19- M. Shahbakhti (PI), D. Robinette, J. Blough, " Driveline Torque Modeling and Estimation for Anti Jerk Control ", Ford Motor Company, 24,770 USD, 2017 – 2018.

18- M. Shahbakhti (PI), R. Robinett, " Micro Concentrated Solar Power (CSP) Contribution on the Management of an Electrical Grid Including Renewable Energy Sources ", Mohammadia School of Engineering via Morocco's Institut de Recherche en Energie Solaire et an Energies Nouvelles (IRESEN), 17,616 USD, 2017 – 2018.

17- J. Naber, D. Robinette, M. Shahbakhti (co-PI), K. Zhang, B. Chen, G. Cesiel (GM), " NEXTCAR: Connected and Automated Control for Vehicle Dynamics and Powertrain Operation on a Light-Duty Multi-Mode Hybrid Electric Vehicle ", US Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E), 3,505,824 USD including 2,801,390 USD from DOE, 553,362 USD from GM cost share, 151,072 USD for MTU cost share, 2017 – 2020.

16- J. Naber, J. Blough, B. Chen, M. Shahbakhti (co-PI), " Sensor Evaluation and Fusion for Closed Loop Combustion Control for SI Engines ", Ford Motor Company, 165,000 USD, 2016 – 2017.

15- M. Shahbakhti (PI*), J. Naber, S. Munshi (Westport Innovations Inc. - Canada), " High BMEP and High Efficiency Micro-Pilot Ignition Natural Gas Engine ", 1,224,356 USD including 600,000 USD from US Department of Energy, 125,000 USD from Westport cash to MTU, 175,000 USD for MTU cost share, and 324,356 USD from Westport in-kind cost share, 2016 – 2019. [*Original PI but changed to Naber due to the final award requirement for foreign national approval.]

14- M. Shahbakhti (lead PI), K. Hedrick (UC Berkeley), K. Butts (Toyota), " GOALI: Collaborative Research: Easily Verifiable Controller Design ", 328,390 USD including 299,986 USD from US National Science Foundation (NSF), 28,404 USD from MTU cost share, 2014 – 2017.

13- J. Naber, M. Shahbakhti (co-PI), P. Dice, " Investigation of Ignition Performance of Hitachi Coils for PFI Natural Gas Fueled Engine on a Single Cylinder, Boosted, Spark Ignition Engine ", 42,500 USD, Hitachi North America, Feb. 2016 – Aug. 2016.

14- M. Shahbakhti (PI), " FPGA Software for Real-Time Powertrain Control Research and Education ", Xilinx® Design Software Tool, 1,099.00 USD, Xilinx Inc., Mar. 2016.

11- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Continuation of Engine Ignition Studies ", 115,000 USD, Ford Motor Company, 2015-2016.

10- J. Naber, M. Shahbakhti (co-PI), " Injector Evaluation and Characterization on Mahle Optical Single Cylinder DI SI Engine ", 63,477 USD, Nostrum Motors, 2015.

9- M. Shahbakhti (PI), R. Berkey, " Advancing Vehicle Education and Research through HIL Simulator and Student Competition Vehicle Support ", 25,000 USD, Denso North America, 2014-2015.

8- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Continuation of Ignition Studies ", 115,000 USD, Ford Motor Company, 2014-2015.

7- M. Shahbakhti (PI), " NI-based Automotive Hardware-in-the-Loop Setup Research", National Instruments, equipment 4,381 USD, 2015.

6- M. Shahbakhti (PI), " Optimal, Energy-Efficient Solutions for Integration of Buildings and Smart Grids ",

15,000 USD, Michigan Tech Research Excellence Fund, 2014-2015.

5- M. Shahbakhti (PI), " Research on Li-ion Battery in Hybrid Electric Powertrain Test Cell ", LG Chem Power Inc., equipment 11,100 USD, 2013.

4- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Ignition Studies ", 95,752 USD, Ford Motor Company, 2013-2014.

3- J. Naber, M. Shahbakhti (co-PI), " Optical Engine for Detailed Combustion Research ", equipment with value over 300,000 USD, Mahle Powertrain North America, 2013.

2- M. Shahbakhti (PI), " REF-MG: Mentoring in Advanced Powertrain Control ", 9,000 USD, Michigan Tech Research Excellence Fund, 2013-2014.

1- J. Worm, J. Naber, M. Shahbakhti (co-PI), 4-day course on " Torque-based Control of SI Engines ", 32,003 USD, DENSO North America Inc., Feb. 2013.

Invited Talks

37- M. Shahbakhti, " Data Analytics for Zero Emission Trucking Testbed ", Transport Canada, Deloitte, AMTA sponsored event on Accelerating Canada's Zero Emission Trucking Sector, Sep. 27, 2024, Edmonton, Alberta.

36- M. Shahbakhti, " Alberta Zero Emissions Truck Electrification Collaboration (AZETEC) ", Panellist on AMTA Industry Innovations EXPO, Sep. 26, 2024, Edmonton, Alberta.

35- M. Shahbakhti, " AI-based Modeling and Intelligent Management for a Fleet of Connected Vehicles ", Workshop, 27th IEEE International Conference on Intelligent Transportation Systems, Sep. 23, 2024, Edmonton, Alberta.

34- M. Shahbakhti, " Data Analytics and Control of Connected and Autonomous Vehicles (CAVs) ", Department of Mathematics and Computer Science, Data and Artificial Intelligence (DAI) Cluster Seminar, Technical University of Eindhoven (TU/e), Apr. 18, 2024, Eindhoven, Netherlands.

33- M. Shahbakhti, " Machine Learning for Monitoring and Control of Automotive Vehicles ", Eindhoven AI Systems Institute (EAISI), EAISI Lecture Series, Technical University of Eindhoven (TU/e), Apr. 17, 2024, Eindhoven, Netherlands.

32- M. Shahbakhti, " Machine Learning Modeling and Control of Automotive Powertrain and Vehicle Emissions ", TNO (Netherlands Organisation for Applied Scientific Research), Apr. 16, 2024, Helmond, Netherlands.

31- M. Shahbakhti, L. Jiang, " Truck Platooning on Canadian Public Roads in Winter Driving Conditions ", Transportation Association of Canada (TAC), Panelist for Technology Achievement Award, Jul. 27, 2023, Online session, Canada.

30- M. Shahbakhti, S. Lindwall, " Data & Movement Information for Cooperative Truck Platooning Systems Trial ", The Data Management (DAMA) Association, Apr. 28, 2022, Edmonton, Canada.

29- M. Shahbakhti, " Cooperative Truck Platooning Trials in Alberta ", SAE Alberta Section, Mar. 17, 2022, Edmonton, Canada.

28- M. Shahbakhti, J. Laverty, " Intelligent Management of University of Alberta Fleet Vehicles ", Panel on Sustainability Awareness: Campus as a Living Lab, University of Alberta, Oct. 26, 2021, Canada.

27- M. Shahbakhti, A. Osornio-Vargas, " Urban Carrying Capacity under Cold Climate for Transportation Generated Air Pollution and Public Exposure", Canada's Social Sciences and Humanities Research Council (SSHRC), Panellist and Online Forum/Talks and, Living within the Earth's Carrying Capacity Program, Panel on Healthy Communities, Apr. 7, 2021, Canada.

26- M. Shahbakhti, " Exergy-wise Control of Energy Systems: A Promising Paradigm to Enable Maximum Energy Conversion Efficiency in Systems ", Control Seminars Series, University of Michigan – Ann Arbor, Delivered online due to Covid travel restrictions, Nov. 13, 2020, Ann Arbor, MI, USA.

25- M. Shahbakhti, " Modeling and Predictive Control of Multi-Mode Combustion Engines along with Hybrid Electric Vehicles, and Energy Saving Opportunities in a Connected World", Mechanical Engineering Department, University of British Columbia, Jan. 30, 2020, Vancouver, BC, Canada.

24- M. Shahbakhti, " Energy Mechatronics: Enabling Smart Buildings and Intelligent Autonomous Vehicles in a Connected World ", School of Sustainable Energy Engineering, Simon Fraser University, Jan. 27, 2020, Vancouver, BC, Canada.

23- M. Shahbakhti, " Intelligent Control of Building and Automotive Energy Systems in a Connected World ", College of Engineering Seminar Series, University of Georgia, Oct. 5, 2018, Athens, GA, USA.

22- M. Shahbakhti, " Energy Mechatronics: Enabling Smart Buildings and Building-to-Grid Operation in a Connected World ", Mechanical Engineering Department, University of Alberta, July 6, 2018, Edmonton, AB, Canada.

21- M. Shahbakhti, " Modeling and Control of Building and Automotive Energy Systems in the New Era of Connected World ", Mechanical and Aerospace (MAE) Engineering Graduate Seminar Series, MAE Department, University of California - Davis, May 17, 2018, Davis, CA, USA.

20- M. Shahbakhti, " Intelligent Control of Buildings Integrated with Renewable Solae Energy Sources ", Guest lecture at Alternative Energy Enterprise, Michigan Technological University, Mar. 27, 2018, Houghton, MI, USA.

19- M. Shahbakhti, " Control of Advanced Hybrid Electric Vehicles ", Center for Automotive Research (CAR), Ohio State University, Sep. 5, 2017, Columbus, OH, USA.

18- M. Shahbakhti, " Ultra Low CO_2 Transportation Technologies via Energy Mechatronics ", Department of Automotive, Mechanical, and Manufacturing Engineering, University of Ontario Institute of Technology, Aug. 11, 2017, Oshawa, ON, Canada.

17- M. Shahbakhti, " Physics-based Control of Energy Systems Ranging from Smart Buildings and Power Grid to Smart Hybrid Electric Vehicles ", Waterloo Institute for Sustainable Energy, WISE Lecture Series, University of Waterloo, Aug. 02, 2017, Waterloo, ON, Canada.

16- M. Shahbakhti, " Multi-Physics Modeling and Model-based Control of Energy Systems ", University of Calgary, Mechanical Engineering Department, Jun. 23, 2017, Calgary, AB, Canada.

15- M. Shahbakhti, " Advanced Engine and Powertrain Research Towards Fuel-efficient Vehicles ", VolvoCars Company, Jun. 2, 2017, Gothenburg, Sweden.

14- M. Shahbakhti, A. Solouk, " Fuel Economy Benefits of Electrified Powertrains with Advanced Combustion Engines: Mild to Strong HEV Applications ", *2017 SIA Int. Powertrain Conference*, Jun. 7, 2017, Versailles, France.

13- B. Mahadevan, J. Johnson, M. Shahbakhti, " Simulation of Temperature and Particulate Matter Distribution and Pressure Drop of a Catalyzed Diesel Particulate Filter ", Cross Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Focus Group including a number of industry, government, and academic representatives, Teleconference Presentation, Mar. 22, 2017, USA.

12- M. Shahbakhti, D. Hanover, " Modeling and Control of Smart Buildings with Renewable Integrations ", Guest lecture at Alternative Energy Enterprise, Michigan Technological University, Mar. 14, 2017, Houghton, MI, USA.

11- M. Shahbakhti, " Control and Electrification of Multi-mode Low Temperature Combustion Engines ", University of Wisconsin-Madison, Mechanical Engineering Department, Feb. 27, 2017, Madison, WI, USA.

10- A. Solouk, M. Shahbakhti, " Potential of Low Temperature Combustion (LTC) Engine Technology for Range Extender Vehicles ", *2016 SAE Range Extenders for Electric Vehicles Symposium*, Nov. 2, 2016, Knoxville, TN, USA.

9- M. Shahbakhti, " Modeling and Control of Energy Systems ", Halla Visteon Climate Control Corp. (HVCC), Apr. 21, 2015, Van Buren Township, MI, USA.

8- M. Shahbakhti, " Model-based Control of a Low Temperature Combustion (LTC) Engine ", University of Wisconsin-Madison, Engine Research Center, May 23, 2013, Madison, WI, USA.

7- M. Shahbakhti, " Model-based Control of a Low Temperature Combustion (LTC) Engine ", GM R&D, October 16, 2013, Warren, MI, USA.

6- M. Shahbakhti, " Control Challenges and Opportunities for Advanced Automotive Combustion Engine Research ", 2013 IEEE Workshop on Open Problems and Challenges in Automotive Control, June 20, 2013, Washington DC, USA.

5- M. Shahbakhti, " LTC Engines: Opportunities, Challenges, and Solutions ", Michigan Tech University, Graduate Curriculum Seminar Series, Apr. 11, 2013, Houghton, MI, USA.

4- M. Shahbakhti, " Model-based Powertrain Controller Design and Verification ", University of Alberta, Apr. 20, 2012, Edmonton, Canada.

3- M. Shahbakhti, " Early Model-based Design and Verification of Powertrain Control System ", University of California - Merced, Feb. 8, 2012, Merced, CA, USA.

2- M. Shahbakhti, " Powertrain Research Seminar ", Cranfield University, Dec. 1, 2011, Cranfield, UK.

1- M. Shahbakhti, " Powertrain Modeling for Model-based Controller Design ", McMaster University, Jul. 14, 2011, Hamilton, Canada.

Media Appearances

- M. Shahbakhti, Interview by M. Cummings, " Alberta semi-automated truck convoys didn't save fuel but tech still has promise, researchers say ", Published in CBC (Canadian Broadcasting Corporation), May 3, 2024.
- M. Shahbakhti, Interview by I. Semeniuk, " At the top of the CN Tower, a rare study of winter air pollution is under way ", Published in The Globe and Mail, Feb. 11, 2024.

Professional Service

Technical Committees

- Secretary, Executive Committee (ExComm) of the ASME-Dynamic Systems and Control Division (DSCD), 2023 – present
- Elected chair (2020-2022), Elected vice-chair (2018-2020), Best Paper Award Committee Chair (2018-2021), Best Paper Award Committee Member (2022-2024), Elected Secretary (2016-2018), Lead session organizer (2014-2016), member (2010-present) of ASME-DSCD Automotive and Transportation Systems Technical Committee
- Elected chair (2018-2020), Elected vice-chair (2016-2018), Best Paper Award Committee Member (2016-2020,2023), secretary (2014-2016), publicity chair (2012-2014), and Fuels & Combustion thrust area leader (2012-2013), member (2012 – present) of ASME-DSCD Energy Systems Technical Committee
- Member of ASME-DSCD Mechatronic Technical Committee, 2011 – present
- Member of IEEE CSS Technical Committee on Automotive Controls, 2015 – present
- Member of SAE Technical Committee on New Engines, Components, Actuators and Sensors, 2016 – present

Editorships

- Editor
  - Technical Editor, ASME/IEEE Transactions on Mechatronics, 2025 – now
  - Guest Editor for Special Issue on “Optimal Design and Operation of Energy Systems”, *Int. Journal of Optimal Control Applications and Methods* (Wiley Publisher), 2020 – 2022

Exhibit 1003, Page 496
Petitioner MWE Investments, LLC, et al.

- Guest Editor for Special Issue on "Connected and Automated Vehicles", *ASME Journal of Dynamic Systems, Measurement, and Control*, 2020 – 2021
- Guest Editor for Special Issue on "Enabling Green Mobility via Advanced Powertrain Engineering", *Int. Journal of Powertrains (IJPT)*, 2019 – 2020
- Guest Editor for Special Issue on "Vehicle Powertrain Research", *Int. Journal of Powertrains*, 2016-2017
- Guest Editor for *ASME Dynamic Systems and Control Division E-Newsletter* – Summer Issue, 2017

- Associate Editor
  - Associate Editor, *ASME Journal of Dynamic Systems, Measurement, and Control*, 2017 – 2023
  - Associate Editor, *Int. Journal of Powertrains* (Inderscience Publishers), 2014 – 2020
  - Associate Editor, 11th IFAC International Symposium on Advances in Automotive Control (AAC), Eindhoven, Netherlands, 2025
  - Associate Editor at large, 2024 IFAC Modeling, Estimation and Control Conference (MECC), Chicago, IL, USA, 2024
  - Associate Editor, Proceedings of 2022 IFAC International Symposium on Advances in Automotive Control, Columbus, OH, USA, 2022
  - Associate Editor, Proceedings of 2014 American Control Conference
  - Associate Editor, Proceedings of 2014 ASME Dynamic Systems Control Conference
- Editorial Board Member, *International Journal of Vehicle Autonomous Systems* (2020 – present), *International Journal of Automobiles and Automobile Technologies* (2020 – present), *International Journal of Powertrains* (2020 – present), *Energies* (2020 – present)

Reviewing/Refereeing Activities

Funding Agencies

- Panel for US Department of Energy (DOE) Vehicle Technologies - Fuels Technologies (FT) Program, Annual Merit Review and Peer Evaluation, Washington DC, 2013, 2014, 2018, 2020, 2021, 2022.
- Panel for US National Science Foundation (NSF), Reviewer for grant proposals, 2015, 2016, 2019, 2020, 2021.
- Panel for US Department of Energy (DOE), Reviewer for grant proposals, 2015, 2017, 2018.
- Grant proposals review, Mitacs (Canadian national research organization) Elevate Program, Accelerate Program, Canada, 2022, 2023, 2024.
- Panel for MTU REF Mentoring Grant Proposals, 2014.
- Grant proposal review, Poland National Science Centre (SHENG), 2018.
- Grant proposal review, Dutch Technology Foundation STW - NWO (Netherlands), 2016.
- Grant proposal review, IdEx Bordeaux (France), 2015.
- Grant proposal review, Luxembourg National Research Fund (Germany), 2014.
- Grant proposal review, Croatian Science Foundation, 2012, 2020.
- Grant proposal review, Shota Rustaveli National Science Foundation (USA), 2012.

Exhibit 1003, Page 497
Petitioner MWE Investments, LLC, et al.

National Institutions

- Review of the Research Program of the US DRIVE Partnership: Fifth Report (2017), 204 pages, Available online, US National Academies of Sciences, Engineering, Medicine, 2017.

Promotion & Tenure

- Promotion to Tenure application assessment, New Jersey Institute of Technology, USA, 2024.
- Promotion to Tenure application assessment, University of Massachusetts at Lowell, USA, 2024.
- Promotion to Tenure application assessment, Tennessee Tech Univ., USA, 2021.
- Promotion to Tenure application assessment, Carleton Univ., Canada, 2021.

Books/eLearning

- CRC Press, Review of a new book on engine controls, 2022.
- Elsevier Publishing, Review of a new book on nonlinear controls, 2020.
- Elsevier Publishing, Review of a new book on automotive powertrain testing, 2019.
- Springer International Publishing AG, Review of a new book on hybrid electric vehicle controls, 2017.
- IEEE eLearning Course, 2018.

Journals

- Automatica (Elsevier)
- Annual Reviews in Control (Elsevier)
- Journal of Dynamic Systems, Measurement, and Control (ASME)
- Applied Energy (Elsevier)
- Journal of the Energy Institute (Elsevier)
- Mechatronics (Elsevier)
- Int. Journal of Robust and Nonlinear Control (Wiley)
- Control Engineering Practice (Elsevier)
- IEEE/ASME Transactions on Mechatronics
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Vehicles
- IEEE Transactions on Intelligent Transportation Systems
- IEEE Transactions on Transportation Electrification
- IEEE Systems Journal
- Transportation Research Part D: Transport and Environment (Elsevier)
- Journal of Mechanical Engineering Science - Proceedings of IMechE, Part C (SAGE)
- Int. Journal of Engine Research (SAGE)
- Int. Journal of Powertrains (Inderscience)
- International Journal of Vehicle Autonomous Systems (Inderscience)
- Journal of Automobile Engineering - Proceedings of IMechE, Part D (SAGE)
- SAE Int. Journal of Fuels and Lubricants
- Fuel (Elsevier)
- Journal of Petroleum Gas and Engineering (Academic Journals)

- Journal of Petroleum Technology and Alternative Fuels (Academic Journals)
- Combustion Science and Technology (Taylor & Francis)
- Journal of Heat Transfer Research (BegellHouse)
- Int. Journal of Vehicle Noise and Vibration (InderScience)

Conferences

- ASME: Dynamic Systems and Control Conference (DSCC); Internal Combustion Engine Conference
- CSME: Canadian Society of Mechanical Engineering International Congress
- SAE: World Congress; Powertrains, Fuels & Lubricants Conference
- IEEE/IFAC: American Control Conference; IFAC World Congress; IEEE Conference on Decision and Control; European Control Conference; Multi Conference on Systems and Control; IEEE Conference on Control Technology and Applications; Int. Symposium on Advances in Automotive Control

Chair/Co-chair Technical Sessions (47)

- Chair of the technical session " Batteries and Fuel Cells ", IFAC Modeling, Estimation and Control Conference (MECC), Oct. 27-30, 2024, Chicago, IL, USA.
- Co-chair of the technical session " Estimation and Control for Energy Storage Systems ", IFAC Modeling, Estimation and Control Conference (MECC), Oct. 27-30, 2024, Chicago, IL, USA.
- Chair of the workshop session on " Frontiers in AI-powered Optimization and Virtual Validation of Vehicle Systems and Fleet ", 27th IEEE International Conference on Intelligent Transportation Systems, Sep. 23, 2024, Edmonton, Alberta, Canada.
- Chair of the technical session on " RI: Machine Learning in Control ", American Control Conference, July 10, 2024, Toronto, ON, Canada.
- Co-chair of the technical session on " Machine Learning in Automotive Powertrains ", IFAC World Congress, July 13, 2023, Yokohama, Japan.
- Chair of the technical session on " Internal Combustion Engine & Gas-turbine Engine Combustion ", Combustion Institute/Canadian Section Spring Tech. Conference, May 16, 2023, Edmonton, AB, Canada.
- Chair of technical session " Rising Stars in Automotive and Transportation Systems ", IFAC Modeling, Estimation and Control Conference (MECC), Oct. 5, 2022, Jersey City, NJ, USA.
- Chair of three technical sessions in Transportation Symposium, Canadian Society of Mechanical Engineers (CSME) 2022 International Congress, Jun. 5-8, 2022, Edmonton, AB, Canada.
- Chair of the technical session on " Engine Combustion II ", Combustion Institute/Canadian Section (CI/CS) Spring Technical Conference, May 2022, Ottawa, ON, Canada.
- Co-chair of the technical session on " Energy Systems Modeling, Estimation and Control ", 2021 IFAC Modeling, Estimation, Control Conference (MECC), Oct. 2021, Austin, TX, USA.
- Co-chair of the special session on " Underrepresented Stories in Controls & Robotics Industry ", 2021 IFAC Modeling, Estimation, Control Conference (MECC), Oct. 2021, Austin, TX, USA.
- Track Chair of 2020 IEEE Connected and Automated Vehicles Symposium (CAVS), Oct. 2020, Victoria, BC, Canada.
- Chair of the session on " Control Methods for Automotive Applications ", IEEE Conference on Control Technology and Applications, Aug. 2020, Montreal, QC, Canada.
- Co-chair of the special session on " Automotive Applications 1 ", IEEE Conference on Control Technology and Applications, Aug. 2020, Montreal, QC, Canada.
- Chair of the session on " Control and Energy Management of Building Systems ", 2019 American Control Conference, Jul. 2019, Philadelphia, PA, USA.

- Co-chair of the special industry session on " Autonomous and Connected Vehicles ", 2019 American Control Conference, Jul. 2019, Philadelphia, PA, USA.
- Chair of the session on " Homogenous Charge Compression Ignition – Part II ", 2019 SAE World Congress, Apr. 2019, Detroit, MI, USA.
- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2018 SAE World Congress, Apr. 2018, Detroit, MI, USA.
- Co-chair of the session on " Control of Smart Buildings and Microgrids ", 2017 ASME Dynamic Systems Control Conference, Oct. 2017, Tysons Corner, VA, USA.
- Co-chair of the session on " Sliding Mode Control ", 2017 ASME Dynamic Systems Control Conference, Oct. 2017, Tysons Corner, VA, USA.
- Co-chair of the session on " Control and Energy Management of Building Systems ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " IC Engine Modeling and Control ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " Modeling, Optimization, and Control of Engine Exhaust Systems ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2017 SAE World Congress, Apr. 2017, Detroit, MI, USA.
- Chair of the session on " Modeling and Control of Automotive Systems ", 2016 ASME Dynamic System Controls Conference, Oct. 2016, Minneapolis, MN, USA.
- Chair of the session on " Modeling and Control of Combustion Engines ", 2016 ASME Dynamic System Controls Conference, Oct. 2016, Minneapolis, MN, USA.
- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2016 SAE World Congress, Apr. 2016, Detroit, MI, USA.
- Chair of the session on " Homogenous Charge Compression Ignition – Part II ", 2016 SAE World Congress, Apr. 2016, Detroit, MI, USA.
- Chair of the session on " Modeling and Control of Electric and Hybrid Vehicles ", 2015 ASME Dynamic System Controls Conference, Oct. 2015, Columbus, OH, USA.
- Chair of the session on " Estimation and Control of Advanced Internal Combustion Engines ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-chair of the session on " Control of Autonomous Vehicles and Connected Vehicles ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-Chair of the session on " Control-Oriented Modeling of Advanced Internal Combustion Engines ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-chair of the session on " Modeling and Control of IC Engines ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Co-chair of the session on " Dynamic Systems Modeling for the Design and Optimization of Vehicle Systems ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Co-chair of the session on " Energy Storage: Transportation Applications ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Chair of the session on " Modeling and Control of Advanced IC Engine Combustion ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.
- Co-chair of the session on " Model-based Estimation for Control and Diagnosis of Automotive systems ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.

- Co-chair of the session on " Modeling and Control of Advanced Transportation Systems ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.
- Chair of the session on "Control of Advanced Combustion Engines", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Chair of the session on "Control Design Methods for Advanced Powertrain Systems and components", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Co-chair of the session on "Automotive Control Systems", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Chair of the session on "Modeling and Control of Advanced Combustion Systems", 2013 American Control Conference, Jun. 2013, Washington, DC, USA.
- Chair of the session on "Modeling, Estimation, and Control of Advanced Engine Sensing and Actuation", 2013 American Control Conference, Jun. 2013, Washington, DC, USA.
- Chair of the session on "Modeling and Model-Based Control of Advanced IC Engines", 2012 ASME Dynamic Systems and Control Conference, Oct. 2012, Fort Lauderdale, FL, USA.

Organizing Technical Sessions at Conferences (78 sessions)

- Co-organized two workshop sessions on " Frontiers in AI-powered Optimization and Virtual Validation of Vehicle Systems and Fleet ", 27th IEEE International Conference on Intelligent Transportation Systems, Sep. 23, 2024, Edmonton, Alberta, Canada.
- Co-organized a special industry session titled " Industrial Stories in Controls " at 2022 IFAC Modeling, Estimation, Control Conference (MECC), Jersey City, NJ, USA.
- Co-organized a technical session (PFL560) in the area of “Powertrain Actuators and Sensors” for 2022 SAE World Congress, Detroit, MI, USA.
- Co-organized a technical invited session in the area of Energy Systems Modeling, Estimation and Control at 2021 IFAC Modeling, Estimation, Control Conference (MECC), Austin, TX, USA.
- Co-organized a special session titled "Underrepresented Stories in Controls & Robotics Industry" at 2021 IFAC Modeling, Estimation, Control Conference (MECC), Austin, TX, USA.
- Co-organized a technical invited session in the area of Mechatronic Applications in Automotive Systems at 2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM).
- Co-organized a technical session (PFL560) in the area of “Powertrain Actuators and Sensors” for 2021 SAE World Congress, Detroit, MI, USA.
- Co-organized a technical invited session in the area of “robust and optimal control for building HVAC systems” at 2020 American Control Conference.
- Co-organized a special industry session titled “women in controls” at 2020 American Control Conference.
- Co-organized a special industry session on controls in autonomous vehicles at 2019 ASME Dynamic Systems and Control Conference.
- Co-organized a technical invited session in the area of modeling and control of thermal energy systems at 2019 ASME Dynamic Systems and Control Conference.
- Co-organized a technical invited session in the area of control and energy management of building systems at 2019 American Control Conference.
- Co-organized a special industry session in the area of connected and autonomous vehicles at 2019 American Control Conference.

- Co-organized two technical sessions in the area of combustion engines for 2019 SAE World Congress.
- Led and co-organized an invited session in the area of modeling and management of power and energy systems for 2018 ASME Dynamic Systems and Control Conference.
- Co-organized two technical sessions in the area of combustion engines for 2018 SAE World Congress.
- Co-organized one technical invited session in the area of control of smart buildings and microgrids for 2017 ASME Dynamic Systems and Control Conference.
- Co-organized one industry special session in the area of control research perspective in Automotive Industry for 2017 ASME Dynamic Systems and Control Conference.
- Led and co-organized eight technical invited sessions in the area of automotive systems for 2017 American Control Conference.
- Co-organized one technical invited session in the area of building energy systems for 2017 American Control Conference.
- Co-organized two technical sessions in the area of combustion engines for 2017 SAE World Congress.
- Led and co-organized three technical invited sessions in the area of Automotive and Transportation Systems for 2016 ASME Dynamic Systems and Control Conference.
- Led and co-organized five technical invited sessions in the area of automotive systems for 2016 American Control Conference.
- Co-organized two technical invited sessions in the area of building energy systems for 2016 American Control Conference.
- Co-organized two technical sessions in the powertrain area for 2016 SAE World Congress.
- Led and co-organized three technical invited sessions in division of Automotive and Transportation Systems (ATS) for 2015 ASME Dynamic Systems and Control Conference.
- Co-organized five technical invited sessions in the area of Automotive and Transportation Systems (ATS) for 2015 American Control Conference.
- Co-organized two technical sessions in the area of HCCI engines for 2015 SAE World Congress.
- Co-organized four technical invited sessions in the area of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2014 ASME Dynamic Systems and Control Conference.
- Co-organized seven technical invited sessions in the areas of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2014 American Control Conference.
- Co-organized six technical invited sessions in the area of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2013 ASME Dynamic Systems and Control Conference.
- Co-organized five technical invited sessions in the areas of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2013 American Control Conference.
- Co-organized three invited technical sessions in the area of Automotive and Transportation Systems (ATS) in 2012 ASME Dynamic Systems and Control Conference.
- Organized and coordinated a series of teaching seminars entitled " What Contributes to Successful Teaching in Engineering " in the Faculty of Engineering, University of Alberta, 2007-2008.

Conference Organizing Team

- Conference Finance Chair, IEEE Conference on Control Technology and Applications (CCTA), Vancouver, BC, Canada, 2026.

- Member of Technical Program Committee (TPC), 2025 International Conference on Intelligent Transportation and Future Mobility (ITFM 2025), Guangxi, Guilin, China, April 11-13, 2025.
- Conference International Program Co-Chair, IFAC Modeling, Estimation, and Control Conference (MECC), Chicago, IL, USA, 2024.
- Co-organized an open invited track on "Machine Learning in Automotive Powertrains" for IFAC World Congress, Yokohama, Japan, July 9-14, 2023.
- Conference Program Co-Chair, Combustion Institute/Canadian Section (CI/CS) Conference, Edmonton, AB, Canada, May 15-18, 2023.
- Conference International Program Committee Member, 10TH IFAC Symposium: Advances in Automotive Control, Columbus, Ohio, USA, August 28-31, 2022.
- Transportation Systems Symposium Co-chair, Canadian Society of Mechanical Engineers (CSME) International Congress, Edmonton, AB, Canada, June 5-8, 2022.
- Conference International Program Co-Chair, IFAC Modeling, Estimation, and Control Conference (MECC), Austin, TX, USA, Oct. 17-20, 2021.
- Member of Technical Program Committee (TPC), 2020 IEEE Connected and Automated Vehicles Symposium (CAVS), Victoria, Canada, 4-5 October, 2020.
- Member of Conference Scientific Committee, 2019 International Symposium on Automotive Science and Technology (ISASTECH), Ankara, Turkey, Sep. 5-6, 2019.
- Conference Program Co-Chair, 2019 International Conference on Advanced Vehicle Powertrains, Hefei, China, Aug. 25-27, 2019.
- Member of Program Committee, 2017 ASME Dynamic Systems and Control Conference, Tysons Corner, VA, USA, Oct. 11-13, 2017.
- Organizing Committee Chair, 2017 International Conference on Advanced Vehicle Powertrains, HangZhou, China, Sep. 25-27, 2017.
- Co-chaired and coordinated 2nd Annual Mechanical Engineering Graduate Symposium, over 180 participants from 8 different departments, University of Alberta, March 6, 2008.
- Member of organizing team for Combustion Institute/Canadian Section (CI/CS) spring technical conference, Banff, Alberta, Canada, May 14-16, 2007.

Workshops

12- R. Rezaei, F. Willems, M. Shahbakhti, H. Tadjine, workshop on " Frontiers in AI-powered Optimization and Virtual Validation of Vehicle Systems and Fleet ", 27th IEEE International Conference on Intelligent Transportation Systems, Sep. 23, 2024, Edmonton, Alberta, Canada.

11- A. Norouzi, C.R. Koch, M. Shahbakhti, workshop on "Machine Learning Control", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5, 2022, Edmonton, AB, Canada. [> 100 attendees]

10- M. Shahbakhti, H. Fathy, workshop (including 16 invited speakers) on "Connected and Automated Vehicles (CAVs)", 2018 ASME Dynamic System and Control Conference, Atlanta, GA, USA, Sep. 30, 2018.

9- A. Scacchioli, M. Shahbakhti, workshop (including 6 invited speakers) on "From Data to Models and Decisions in Engineering Systems", 2018 ASME Dynamic System and Control, Atlanta, GA, USA, Sep. 30, 2018.

8- M. Shahbakhti, K. Hedrick, K. Butts, half-day workshop on "Methods of Easily Verifiable Control Design", American Control Conference, Boston, MA, USA, Jul. 5, 2016.

7- J. Worm, J. Naber, M. Shahbakhti, 4-day workshop on " Torque-based Control of SI Engines ", DENSO Inc., Southfield, MI, USA, Feb. 5-8, 2013.

Exhibit 1003, Page 503
Petitioner MWE Investments, LLC, et al.

5- M. Shahbakhti, N. Yusefi, " Automotive Engines and Power Transmission Systems ", Let's Talk Science Workshop, Edmonton, Canada, Mar. 14, 2008.

5- M. Shahbakhti, N. Yusefi, " Vortex in Rotational Flows ", Let's Talk Science Workshop, Edmonton, Canada, Mar. 14, 2008.

4- M. Shahbakhti, " HCCI Engines and Advanced Methods to Improve Emissions of Motor Vehicles ", 81th Annual GETCA Convention (Greater Edmonton Teachers Convention), Shaw conference center, Edmonton, Canada, Mar. 1-2, 2007.

3- M. Shahbakhti, " Vehicles' Emissions ", Heritage Youth Researcher Summer (HYRS) Teachers Workshop, University of Alberta, Jul. 25-26, 2006.

1- M. Shahbakhti, " Engineering Solutions for Automotive Emissions ", HYRS Teachers Workshop, University of Alberta, Aug. 8-10, 2005.

1- M. Shahbakhti, " Methods to Reduce Emissions of Vehicles during Cold Start and Warm up Conditions ", 3rd International Conference on Internal Combustion Engines (ICICE), Tehran, Iran, Feb. 19, 2004.

Publications (students under Shahbakhti's supervision/mentorship are indicated by "*")



Publications cited in 83 countries [Google Scholar]

Book Chapters

4- A. R. Razmi*, Sh. Sharifi*, E. Gholamian, A. Arabkoohsar, M. Shahbakhti, " Green Hydrogen ", pages 574-620, Book title: Future Grid-Scale Energy Storage Solutions, Elsevier, ISBN 978-0-323-90786-6, 2023.

3- Sh. Sharifi*, A. R. Razmi*, M. H. Nabat, J. Liu, A. Arabkoohsar, M. Shahbakhti, " Power-to-X ", pages 621-646, Book title: Future Grid-Scale Energy Storage Solutions, Elsevier, ISBN 978-0-323-90786-6, 2023.

2- M. H. Nabat, A. R. Razmi*, Sh. Sharifi*, A. Arabkoohsar, M. Shahbakhti, " Liquid Air Energy Storage ", pages 345-408, Book title: Future Grid-Scale Energy Storage Solutions, Elsevier, ISBN 978-0-323-90786-6, 2023.

1- S. Batool*, J. D. Naber, M. Shahbakhti, " Multi-mode Low Temperature Combustion (LTC) and Mode Switching Control ", pages 43-93, Book title: Advanced Combustion for Sustainable Transport, Springer, ISBN 978-981-16-8417-3, 2022.

Selected Peer Reviewed Journal Papers

113- S. Moghadasi*, A. Yasami*, S. Munshi, G. McTaggart-Cowan, M. Shahbakhti, " Real-world Steep Drive Cycles and Gradeability Performance Analysis of Hybrid Electric and Conventional Class 8 Regional-haul Trucks ", *Energy*, Vol. 320, 24 pages, 2025.

112- A. Razmi*, A. R. Hanifi, M. Shahbakhti, " A Comparative Techno-Economic Analysis Between Solar-based Hydrogen Production by Methane Pyrolysis and Water Electrolysis Methods ", *Renewable Energy*, Vol. 242, pages 1-26, 2025.

111-Z. Salehi*, M. Tofigh*, A. Kharazmi, D. J. Smith, A. R. Hanifi, C. R. Koch, M. Shahbakhti, " Transfer Learning-based Deep Neural Network Model for Performance Prediction of Hydrogen-Fueled Solid Oxide Fuel Cells ", *Int. Journal of Hydrogen Energy*, Vol. 99, pages 102-111, 2025.

110- N. Balazadeh, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan, " Predicting Transient Performance of a Heavy-Duty Gaseous-Fuelled Engine Using Combined Phenomenological and Machine Learning Models ", *Int. Journal of Engine Research*, 18 pages, 2024.

109- M. Tofigh*, A. Kharazmi, D. J. Smith, A. R. Hanifi, C. R. Koch, M. Shahbakhti, " Temporal Dilated Convolution and Nonlinear Autoregressive Network for Predicting Solid Oxide Fuel Cell Performance ", *Engineering Applications of Artificial Intelligence*, Vol. 136, 13 pages, 2024.

108- A. Ansari*, H. Abediasl*, M. Shahbakhti, " Ambient Temperature Effects on Energy Consumption and CO2 Emissions of a Plug-in Hybrid Electric Vehicle ", *Energies*, Vol. 17, Issue 14, 21 pages, 2024, *to appear*.

107- M. Tofigh*, M. Fakouri Hasanabadi*, A. R. Hanifi, D. J. Smith, A. Kharazmi, C. R. Koch, M. Shahbakhti, " Control-oriented Modeling of a Solid Oxide Fuel Cell Affected by Redox Cycling using a Novel Deep Learning Approach ", *ASME Journal of Dynamic Systems, Measurement, and Control*, 13 pages, 2024, *to appear*.

106- S. Shahpouri*, D. Gordon, M. Shahbakhti, C. R. Koch, " Transient NOx Emission Modeling of a Hydrogen-Diesel Engine Using Hybrid Machine Learning Methods ", *Int. Journal of Engine Research*, 21 pages, 2024, *to appear*.

105- A. Razmi*, A. R. Hanifi, M. Shahbakhti, " Thermodynamic and Economic Analysis of a Novel Concept for Methane Pyrolysis in Molten Salt Combined with Heliostat Solar Field ", *Energy*, Vol. 301, 17 pages, 2024.

104- M. Tofigh*, Z. Salehi*, A. Kharazmi, D. J. Smith, A. R. Hanifi, C. R. Koch, M. Shahbakhti, " Transient Modeling of a Solid Oxide Fuel Cell using an Efficient Deep Learning HY-CNN-NARX Paradigm ", *Journal of Power Sources*, Vol. 606, 15 pages, 2024.

103- S. Moghadasi*, Y. Long*, L. Jiang*, S. Munshi, G. McTaggart-Cowan, M. Shahbakhti, " Design and Performance Analysis of Hybrid Electric Class 8 Heavy-Duty Regional-haul Trucks with a Micro-Pilot Natural Gas Engine in Real-World Highway Driving Conditions ", *Journal of Energy Conversion and Management*, Vol. 309, 20 pages, 2024.

102- L. Jiang*, J. Kheyrollahi, C. R. Koch, M. Shahbakhti, " Cooperative Truck Platooning Trial on Canadian Public Roads under Commercial Operation in Winter Driving Conditions ", *IMechE Part D – Journal of Automobile Engineering*, 13 pages, DOI:10.1177/09544070241245477, 2024.

Exhibit 1003, Page 505
Petitioner MWE Investments, LLC, et al.

101- S. Batool*, J. Naber, M. Shahbakhti, " Machine Learning Approaches for Identification of Heat Release Shapes in a Low Temperature Combustion Engine for Control Applications ", *Control Engineering Practice*, Vol. 144, 16 pages, 2024.

100- L. Jiang*, J. Kheyrollahi, C. R. Koch, M. Shahbakhti, " Performance Analysis of Cooperative Truck Platooning under Commercial Operation during Canadian Winter Season ", *SAE Int. Journal of Connected and Automated Vehicles*, Vol. 7, Issue 2, 16 pages, 2024.

99- A. Razmi*, Sh. Sharifi*, S. Vafaeenezhad, A. R. Hanifi, M. Shahbakhti, " Modeling and Microstructural Study of the Anode-support Solid Oxide Fuel Cells: Experimental and Thermodynamic Analyses", *Int. Journal of Hydrogen Energy*, Vol. 54, Pages 613-634, 2024.

98- N. Balazadeh Meresht, S. Moghadasi*, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan, " Advances in Vehicle and Powertrain Efficiency of Long-haul Commercial Vehicles: A Review ", *Energies*, Vol. 16, Issue 19, 37 pages, 2023.

97- H. Abediasl*, N. Balazadeh Meresht, H. Alizadeh, M. Shahbakhti, C. R. Koch, V. Hosseini, "Road Transportation Emissions and Energy Consumption in Cold Climate Cities", *Urban Climate*, Vol. 52, 23 pages, 2023.

96- A. R. Razmi*, A. R. Hanifi, M. Shahbakhti, " A Green Hydrogen Production and Storage Concept based on Heliostat Solar Field and Solid Oxide Electrolyzer/Fuel Cells: Thermodynamic and Economic Analyses ", *Journal of Renewable Energy*, Vol. 215, 21 pages, 2023.

95- N. Samadi*, M. Shahbakhti, " Energy Efficiency and Optimization Strategies in a Building to Minimize Airborne Infection Risks ", *Energies*, Vol. 16, Issue 3, 28 pages, 2023.

94- H. Abediasl*, A. Ansari*, V. Hosseini, C. R. Koch, M. Shahbakhti, " Real-time Fuel Consumption Estimation using Machine Learning and On-board Diagnostics Data ", *IMechE Part D: Journal of Automobile Engineering*, 15 pages, doi:10.1177/09544070231185609, 2023.

93- C. Reddy*, V. B. Vinhaes*, J. D. Naber, R. D. Robinett, M. Shahbakhti, " Exergy-Based Model Predictive Control of an Integrated Dual Fuel Engine and a Waste Heat Recovery System ", *Control Engineering Practice*, Vol. 135, 15 pages, 2023.

92- S. Shahpouri*, D. Gordon, C. Hayduk, R. Rezaei, C. R. Koch, M. Shahbakhti, " Hybrid Emission and Combustion Modeling of Hydrogen Fueled Engines ", International Journal of Hydrogen Energy, Vol. 48, Issue 62, pages 24037-24053, 2023.

91- P. Reddy*, M. Ravichandran, J. Doering, M. Shahbakhti, " Real-time Predictive Clunk Control using a Reference Governor ", *Control Engineering Practice*, Vol. 135, 15 pages, 2023.

90- A. Norouzi*, H. Heidarifar*, H. Borhan, M. Shahbakhti, C. R. Koch, " Integrating Machine Learning and Model Predictive Control for Automotive Applications: A Review and Future Directions ", *Engineering Applications of Artificial Intelligence*, Vol. 120, 31 pages, 2023.

89- X. Ma, M. Shahbakhti, T. Chigan, " Deep Learning based Distributed Meta-Learning for Fast and Accurate Online Adaptive Powertrain Fuel Consumption Modeling ", *IEEE Transactions on Vehicular Technology*, Vol. 72, Issue 6, pages 7251-7264, 2023.

88- A. Norouzi*, S. Shahpouri*, D. Gordon, M. Shahbakhti, C. R. Koch, " Safe Deep Reinforcement Learning in Diesel Engine Emission Control ", *Proc IMechE Part I: Journal of Systems and Control Engineering*, DOI: 10.1177/09596518231153445, 14 pages, 2023.

87- B. K. Irdmousa*, L. N. A. Basina*, J. D. Naber, J. Mohammadpour Velni, H. Borhan, M. Shahbakhti, " Control-oriented Data-driven and Physics-based Modeling of Maximum Pressure Rise Rate in Reactivity Controlled Compression Ignition Engines ", *SAE Int. Journal of Engines*, Vol. 16, Issue 6, 12 pages, 2023.

86- S. Shahpouri*, A. Norouzi*, C. Hayduk, A. Fandakov, R. Rezaei, C. R. Koch, M. Shahbakhti, " Laminar Flame Speed Modeling for Low Carbon Fuels Using Methods of Machine Learning ", *Fuel*, Vol. 333, Issue 1, 11 pages, 2023.

Exhibit 1003, Page 506
Petitioner MWE Investments, LLC, et al.

85- S. Batool*, J. D. Naber, M. Shahbakhti, " Closed-loop predictive control of a multi-mode engine including HCCI, PPCI and RCCI combustion modes ", *SAE International Journal of Fuels and Lubricants*, Vol. 16, Issue 1, 22 pages, 2023.

84- D. C. Gordon, A. Norouzi*, A. Winkler, J. McNally, E. Nuss, D. Abel, M. Shahbakhti, J. Andert, C. R. Koch, " End-to-End Deep Neural Network-based Nonlinear Model Predictive Control: Experimental Implementation on Diesel Engine Emission Control", *Energies*, Vol. 15, Issue 24, 24 pages, 2022.

83- A. Khameneian*, P. Dice, J. Duncan, M. Shahbakhti, J. D. Naber, C. Archer, P. Moilanen, C. Glugla, G. Huberts, " Dynamic Individual-Cylinder Analysis of a Gasoline Direct Injection Engine Emissions for Cold Crank-Start at Elevated Cranking Speed Conditions of a Hybrid Electric Vehicle ", *Control Engineering Practice*, Vol. 129, 15 pages, 2022.

82- A. Norouzi*, S. Shahpouri*, D. Gordon, A. Winkler, E. Nuss, D. Abel, J. Andert, M. Shahbakhti, C. R. Koch, " Deep Learning based Model Predictive Control for Compression Ignition Engines ", *Control Engineering Practice*, Vol. 127, 13 pages, 2022.

81- A. R. Razmi*, S. M. Alirahmi, M. H. Nabat, E. Assareh, M. Shahbakhti, " A Green Hydrogen Energy Storage Concept based on Parabolic Trough Collector and Proton Exchange Membrane Electrolyzer/Fuel Cell: Thermodynamic and Exergoeconomic Analyses with Multi-Objective Optimization ", *International Journal of Hydrogen Energy*, Vol. 47, Issue 62, Pages 26468-26489, 2022.

80- V. Bonfochi Vinhaes*, X. Yang*, G. McTaggart-Cowan, S. Munshi, M. Shahbakhti, J. Naber, " Development of a Medium-Duty Stoichiometric Diesel Micro-Pilot Natural Gas Engine ", *International Journal of Engine Research*, 14 pages, 2022. doi:10.1177/14680874221087954

79- O. Wine*, A. O. Vargas, S. Campbell, V. Hosseini, C. R. Koch, M. Shahbakhti, " Cold Climate Impact on Air Pollution Related Health Outcomes: A Scoping Review ", *International Journal of Environmental Research and Public Health*, Vol. 19, Issue 3, 17 pages, 2022.

78- V. Bonfochi Vinhaes*, G. McTaggart-Cowan, S. Munshi, M. Shahbakhti, J. D. Naber, " Experimental Studies of Low Load Limit in a Stoichiometric Micro-Pilot Diesel Natural Gas Engine ", *Energies*, Vol. 15, Issue 3, 18 pages, 2022.

77- M. Toub*, R. D. Robinett III, M. Shahbakhti, " Building-to-Grid Optimal Control of Integrated MicroCSP and Building HVAC System for Optimal Demand Response Programs", *Optimal Control Applications and Methods*, 19 pages, 2022.

76- S. Hemmati*, R. Yadav*, S. Kaushik*, D. Robinette, M. Shahbakhti, " Important Powertrain Dynamics for Developing Models for Control of Connected and Automated Electrified Vehicles ", *IMechE Part D: Journal of Automobile Engineering*, 18 pages, 2022. doi:10.1177/09544070211070738

75- A. Khameneian*, B. Khoshbakht Irdmousa*, P. Dice, M. Shahbakhti, J. D. Naber, P. Moilanen, C. Archer, C. Glugla, G. Huberts, " A Dynamic Method to Analyze Cold Start First Cycles Engine-Out Emissions at Elevated Cranking Speed Conditions of a Hybrid Electric Vehicle Including a Gasoline Direct Injection Engine ", *SAE International Journal of Engines*, Journal Article Number 03-15-06-0044, Vol. 15, Issue 6, 21 pages, 2022.

74- C. Reddy*, V. Bonfochi Vinhaes*, J. D. Naber, R. D. Robinett III, M. Shahbakhti, " Model Predictive Control of a Dual Fuel Engine Integrated with Waste Heat Recovery used for Electric Power in Buildings", *Optimal Control Applications and Methods*, 20 pages, 2022.

73- A. Mohammad, R. Rezaei, C. Hayduk, T. O. Delebinski, S. Shahpouri*, M. Shahbakhti, " Physical-oriented and Machine Learning-based Emission Modeling in a Diesel Compression Ignition Engine: Dimensionality Reduction and Regression ", *Int. J. of Engine Research*, 15 pages, 2022.

72- P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Real-time Estimation of Backlash Size in Automotive Drivetrains ", *IEEE/ASME Transactions on Mechatronics*, 11 pages, 2022.

Exhibit 1003, Page 507
Petitioner MWE Investments, LLC, et al.

71- A. Khameneian*, X. Wang, P. Dice, J. D. Naber, M. Shahbakhti, C. Archer, P. Moilanen, C. Glugla, G. Huberts, " A Real-Time Control-Oriented Discrete Nonlinear Model Development for In-Cylinder Air Charge, Residual Gas and Temperature Prediction of a Gasoline Direct Injection Engine Using Cylinder, Intake and Exhaust Pressures ", *Control Eng. Practice*, Vol. 119, 21 pages, 2022.

70- M. Aliramezania, C. R. Koch, M. Shahbakhti, " Modeling, Diagnostics, Optimization, and Control of Internal Combustion Engines via Advanced Machine Learning Techniques: A Review and Future Directions ", *Progress in Energy and Combustion Science*, Vol. 88, 38 pages, 2022.

69- S. Shahpouri*, A. Norouzi*, C. Hayduk, R. Rezaei, M. Shahbakhti, C. R. Koch, " Hybrid Machine Learning Approaches and a Systematic Model Selection Process for Predicting Soot Emissions in Compression Ignition Engines ", *Energies*, Vol. 14, Issue 23, 25 pages, 2021.

68- A. Norouzi*, H. Heidarifar*, M. Shahbakhti, C. R. Koch, H. Borhan, " Model Predictive Control of Internal Combustion Engines: A Review and Future Directions ", *Energies*, Vol. 14, Issue 19, 40 pages, 2021.

67- S. A. Nadeem*, P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Model Predictive Control of an Automotive Driveline for Optimal Torque Delivery with Minimal Oscillations during Torque Converter Slipping Conditions ", *SAE International Journal of Passenger Cars: Mechanical Systems*, Paper No. 06-14-01-0004, Vol. 14, Issue 1, 16 pages, 2021.

66- M. Toub*, C. R. Reddy*, R.D. Robinett III, M. Shahbakhti, " Integration and Optimal Control of MicroCSP with Building HVAC Systems: Review and Future Directions ", *Energies*, Vol. 14, Issue 3, 42 pages, 2021.

65- S. Hemmati*, N. Doshi*, D. Hanover*, C. Morgan, M. Shahbakhti, " Integrated HVAC and Powertrain Thermal Energy Management for a Connected Hybrid Electric Vehicle ", *Applied Energy*, Vol. 283, 22 pages, 2021.

64- A. Paykani, A. Garcia Martinez, M. Shahbakhti, P. Rahnama, R. D. Reitz, " Reactivity Controlled Compression Ignition Engine: Pathways Towards Commercial Viability ", *Applied Energy*, Vol. 282, Part A, 23 pages, 2021.

63- S. Polat*, H. S. Yücesu, A. Uyumaz, K. Kannan*, M. Shahbakhti, " An Experimental Investigation on Combustion and Performance Characteristics of Supercharged HCCI Operation in Low Compression Ratio Engine Setting ", *Applied Thermal Engineering*, Vol. 180, 16 pages, Nov. 2020.

62- Y. Bao, J. Mohammadpour Velni, M. Shahbakhti, " Epistemic Uncertainty Quantification in State-space LPV Model Identification Using Bayesian Neural Networks ", *IEEE Control Systems Letters (L-CSS)*, Vol. 5, Issue 2, Pages 719-724, 2020.

61- X. Ma, M. Shahbakhti, T. Chigan, " Connected Vehicle based Distributed Meta-Learning for Online Adaptive Engine/Powertrain Fuel Consumption Modeling ", *IEEE Transactions on Vehicular Technology*, Vol. 69, Issue 9, Pages 9553-9565, 2020.

60- C. Reddy*, M. Shahbakhti, R. Robinett, M. Razmara*, " Exergy-wise Predictive Control Framework for Optimal Performance of MicroCSP Systems for HVAC Applications in Buildings ", *Energy Conversion and Management*, Vol. 210, 15 pages, 2020.

59- M. Toub*, C. Reddy*, M. Razmara*, M. Shahbakhti, R. Robinett, G. Aniba, " Model-Based Predictive Control for Optimal MicroCSP Operation Integrated with Building HVAC Systems ", *Energy Conversion and Management*, Vol. 199, 16 pages, 2019.

58- V. R. Chundru, B. S. Mahadevan*, J. H. Johnson, G. G. Parker, M. Shahbakthi, " Development of a 2D Model of a SCR Catalyst on a DPF ", *Emission Control Science and Technology*, Vol. 5, Issue 2, Pages 133-171, 2019.

57- E. Ansari*, T. Menucci, M. Shahbakhti, J. Naber, " Experimental Investigation into Effects of High Reactive Fuel on Combustion and Emission Characteristics of the Diesel - Natural Gas RCCI Engine ", *Applied Energy*, Vol. 239, Pages 948-956, 2019.

56- A. Raut*, B. Irdmousa*, M. Shahbakhti, " Dynamic Modeling and Model Predictive Control of an RCCI Engine ", *Control Engineering Practice*, Vol. 81, Pages 129-144, 2018.

55- E. Ansari*, M. Shahbakhti, J. Naber, " Optimization of Performance and Operational Cost for a Dual Mode

Exhibit 1003, Page 508
Petitioner MWE Investments, LLC, et al.

Diesel-Natural Gas RCCI and Diesel Combustion Engine ", *Applied Energy*, Vol. 231, Pages 549-561, 2018.

54- M. Bidarvatan*, M. Shahbakhti, " Analysis and Control of Torque Split in Hybrid Electric Vehicles by Incorporating Powertrain Dynamics ", *ASME Journal of Dynamic Systems, Measurement, Control*, Vol. 140, Issue 11, No. 111009-111009-11, 2018.

53- M. Amini*, M. Shahbakhti, S. Pan, " Adaptive Discrete Second Order Sliding Mode Control with Application to Nonlinear Automotive Systems ", *ASME Journal of Dynamic Systems, Measurement, Control*, Vol. 140, Issue 12, No. 121010-121010-12, 2018.

52- B. M. Mahadevan*, J. Johnson, M. Shahbakhti, " Development of a Kalman Filter Estimator for Simulation and Control of Particulate Matter Distribution of a Diesel Catalyzed Particulate Filter ", *International Journal of Engine Research*, 19 pages, DOI: 10.1177/1468087418785855, 2018.

51- M. Razmara*, G. Bharati, M. Shahbakhti, S. Paudyal, R. Robinett, " Bilevel Optimization Framework for Smart Building-to-Grid Systems ", *IEEE Transactions on Smart Grid*, Vo. 9, No. 2, Pages 582-593, 2018.

50- A. Solouk*, M. Shakiba, J. Arora*, M. Shahbakhti, " Fuel Consumption Assessment of an Electrified Powertrain with a Multi-Mode High-Efficiency Engine in Various Levels of Hybridization ", *Energy Conversion and Management*, Vol. 155, Pages 100-115, 2018.

49- A. Rezaei*, J. B. Burl, A. Solouk*, B. Zhou, M. Rezaei, M. Shahbakhti, " Catch Energy Saving Opportunity (CESO), an Instantaneous Optimal Energy Management Strategy for Series Hybrid Electric Vehicles ", *Applied Energy*, Vol. 208, pages 655-665, 2017.

48- A. Solouk*, J. Tripp*, M. Shakiba, M. Shahbakhti, " Fuel Consumption Assessment of a Multi-Mode Low Temperature Combustion Engine as Range Extender for an Electric Vehicle ", *Energy Conversion and Management*, Vol. 148, pages 1478–1496, 2017.

47- M. Razmara*, G. R. Bharati, D. Hanover*, M. Shahbakhti, S. Paudyal, R.D. Robinett III, " Building-to-grid Predictive Power Flow Control for Demand Response and Demand Flexibility Programs ", *Applied Energy*, Vol. 203, pages 128-141, 2017.

46- K. Poorghasemi, R. Khoshbakhti Saray, E. Ansari*, B. Khoshbakht*, M. Shahbakhti, J. D. Naber, " Effect of Diesel Injection Strategies on Natural Gas/Diesel Combustion Characteristics in a Light Duty Diesel Engine ", *Applied Energy*, Vol. 199, pages 430-446, 2017.

45- B. Bahri, M. Shahbakhti, A.A. Aziz, " Real-time Modeling of Ringing in HCCI Engines using Artificial Neural Networks ", *Energy*, Vol. 125, pages 509-518, 2017.

44- M. Fathi, O. Jahanian, M. Shahbakhti, " Modeling and Controller Design Architecture for Cycle-by-Cycle Combustion Control of Homogeneous Charge Compression Ignition (HCCI) Engines - A Comprehensive Review ", *Energy Conversion and Management*, Vol. 139, pages 1-19, 2017.

43- M. R. Amini*, M. Shahbakhti, S. Pan, J. K. Hedrick, " Bridging the Gap Between Designed and Implemented Controllers via Adaptive Robust Discrete Sliding Control ", *Control Engineering Practice*, Vol. 59, pages 1-15, 2017.

42- A. Solouk*, M. Shakiba, M. Shahbakhti, " Analysis and Control of a Torque Blended Hybrid Electric Powertrain with a Multi-Mode LTC-SI Engine ", *SAE Int. J. of Alternative Powertrains*, 15 pages, 6(1):2017, DOI:10.4271/2017-01-1153, 2017.

41- M. R. Amini*, M. Razmara*, M. Shahbakhti, " Robust Model-Based Discrete Sliding Mode Control of an Automotive Electronic Throttle Body ", *SAE Int. J. of Commercial Vehicles*, 15 pages, 10(1):2017, DOI:10.4271/2017-01-0598, 2017.

40- Y. Wang*, J. Zhang*, X. Wang*, P. Dice, M. Shahbakhti, J. Naber, M. Czekala, Q. Qu, G. Huberts, " Investigation of Impacts of Spark Plug Orientation on Early Flame Development and Combustion in a DI Optical Engine ", *SAE Int. J. Engines*, 17 pages, 10(3):2017, DOI:10.4271/2017-01-0680, 2017.

39- A. Solouk*, M. Shahbakhti, " Modeling and Energy Management of an HCCI based Powertrain for Series Hybrid and Extended Range Electric Vehicles ", *Int. J. of Powertrains*, Vol. 6, Issue 3, pages 226-258, 2017.

38- B. M. Singalandapuram*, J. H. Johnson and M. Shahbakhti, " Predicting Pressure Drop, Temperature and Particulate Matter Distribution of a Catalyzed Diesel Particulate Filter using a Multi-zone Model including Cake Permeability ", *Emission Control Science & Technology*, Vol. 3, Issue 2, pages 171-201, 2017.

37- A. Solouk*, M. Shahbakhti, " Energy Optimization and Fuel Economy Investigation of Series Hybrid Electric Vehicle Integrated with Diesel/RCCI Engines ", *Energies*, 9(12), pages 1-23, 1020; 2016.

36- M. Razmara*, M. Bidarvatan*, M. Shahbakhti, R. Robinett III, " Optimal Exergy-based Control of Internal Combustion Engines ", *Applied Energy*, Vol. 183, pages 1389-1403, 2016.

35- B. Bahri, M. Shahbakhti, K. Kannan*, A.A. Aziz, " Identification of Ringing Operation for Low Temperature Combustion Engines ", *Applied Energy*, Vol. 171, pages 142-152, Jun. 2016.

34- M.R. Nazemi* and M. Shahbakhti, " Modeling and Analysis of Fuel Injection Parameters for Combustion and Performance of an RCCI Engine ", *Applied Energy*, Vol. 165, pages 135-150, Mar. 2016.

33- K. Khodadadi Sadabadi*, M. Shahbakhti, A. N. Bharath and R. D. Reitz, " Modeling of Combustion Phasing of a Reactivity-Controlled Compression Ignition Engine for Control Applications ", *Int. J. of Engine Research*, Vol. 17, Issue 4, Pages 421-435, 2016.

32- M. Razmara*, M. Maasoumy, M. Shahbakhti, and R. D. Robinett III, " Optimal Exergy Control of Building HVAC System ", *Applied Energy*, Vol. 156, pages 555-565, Oct. 2015.

31- B. M. Singalandapuram*, J. H. Johnson and M. Shahbakhti, " Experimental and Simulation Analysis of Temperature and Particulate Matter Distribution for a Catalyzed Diesel Particulate Filter ", *Emission Control Science & Technology*, Vol. 1, Issue 4, Pages 255-283, Oct. 2015.

30- M. Boudaghi*, M. Shahbakhti, S.A. Jazayeri, " Misfire Detection of SI Engines Using a New Technique Based on Mean Power Output ", *ASME J. of Engineering for Gas Turbines and Power*, 9 pages, Vol. 137, Issue 9, Sept. 2015.

29- B. M. Singalandapuram*, J. H. Johnson and M. Shahbakhti, " Development of a Catalyzed Diesel Particulate Filter Multi-zone Model for Simulation of Axial and Radial Substrate Temperature and Particulate Matter Distribution ", *Emission Control Science & Technology*, Vol. 1, Issue 2, Pages 183-202, May 2015.

28- R. Salehi*, A. Alasty, M. Shahbakhti, G. Vossoughi, " Detection and Isolation of Faults in the Exhaust Path of Turbocharged Automotive Engines ", *Int. J. of Automotive Technology*, Vol. 16, Issue 1, Pages 127-138, Feb. 2015.

27- J. Rezaei*, M. Shahbakhti, B. Bahri, A.A. Aziz, " Performance Prediction of Oxygenate Fueled HCCI Engines using Artificial Neural Networks ", *Applied Energy*, Vol. 138, Pages 460-473, Jan. 2015.

26- M. Shahbakhti, M. R. Amini*, J. Li*, S. Asami, J. K. Hedrick, " Early Model-Based Design and Verification of Automotive Control System Software Implementations ", *ASME Journal of Dynamic Systems, Measurement and Control*, 14 pages, Vol. 137, Issue 2, Feb. 2015.

25- M. Bidarvatan*, V. Thakkar*, M. Shahbakhti, B. Bahri, A.A. Aziz, " Grey-box Modeling of HCCI Engines ", *Applied Thermal Engineering*, Vol. 70, Issue 1, Pages 397-409, Sept. 2014.

24- M. Maasoumy, M. Razmara*, M. Shahbakhti, A. Sangiovanni-Vincentelli, " Handling Model Uncertainty in Model Predictive Control for Energy Efficient Buildings ", *Energy and Buildings*, Vol. 77, Pages 377-392, Jul. 2014.

23- M. Amini*, M. Shahbakhti, A. Ghaffari, " A Novel Singular Perturbation Technique for Model-Based Control of Cold Start Hydrocarbon Emission ", *SAE Int. J. Engines*, 13 pages, Vol. 7, Issue 3, Aug. 2014.

22- M. Bidarvatan*, M. Shahbakhti, " Integrated HCCI Engine Control based on a Performance Index ", *ASME J. of Engineering for Gas Turbines and Power*, 12 pages, Vol. 136, Issue 10, Oct. 2014.

21- M. Bidarvatan*, M. Shahbakhti, " Grey-Box Modeling for Performance Control of an HCCI Engine with Blended Fuels ", *ASME J. of Engineering for Gas Turbines and Power*, 10 pages, Vol. 136, Issue 10, Oct. 2014.

20- R. Salehi*, M. Shahbakhti, J. K. Hedrick, " Real-time Hybrid Switching Control of Automotive Cold Start Hydrocarbon Emission ", *ASME J. of Dynamic Systems, Measurement and Control*, 11 pages, Vol. 136, Issue 4, Jul. 2014.

19- M. Bidarvatan*, M. Shahbakhti, S. A. Jazayeri, C. R. Koch, " Cycle-to-Cycle Modeling and Sliding Mode Control of Blended-Fuel HCCI Engine ", *J. of Control Engineering Practice*, Vol. 24, Pages 79-91, Mar. 2014.

18- M. Koochack, A. Gharehghani, M. Shahbakhti, " Experimental and Simulation Study of In-cylinder Strategies for Regeneration of Lean NOx Traps in an HSDI Diesel Engine ", *IMechE Part D: J. of Automobile Engineering*, Vol. 227, Issue 12, Pages 1661-1673, Dec. 2013.

17- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " Analysis and Modeling of Exhaust Gas Temperature in an Ethanol Fuelled HCCI Engine ", *J. of Mechanical Science and Technology*, Vol. 27, Issue 11, Pages 3531-3539, Nov. 2013.

16- M. Dehghani*, M. Shahbakhti, C. R. Koch, S. A. Jazayeri, " Thermodynamic Control-oriented Modeling of Cycle-to-Cycle Exhaust Gas Temperature in an HCCI Engine ", *Applied Energy*, Vol. 110, Pages 236-243, Oct. 2013.

15- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " Understanding and Detection of Misfire in an HCCI Engine Fuelled with Ethanol ", *Applied Energy*, Vol. 108, pages 24-33, Aug. 2013.

14- M. Nazoktabar, S. A. Jazayeri, O. Jahanian, M. Shahbakhti, " Using a Single Zone Thermodynamic Model in an HCCI Engine to Predict Effective Controlling Parameters ", *J. of Engine Research*, Vol. 25, pages 13-23, 2013.

13- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " Misfire Detection Based on Statistical Analysis for an Ethanol Fueled HCCI Engine ", *J. of International Review of Mechanical Engineering*, Vol. 6, Issue 6, pages 1276-1282, 2012.

12- M. Bidarvatan*, M. Shahbakhti, S. A. Jazayeri, " Model-Based Control of Combustion Phasing in an HCCI Engine ", *SAE Int. J. Engines*, Vol. 5, Issue 3, pages 1163-1176, 2012.

11- M. Bidarvatan*, M. Shahbakhti, S. A. Jazayeri, " Optimal Integral State Feedback Control of HCCI Combustion Timing ", *Int. J. of Automotive Engineering*, Vol. 1, Issue 3, pages 206-217, 2011.

10- M. Shahbakhti, A. Ghazimirsaied, C. R. Koch, " Experimental Study of Exhaust Temperature Variation in an HCCI Engine ", *IMechE Part D: J. of Automobile Engineering*, Vol. 224, pages 1177-1197, 2010.

9- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " HCCI Combustion Phasing Prediction Using a Symbol-Statistic Approach ", *ASME J. of Engineering for Gas Turbine and Power*, Vol. 132, Issue 8, 5 pages, Aug. 2010.

8- M. Shahbakhti, C. R. Koch, " Physics Based Control Oriented Model for HCCI Combustion Timing ", *ASME J. of Dynamic Systems, Measurement and Control*, Vol. 132, Issue 2, 12 pages, Mar. 2010.

7- M. Shahbakhti, S. A. Jazayeri, M. Ghafuri, A. R. Aslani, A. Sahraeian, S. Azadi, " A Method to Determine Fuel Transport Dynamic Model Parameters in Port-Fuel Injected Gasoline Engines during Cold Start and Warm-Up Conditions ", *ASME J. of Engineering for Gas Turbine and Power*, Vol. 132, Issue 7, 5 pages, Jul. 2010.

6- M. Shahbakhti, C. R. Koch, " Dynamic Modeling of HCCI Combustion Timing in Transient Fueling Operation ", *SAE Int. J. Engines*, Vol. 2, pages 1098-1113, Oct. 2009.

6- M. Shahbakhti, C. R. Koch, " Characterizing the Cyclic Variability of Ignition Timing in an HCCI Engine

Fueled with n-Heptane/iso-Octane Blend Fuels ", *Int. J. of Engine Research*, Vol. 9, Issue 5, pages 361-397, Oct. 2008.

4- M. Shams Zahraei, S. A. Jazayeri, M. Shahbakhti, M. Sharifirad, " Look-Forward Longitudinal Dynamic Modeling for a Series-Parallel Hybrid Electric Vehicle ", *Int. J. of Electric and Hybrid Vehicles*, Vol. 1, Issue 4, pages 342-363, 2008.

3- P. Kirchen, M. Shahbakhti, C. R. Koch, " A Skeletal Kinetic Mechanism for PRF Combustion in HCCI Engines ", *J. of Combustion Science and Technology*, Vol. 179, Issue 6, pages 1059-1083, Jun. 2007.

2- K. Swan, M. Shahbakhti, C. R. Koch, " Predicting Start of Combustion Using a Modified Knock-Integral Method for an HCCI Engine ", *SAE 2006 Transactions J. of Engines*, pages 611-620, Mar. 2007.

1- S. Sharifi Rad, S. A. Jazayeri, M. Shahbakhti, " Automatic Driver Design and Longitudinal Dynamic Simulation for Passenger Cars ", *SAE 2006 Transactions J. of Passenger Cars - Mechanical Systems*, pages 923-930, Mar. 2007.

Submitted Journal Papers

1- H. Mehnatkesh*, A. Winkler, E. Sperling, J. Kheyrollahi Kalvanagh, M. Shahbakhti, D. Gordon, C. R. Koch, " Procedure for Deep Learning-Based Model Predictive Control with Bayesian Hyperparameter Optimization for a Hydrogen/Diesel Dual-Fuel Engine ", *Control Engineering Practice*, 24 pages, Dec. 2024.

2- A. Yasami*, M. Tofigh*, B. Bahri, C. R. Koch, M. Shahbakhti, " Intelligent Ensemble Architecture for Capturing Transient Nitrogen Oxides (NOx) Emission Spikes in Real World Driving Condition ", *Engineering Applications of Artificial Intelligence*, 37 pages, Feb. 2025.

3- L. Jiang*, M. Shahbakhti, " Reducing Fuel Consumption and Tailpipe Nitrogen Oxides Emissions through Large-Spacing Cooperative Truck Platooning under Varying Road Gradients ", *Journal of Transportation Part D*, 30 pages, Mar. 2025.

4- A. Razmi*, A. R. Hanifi, M. Shahbakhti, " Techno-economic Assessment of Solid Oxide Fuel Cells Versus Hydrogen Fuelled Internal Combustion Engines for Institutional Energy Management: A Case Study of the University of Alberta", *Energy*, 30 pages, Apr. 2025.

5- S. Shahpouri*, L. Jiang*, C. R. Koch, M. Shahbakhti, " Tailpipe NOx Emissions Modeling of a Heavy-Duty Diesel Truck using Deep Learning Method ", *Energies*, 28 pages, Apr. 2025.

6- A. Yasami*, M. Tofigh*, M. Shahbakhti, C. R. Koch, " A Generative Physics-Informed Reinforcement Learning-Based Approach for Construction of Representative Drive Cycle ", *Transportation Research Part D*, 27 pages, Apr. 2025.

Selected Peer Reviewed Conference Proceeding Papers (6 to 22-page conference papers)

138- L. Jiang*, M. Shahbakhti, " Large-Spacing Truck Platooning under Windy Conditions ", *American Control Conference*, 6 Pages, Jul. 8-10, 2025, Denver, CO, USA. [Accepted in Jan. 2025]

137- M. Tofigh*, D. Smith, S. Hanifi*, A. Hanifi, M. Shahbakhti, " A deep Conv-Atten-KAN Architecture to Identify Solid Oxide Fuel Cell Dynamics under Fuel Starvation ", *IEEE/IFAC 9th International Conference on Control Automation and Diagnosis (ICCAD'25)*, 6 Pages, Jul. 1-3, 2025, Barcelona, Spain. [Accepted in Apr. 2025]

136- A. Yasami*, M. Tofigh*, L. Jiang*, H. Abediasl*, C. R. Koch, M. Shahbakhti, " Data-Efficient Vehicular Fuel Rate Estimation via Transfer Learning Using Nonlinear-Autoregressive-Exogenous Neural Network ", *11th Symposium on Advances in Automotive Control*, 6 Pages, Jun. 16-18, 2025, Eindhoven, Netherlands. [Accepted in Feb. 2025]

135- A. Yasami*, M. Tofigh*, M. Shahbakhti, C. R. Koch, " Representative Driving Cycle Construction Incorporating Road Grade Transitions Using A Markov-chain Method ", *Canadian Society of Mechanical*

Engineers (CSME) 2025 International Congress, 6 pages, May 25-28, 2025, Montréal, QC, Canada. [Accepted in Mar. 2025]

134- L. Jiang*, M. Shahbakhti, " Fuel-Efficient Large-Spacing Truck Platooning in Windy Conditions Considering Longitudinal and Lateral Motions ", *Int. Conference on Intelligent Transportation and Future Mobility (ITFM 2025)*, 6 Pages, Apr. 11-13, 2025, Guilin, Guangxi, China.

133- N. Balazadeh, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan, " Evaluating the Potential of a Turbo-compound System for a Heavy-Duty Natural Gas Engine: A Modelling Study ", *SAE 2025 World Congress*, 20 pages, SAE Paper No. 2025-01-8355, Apr. 8-10, 2025, Detroit, MI, USA.

132- A. Razmi*, A. R. Hanifi, M. Shahbakhti, " Potential of Solid Oxide Fuel Cell-based Combined Heat and Power Systems for Commercial and Residential Applications in Alberta and Canada", *Global conference on Renewable Energy and Climate Change*, 6 Pages, Nov. 27-28, 2024, Toronto, ON, Canada.

131- Z. Salehi*, M. Tofigh*, S. Vafaeenezhad*, A. Kharazmi, D. J. Smith, C. R. Koch, M. Shahbakhti, " Performance Prediction of a Range of Diverse Solid Oxide Fuel Cells using Deep Learning and Principal Component Analysis ", *IFAC Modeling, Estimation and Control Conference (MECC)*, 6 Pages, Oct. 27-30, 2024, Chicago, IL, USA.

130- H. Abediasl*, M. Aliramezani, C. R. Koch, M. Shahbakhti, " Monitoring Real-time Fleet Emissions through an Intelligent Fleet Management System ", *27th IEEE International Conference on Intelligent Transportation Systems (ITS)*, 6 Pages, Sep. 24-27, 2024, Edmonton, AB, Canada.

129- L. Jiang*, D. Gordon, M. Shahbakhti, " Fuel Efficient Control System Design for Cooperative Truck Platooning at Large Separation Distances ", *27th IEEE International Conference on Intelligent Transportation Systems (ITS)*, 6 Pages, Sep. 24-27, 2024, Edmonton, AB, Canada.

128- M. Tofigh*, Z. Salehi*, D. Smith, A. Kharazmi, A. R. Hanifi, C.R. Koch, M. Shahbakhti, " Developing an Efficient Model for a SOFC System Using Self-supervised Convolutional Autoencoder and Stateful LSTM Network ", *American Control Conference*, 6 pages, Jul. 8-12, 2024, Toronto, ON, Canada.

127- Y. Ma*, B. Bahri*, M. Shahbakhti, " A Simulation Model of a Fuel Cell Electric Bus for Predicting Energy Consumption ", *Canadian Society of Mechanical Engineers (CSME) 2024 International Congress*, 6 pages, May 26-29, 2024, Toronto, ON, Canada.

126- Y. Ma*, B. Bahri*, M. Shahbakhti, " A Simulation Model for Predicting Energy Consumption of an Electric Transit Bus ", *Canadian Society of Mechanical Engineers (CSME) 2024 International Congress*, 6 pages, May 26-29, 2024, Toronto, ON, Canada.

125- S. Batool*, J. Naber, M. Shahbakhti, " Classification and Characterization of Heat Release Rate Traces in Low Temperature Combustion for Optimal Engine Operation ", *SAE 2024 World Congress*, 11 pages, SAE Paper No. 2024-01-2835, Apr. 16-18, 2024, Detroit, MI, USA.

124- N. Balazadeh, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan, " Downsizing a Heavy-Duty Natural Gas Engine by Scaling the Air Handling System and Leveraging Phenomenological Combustion Model ", *SAE 2024 World Congress*, 17 pages, SAE Paper No. 2024-01-2114, Apr. 16-18, 2024, Detroit, MI, USA.

123- S. Batool*, J. D. Naber, M. Shahbakhti, " Closed-loop Control of SI↔RCCI Mode Transitions in a Multi-Mode Combustion Engine, ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 56, Issue 3, Pages 79-84, Oct. 2-5, 2023, Lake Tahoe, NV, USA.

122- P. Reddy*, X. Wang, M. Shahbakhti, J. D. Naber, M. Ravichandran, J. Doering, " Integration of Optimal Engine and Driveline Controllers to Minimize Driveline Clunk and Shuffle ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 56, Issue 3, Pages 91-96, Oct. 2-5, 2023, Lake Tahoe, NV, USA.

121-B. Khoshbakht*, J. Naber, M. Shahbakhti, " CFD-based Data-driven Modeling of Reactivity and Stratification Dynamics for RCCI Engine Control ", *IFAC World Congress*, 6 pages, July 9-14, 2023, Yokohama, Japan.

120- S. Moghadasi*, A. Salahi*, H. Borhan, C. R. Koch, M. Shahbakhti, " Model Predictive Control Using Machine Learning for Voltage Control of a PEM Fuel Cell Stack ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

119- A. Salahi*, S. Moghadasi*, H. Borhan, C. R. Koch, M. Shahbakhti, " Imitative Learning Control of a LSTM-NMPC Controller on PEM Fuel Cell for Computational Cost Reduction ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

118- H. Heidarifar*, M. Shahbakhti, " Energy Saving in a Residential Building Using Occupancy Information ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

117- H. Heidarifar*, M. Shahbakhti, " Occupancy Detection in a Residential Building Using Sensor Fusion Data and Machine Learning Algorithms ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

116- Y. Liu*, H. Abediasl*, A. Ansari*, M. Shahbakhti, " Characterizing Driving Behavior and Link to Fuel Consumption for University Campus Shuttle Minibuses ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

115- A. Yasami*, A. Vafamand*, A. Jordan, H. Borhan, C. R. Koch, M. Shahbakhti, " Control of a Modified Double Inverted Pendulum Using Machine Learning Based Model Predictive Control ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

114- N. Balazadeh Meresht, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan1, " Developing Machine Learning Models to Predict Methane and Nitrogen Oxide Engine-out Emissions from a Heavy-duty Natural-gas Engine ", *Canadian Society of Mechanical Engineers (CSME) 2023 International Congress*, 6 pages, May 28-31, 2023, Sherbrooke, QC, Canada.

113- R. Sitaraman*, S. Batool*, H. Borhan, J. Mohammadpour Velni, J. D. Naber, M. Shahbakhti, " Machine Learning-based Classification of Combustion Events in an RCCI Engine Using Heat Release Rate Shapes ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, 7 Pages, Oct. 2-5, 2022, Jersey City, NJ, USA.

112-R. Sitaraman*, S. Batool*, H. Borhan, J. Mohammadpour Velni, J. D. Naber, M. Shahbakhti, " Data-Driven Model Learning and Control of RCCI Engines based on Heat Release Rate ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, 7 Pages, Oct. 2-5, 2022, Jersey City, NJ, USA.

111-A. Norouzi*, S. Shahpouri*, D. Gordon, A. Winkler, E. Nuss, D. Abel, M. Shahbakhti, C. R. Koch, " Machine Learning Integrated with Model Predictive Control for Imitative Optimal Control of Compression Ignition Engines ", *10th IFAC Symposium on Advances in Automotive Control*, 8 pages, Aug. 28-31, 2022, Columbus, OH, USA.

110- Y. Liu*, A. Ansari*, M. Shahbakhti, " Identification of the Driving Cycle for University Fleet Vehicles ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, 6 pages, Jun. 5-8, 2022, Edmonton, AB, Canada.

109- A. Khaled ElKashat*, A. R. Razmi*, S. Vafaeenezhad, A. R. Hanifi, T. H. Etsell, M. Shahbakhti, " Experimental and Thermodynamic Analyses of a Novel Anode Supported Solid Oxide Fuel Cell ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, 6 pages, Jun. 5-8, 2022, Edmonton, AB, Canada.

108- H. Abediasl*, V. Hosseini, C. R. Koch, M. Shahbakhti, " Emission Measurement of University Fleet Vehicles through On-road Remote Sensing and Identification of High NOx Emitters ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, 6 pages, Jun. 5-8, 2022, Edmonton, AB, Canada.

107- A. Ansari*, H. Abediasl*, P. Rakeshkumar Patel*, V. Hosseini, C. R. Koch, M. Shahbakhti, " Estimating Instantaneous Fuel Consumption of Vehicles by using Machine Learning and Real-time On-board Diagnostics (OBD) Data ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, 6 pages, Jun. 5-8, 2022, Edmonton, AB, Canada.

106- V. Bonfochi Vinhaes*, X. Yang*, G. McTaggart-Cowan, B. Eggar, S. Munshi, M. Shahbakhti, J. D. Naber, " Multi-Variable Sensitivity Analysis and Ranking of Control Factors Impact in a Stoichiometric Micro-

Pilot Natural Gas Engine at Medium Loads ", *2022 SAE World Congress*, 14 pages, SAE Paper No. 2022-01-0463, Apr. 5-7, 2022, Detroit, MI, USA.

105- S. Batool*, J. Naber, M. Shahbakhti, " Data-Driven Modeling and Control of Cyclic Variability of an Engine Operating in Low Temperature Combustion Modes ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 54, Issue 20, Pages 834-839, Oct. 24-27, 2021, Austin, TX, USA.

104- S. Shahpouri*, A. Norouzi*, C. Hayduk, R. Rezaei, M. Shahbakhti, C.R. Koch, " Soot Emission Modeling of a Compression Ignition Engine Using Machine Learning ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 54, Issue 20, Pages 826-833, Oct. 24-27, 2021, Austin, TX, USA.

103- P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Drivetrain Clunk Control via a Reference Governor ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 54, Issue 20, Pages 846-851, Oct. 24-27, 2021, Austin, TX, USA.

102- B. Khoshbakht Irdmousa*, J. Naber, J. Mohammadpour Velni, H. Borhan, M. Shahbakhti, " Input-output Data-driven Modeling and MIMO Predictive Control of an RCCI Engine Combustion ", *IFAC Modeling, Estimation and Control Conference (MECC)*, IFAC-PapersOnLine, Vol. 54, Issue 20, Pages 406-411, Oct. 24-27, 2021, Austin, TX, USA.

101- C. R. Reddy*, M. Shahbakhti, R. D. Robinett III, V. B. Vinhaes* and J. D. Naber, " Model Predictive Control of a Waste Heat Recovery System Integrated with a Dual Fuel Natural Gas-Diesel Engine ", *American Control Conference*, pages 1842-1847, May 26-28, 2021, New Orleans, LA, USA.

100- A. Mohammad, R. Rezaei, C. Hayduk, T. O. Delebinski, S. Shahpouri*, M. Shahbakhti, " Hybrid Physical and Machine Learning-oriented Modeling Approach to Predict Emissions in a Diesel Compression Ignition Engine ", *SAE 2021 World Congress*, 12 pages, SAE Paper No. 2021-01-0496, Apr. 13-15, 2021, Detroit, MI, USA.

99- Y. Bao, J. Mohammadpour Velni, M. Shahbakhti, " An Online Transfer Learning Approach for Identification and Predictive Control Design with Application to RCCI Engines ", *2020 ASME Dynamic Systems Control Conference*, 9 pages, Oct. 4-7, 2020, Pittsburgh, PA, USA.

98- A. Khameneian*, X. Wang, P. Dice, M. Shahbakhti, J. Naber, C. Archer, P. Moilanen, C. Glugla, G. Huberts, " Model-Based Dynamic In-Cylinder Air Charge, Residual Gas and Temperature Estimation for a GDI Spark Ignition Engine Using Cylinder, Intake and Exhaust Pressures ", *2020 ASME Dynamic Systems Control Conference*, 10 pages, Oct. 4-7, 2020, Pittsburgh, PA, USA.

97- P. Reddy*, K. Darokar*, M. Shahbakhti, D. Robinette, M. Ravichandran, and J. Doering, " Backlash Size Estimation in Automotive Drivelines ", *IEEE Conference on Control Technology and Applications*, 6 pages, Aug. 24-26, 2020, Montréal, Canada.

96- L. N. A. Basina*, B. K. Irdmousa*, J. Mohammadpour Velni, H. Borhan, J. D. Naber, and M. Shahbakhti, " Data-driven Modeling and Predictive Control of Maximum Pressure Rise Rate in RCCI Engines ", *IEEE Conference on Control Technology and Applications*, 6 pages, Aug. 24-26, 2020, Montréal, Canada.

95- K. Darokar*, P. Reddy*, M. Shahbakhti, D. Robinette, M. Ravichandran, and J. Doering, " Automotive Backlash Position Estimator for Driveline Jerk Control ", *IEEE Conference on Control Technology and Applications*, 6 pages, Aug. 24-26, 2020, Montréal, Canada.

94-Y. Bao, J. Mohammadpour Velni, A. Basina*, M. Shahbakhti, " Identification of State-space Linear Parameter-varying Models Using Artificial Neural Networks ", *IFAC World Congress*, 6 pages, Jul. 12-17, 2020, Berlin, Germany.

93- R. Maharjan*, M. Shahbakhti, R. Rezaei, R. Möllmann, Y. Huang, T. Delebinski " Optimization of Diesel Engine and After-treatment Systems for a Series Hybrid Forklift Application ", *SAE 2020 World Congress*, 12 pages, SAE Paper No. 2020-01-0658, Apr. 21-23, 2020, Detroit, MI, USA.

Exhibit 1003, Page 515
Petitioner MWE Investments, LLC, et al.

92- M. Toub*, M. Shahbakhti, R. Robinett, G. Aniba, " Model Predictive Control of MicroCSP Integrated into a Building HVAC System for Load Following Demand Response Programs ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 8-11, 2019, Park City, UT, USA.

91- X. Wang, A. Khamenian*, P. Dice, B. Chen, M. Shahbakhti, J. Naber, C. Archer, Q. Qu, C. Glugla, G. Huberts, " Control-Oriented Model-Based Burn Duration and Ignition Timing Prediction with Recursive-Least-Square Based Adaptation for Closed-Loop Combustion Phasing Control of a Spark Ignition Engine ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 8-11, 2019, Park City, UT, USA.

90- N. Doshi*, D. Hanover*, S. Hemmati*, C. Morgan, M. Shahbakhti, " Modeling of Thermal Dynamics of a Connected Hybrid Electric Vehicle for Integrated HVAC and Powertrain Optimal Operation ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 8-11, 2019, Park City, UT, USA.

89- P. Krishna Bhat, J. Oncken, R. Yadav*, B. Chen, M. Shahbakhti, and D. Robinette, "Generation of Optimal Velocity Trajectory for Real-Time Predictive Control of a Multi-Mode PHEV," *2019 IEEE 90th Vehicular Technology Conference: VTC2019-Fall*, Sep. 22–25, 2019, Honolulu, Hawaii, USA.

88- S. Polat*, H. Serdar Yücesu, H. Solmaz*, A. Uyumaz, K. Kannan*, M. Shahbakhti, " An Experimental Study on the Variation of COV_{IMEP} and Ringing Intensity at Different Air Excess Coefficients in a HCCI Engine ", *International Symposium on Automotive Science and Technology (ISASTECH)*, 9 pages, Sep. 5-6, 2019, Ankara, Turkey.

87- X. Wang, A. Khamenian*, P. Dice, B. Chen, M. Shahbakhti, J. Naber, C. Archer, Q. Qu, C. Glugla, G. Huberts, " Model-Based Combustion Duration and Ignition Timing Prediction for Combustion Phasing Control of a Spark-Ignition Engine Using In-Cylinder Pressure Sensors ", 10 pages, *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE)*, Aug. 18-21, 2019, Anaheim, CA, USA.

86- S. Bhasme*, S. Hemmati*, D. Robinette, M. Shahbakhti, " Modelling of Chevy Volt Gen II Supervisory Controller in Charge-Sustaining Mode", 2019 International Conference on Advanced Vehicle Powertrains, 23 pages, Aug. 25-27, 2019, Hefei, China.

85- C. Reddy*, M. Razmara*, M. Shahbakhti, R. Robinett, " Optimal Exergy-wise Predictive Control for a Combined MicroCSP and HVAC System in a Building ", 6 pages, *American Control Conference*, Jul. 10-12, 2019, Philadelphia, PA, USA.

84- B. Khoshbakht Irdmousa*, S. Z. Rizvi, J. Mohammadpour Velni, J. Naber, M. Shahbakhti, " Data-driven Modeling and Predictive Control of Combustion Phasing for RCCI Engines ", 6 pages, *American Control Conference*, Jul. 10-12, 2019, Philadelphia, PA, USA.

83- M. Toub*, M. Shahbakhti, R. Robinett, G. Aniba, " MPC-trained ANFIS for Control of MicroCSP Integrated into a Building HVAC System ", 6 pages, *American Control Conference*, Jul. 10-12, 2019, Philadelphia, PA, USA.

82- P. Reddy*, K. Darokar*, D. Robinette, M. Shahbakhti, J. Blough, M. Ravichandran, M. Farmer, J. Doering, " Control-Oriented Modeling of a Vehicle Drivetrain for Shuffle and Clunk Mitigation ", *SAE 2019 World Congress*, 15 pages, SAE Paper No. 2019-01-0345, Apr. 9-11, 2019, Detroit, MI, USA.

81- X. Yang*, V. B. Vinhaes*, M. Turcios, G. McTaggart-Cowan, J. Huang, J. Naber, M. Shahbakhti, H. Schmidt, W. Atkinson, " Process for Study of Micro-Pilot Diesel-NG Dual Fuel Combustion in a Constant Volume Combustion Vessel Utilizing the Premixed Pre-burn Procedure ", *SAE 2019 World Congress*, 15 pages, SAE Paper No. 2019-01-1160, Apr. 9-11, 2019, Detroit, MI, USA.

80- C. R. Reddy*, M. Toub*, M. Razmara, M. Shahbakhti, R. D. Robinett III, G. Aniba, " Modeling and Optimal Control of MicroCSP and a Building HAVC System to Minimize Electricity Cost ", 10 pages, *ASME 2018 Dynamic Systems and Control Conference*, Sep. 30 – Oct. 3, 2018, Atlanta, GA, USA.

Exhibit 1003, Page 516
Petitioner MWE Investments, LLC, et al.

79- H. Wang, K. Sacheva, J. Tripp*, B. Chen, D. Robinette, M. Shahbakhti, " Optimal Map-Based Mode Selection and Powertrain Control for a Multi-Mode Plug-in Hybrid Electric Vehicle ", *14th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA)*, 6 pages, July 2-4, 2018, Oulu, Finland.

78- M. Toub*, C. R. Reddy*, M. Razmara, M. Shahbakhti, R. D. Robinett III, G. Aniba, " Model Predictive Control for MicoCSP Integration into a Building HVAC System ", *14th IEEE International Conference on Control and Automation*, 6 pages, Jun. 12-15, 2018, Anchorage, AK, USA.

77- M. Amini*, M. Shahbakhti, J. Sun, " Predictive Second Order Sliding Control of Constrained Linear Systems with Application to Automotive Control Systems ", *2018 American Control Conference*, 6 pages, June 27-29, 2018, Milwaukee, WI, USA.

76- A. Raut*, M. Bidarvatan, H. Borhan, M. Shahbakhti, " Model Predictive Control of an RCCI Engine ", 7 pages, *2018 American Control Conference*, 6 pages, June 27-29, 2018, Milwaukee, WI, USA.

75- Y. Wang*, J. Zhang, Z. Yang, X. Wang, P. Dice, M. Shahbakhti, J. Naber, M. Czekala, Q. Qu, G. Huberts, " Investigation of Flow Conditions and Tumble Near the Spark Plug in a DI Optical Engine at Ignition ", *SAE 2018 World Congress*, 18 pages, SAE Paper No. 2018-01-0208, Apr. 10-12, 2018, Detroit, MI, USA.

74- M. R. Amini*, M. Shahbakhti, S. Pan, " MIMO First and Second Order Discrete Sliding Mode Controls of Uncertain Linear Systems Under Implementation Imprecisions ", *ASME 2017 Dynamic Systems and Control Conference*, 10 pages, Oct. 11-13, 2017, Tysons Corner, VA, USA.

73- M. R. Amini*, M. Shahbakhti, " Design of an SI Engine Cold Start Controller based on Dynamic Coupling Analysis ", *2017 Int. Conference on Advanced Vehicle Powertrains*, 22 pages, Sep. 25-27, 2017, Hangzhou, China.

72- M. Razmara*, G. R. Bharati, D. Hanover*, M. Shahbakhti, S. Paudya, and R. D. Robinett III, " Enabling Demand Response Programs via Predictive Control of Building-to-Grid Systems Integrated with PV Panels and Energy Storage Systems ", *2017 American Control Conference*, 6 pages, May 24-26, 2017, Seattle, WA, USA.

71- M. R. Amini*, M. Shahbakhti, S. Pan, and J. K. Hedrick, " Discrete Adaptive Second Order Sliding Mode Controller Design with Application to Automotive Control Systems with Model Uncertainties ", *2017 American Control Conference*, 6 pages, May 24-26, 2017, Seattle, WA, USA.

70- N. Teja Kondipati*, J. K. Arora*, M. Bidarvatan, M. Shahbakhti, " Modeling, Design and Implementation of a Closed-Loop Combustion Controller for an RCCI Engine", *2017 American Control Conference*, 6 pages, May 24-26, 2017, Seattle, WA, USA.

69- M. Amini*, M. Razmara*, M. Shahbakhti, " Robust Model-Based Discrete Sliding Mode Control of an Automotive Electronic Throttle Body ", *SAE 2017 World Congress*, 15 pages, SAE Paper No. 2017-01-0598, Apr. 4-6, 2017, Detroit, MI, USA.

68- A. Solouk*, M. Shakiba, M. Shahbakhti, " Analysis and Control of a Torque Blended Hybrid Electric Powertrain with a Multi-Mode LTC-SI Engine ", *SAE 2017 World Congress*, 15 pages, SAE Paper No. 2017-01-1153, Apr. 4-6, 2017, Detroit, MI, USA.

67- J. K. Arora*, M. Shahbakhti, " Real-time Closed-loop Control of a Light-duty RCCI Engine During Transient Operations ", *SAE 2017 World Congress*, 15 pages, SAE Paper No. 2017-01-0767, Apr. 4-6, 2017, Detroit, MI, USA.

66- Y. Wang*, J. Zhang*, P. Dice, X. Wang*, M. Shahbakhti, J. Naber, M. Czekala, Q. Qu, G. Huberts, " An Experimental Study on the Interaction between Flow and Spark Plug Orientation on Ignition Energy and Duration for Different Electrode Designs ", *SAE 2017 World Congress*, 10 pages, SAE Paper No. 2017-01-0672, Apr. 4-6, 2017, Detroit, MI, USA.

65- A. Yazdani*, J. Naber, M. Shahbakhti, P. Dice, C. Glugla, S. Cooper, D. McEwan, G. Huberts, " Air Charge and Residual Gas Fraction Estimation for a Spark-Ignition Engine Using In-Cylinder Pressure ", *SAE 2017 World Congress*, 15 pages, SAE Paper No. 2017-01-0527, Apr. 4-6, 2017, Detroit, MI, USA.

Exhibit 1003, Page 517
Petitioner MWE Investments, LLC, et al.

64- Y. Wang*, J. Zhang*, X. Wang*, P. Dice, M. Shahbakhti, J. Naber, M. Czekala, Q. Qu, G. Huberts, " Investigation of Impacts of Spark Plug Orientation on Early Flame Development and Combustion in a DI Optical Engine ", *SAE 2017 World Congress*, 17 pages, SAE Paper No. 2017-01-0680, Apr. 4-6, 2017, Detroit, MI, USA.

63- A. Solouk*, M. Shakiba, K. Kannan*, H. Solmaz, M. Bidarvatan*, N. T. Kondipati*, P. Dice, M. Shahbakhti, " Fuel Economy Benefits of Integrating a Multi-Mode Low Temperature Combustion (LTC) Engine in a Series Extended Range Electric Powertrain ", *SAE 2016 Int. Powertrains, Fuels & Lubricants Conference*, 15 pages, SAE Paper No. 2016-01-2361, Oct. 24-26, 2016, Baltimore, Maryland, USA. (Received best presentation award of the conference.)

62- E. Ansari*, K. Poorghasemi*, B. K. Irdmousa*, M. Shahbakhti, J. D. Naber, " Efficiency and Emissions Mapping of a Light Duty Diesel – Natural Gas Engine Operating in Conventional Diesel and RCCI Modes ", *SAE 2016 Int. Powertrains, Fuels & Lubricants Conference*, 15 pages, SAE Paper No. 2016-01-2309, Oct. 24-26, 2016, Baltimore, Maryland, USA.

61- M. R. Amini*, M. Shahbakhti, S. Pan, J. K. Hedrick, " Handling Model and Implementation Uncertainties via an Adaptive Discrete Sliding Mode Controller Design ", *2016 ASME Dynamic Systems Control Conference*, 10 pages, Oct. 12-14, 2016, Minneapolis, MN, USA. (Selected as the top 6 best student papers out of 233 conference paper submissions.)

60- K. Khodadadi Sadabadi*, M. Shahbakhti, " Dynamic Modeling and Controller Design of Combustion Phasing of an RCCI Engine ", *2016 ASME Dynamic Systems Control Conference*, 10 pages, Oct. 12-14, 2016, Minneapolis, MN, USA.

59- G. R. Bharati, M. Razmara*, S. Paudyal, M. Shahbakhti, R. Robinett III, " Hierarchical Optimization Framework for Demand Dispatch in Building-Grid Systems ", 5 pages, *2016 IEEE Power & Energy Society (PES) General Meeting*, Jul. 17-21, 2016, Boston, MA, USA.

58- M. R. Amini*, M. Shahbakhti, J. K. Hedrick, " Discrete Sliding Controller Design with Robustness to Implementation Imprecisions via Online Uncertainty Prediction ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA. (Selected as best presentation of the session)

57- M. Razmara*, M. Bidarvatan*, M. Shahbakhti, R. Robinett III, " Novel Exergy-Wise Predictive Control of Internal Combustion Engines ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA. (Selected as best presentation of the session)

56- J. Dobbs*, M. Razmara*, M. Shahbakhti, S. Paudyal, " Selecting Control Input Type for a Building Predictive Controller Integrated in a Power Grid ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA.

55- M. Razmara*, M. Bidarvatan*, M. Shahbakhti, R. Robinett III, " Innovative Exergy-based Combustion Phasing Control of IC Engines ", *2016 SAE World Congress*, 13 pages, SAE Paper No. 2016-01-0815, Apr. 12-14, 2016, Detroit, MI, USA.

54- M. R. Amini*, M. Shahbakhti, J. K. Hedrick, " Easily Verifiable Adaptive Sliding Mode Controller Design with Application to Automotive Engines ", *2016 SAE World Congress*, 16 pages, SAE Paper No. 2016-01-0629, Apr. 12-14, 2016, Detroit, MI, USA.

53- M. Bidarvatan* and M. Shahbakhti, " Energy Management of a Hybrid Electric Vehicle by Incorporating Powertrain Dynamics ", *ASME Dynamic Systems and Control Conference*, 10 pages, Oct. 28-30, 2015, Columbus, Ohio, USA. (Best Paper Award, ASME Automotive and Transportation Systems Technical Committee.)

52- M. Razmara*, M. Maasoumy, M. Shahbakhti, R. Robinett , " Exergy-Based Model Predictive Control for Building HVAC Systems ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA.

51- M. Razmara*, G. Bharati, M. Shahbakhti, S. Paudyal, R. Robinett , " Bidirectional Optimal Operation of Smart Building-to-Grid Systems ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA.

50- M. Bidarvatan*, D. Kothari*, M. Shahbakhti, " Integrated Cycle-to-Cycle Control of Exhaust Gas Temperature, Load, and Combustion Phasing in an HCCI Engine ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA. (Selected as best presentation of the session)

49- S. Polat*, K. Kannan*, M. Shahbakhti, A. Uyumaz, H. S. Yücesu, " An Experimental Study for the Effects of Supercharging on Performance and Combustion of an Early Injection HCCI Engine ", *Int. Research Conference on Engineering, Science and Management (IRCESM)*, 6 pages, June 3-4, 2015, Dubai, UAE. (Received best presentation award of the conference)

48- H. Saigaonkar*, M. Nazemi* and M. Shahbakhti, " Sequential Model for Residual Affected HCCI with Variable Valve Timing ", 15 pages, *2015 SAE World Congress*, SAE Paper No. 2015-01-1748, Apr. 21-23, 2015, Detroit, MI, USA.

47- M. Bidarvatan* and M. Shahbakhti, " Impact of Engine Dynamics on Torque Split Management of a Hybrid Electric Vehicle ", *ASME Dynamic Systems and Control Conference*, 10 pages, October 22-24, 2014, San Antonio, Texas, USA.

46- A. Solouk*, M. Shahbakhti, M. J. Mahjoob, " Energy Management and Control of a Hybrid Electric Vehicle with an Integrated Low Temperature Combustion (LTC) Engine ", *ASME Dynamic Systems and Control Conference*, 10 pages, October 22-24, 2014, San Antonio, Texas, USA.

45- M. J. Rezaei* and M. Shahbakhti, " Artificial Neural Networks Based Prediction of Performance and Exhaust Emissions in a Butanol Fuelled HCCI Engine", *Int. Conference on Advanced Technology & Sciences*, 6 pages, August 12-15, 2014, Antalya, Turkey.

44- M. Nazemi*, H. Saigaonkar*, M. Shahbakhti, " Thermo-kinetic Modeling of Variable Valve Timing Effects on HCCI Engine Combustion", *Int. Conference on Advanced Technology & Sciences*, 6 pages, August 12-15, 2014, Antalya, Turkey.

43- M. Maasoumy, M. Razmara*, M. Shahbakhti, A. Sangiovanni-Vincentelli, " Selecting Building Predictive Control Based on Model Uncertainty ", 7 pages, *American Control Conference*, Jun. 4-6, 2014, Portland, OR, USA.

42- M. Bidarvatan*, V. Thakkar*, M. Shahbakhti, " Grey-box Modeling and Control of HCCI Engine Emissions", 6 pages, *American Control Conference*, Jun. 4-6, 2014, Portland, OR, USA.

41- M. Amini*, M. Shahbakhti, A. Ghaffari, " A Novel Singular Perturbation Technique for Model-Based Control of Cold Start Hydrocarbon Emission ", 13 pages, *SAE World Congress*, SAE Paper No. 2014-01-1547, Apr. 8-10, 2014, Detroit, MI, USA.

40- M. Bidarvatan*, M. Shahbakhti, " Integrated HCCI Engine Control based on a Performance Index ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19107, 11 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.

39- M. Bidarvatan*, M. Shahbakhti, " Grey-Box Modeling for HCCI Engine Control ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19097, 10 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.

38- M. Boudaghi*, M. Shahbakhti, S. A. Jazayeri, " A New Physics-based Misfire Detection Technique for a SI Engine ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19096, 11 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.

37- M. Maasoumy, B. Moridian*, M. Razmara*, M. Shahbakhti, A. Sangiovanni-Vincentelli, " On-line Simultaneous State Estimation and Parameter Adaptation for Building Predictive Control ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 21-23, 2013, Palo Alto, CA, USA. (Selected as the top 6 best student papers out of 406 conference paper submissions.)

Exhibit 1003, Page 519
Petitioner MWE Investments, LLC, et al.

36- R. Salehi*, M. Shahbakhti, A. Alasty, G. Vossoughi, " On-line Fault Detection and Isolation (FDI) for the Exhaust Path of a Turbocharged SI Engine ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 21-23, 2013, Palo Alto, CA, USA.

35- B. Bahri*, A. A. Aziz, M. F. Muhamad Said, M. Shahbakhti, " Misfiring Cycle Pressure Measurement for Diesel-converted HCCI Engine ", 6 pages, *ICA Int. Conference on Instrumentation, Control and Automation*, Aug. 28-30, 2013, Bali, Indonesia.

34- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " Ethanol Fuelled HCCI Engine: A Review ", 7 pages, *Int. Conference on Mechanical, Aeronautical and Automotive Engineering*, Jul. 4-5, 2013, SG, Singapore.

33- M. Bidarvatan*, M. Shahbakhti, " Two-Input Two-Output Control of Blended Fuel HCCI Engines ", Proceeding of *SAE World Congress*, SAE Paper No. 2013-01-1663, 15 pages, Apr. 16-18, 2013, Detroit, USA.

32- R. Salehi*, M. Shahbakhti, J. K. Hedrick, " Hybrid Switching Control of Automotive Cold Start Hydrocarbon Emission ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.

31- K. Edelberg*, M. Shahbakhti, J. K. Hedrick, " Incorporation of Implementation Imprecision in Automotive Control Design ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.

30- R. Salehi*, M. Shahbakhti, A. Alasty, G.R. Vossoughi, " Control Oriented Modeling of a Radial Turbine for a Turbocharged Gasoline Engine ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.

29- R. Salehi*, M. Shahbakhti, A. Alasty, G.R. Vossoughi, " Nonlinear Observer Design for Turbocharger in a SI Engine ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.

28- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " A Diagnosis Technique for the Identification of Misfire in a Converted-Diesel HCCI Engine ", 6 pages, *13th WSEAS Int. Conference on Robotics, Control and Manufacturing Technology*, Apr. 2-4, 2013, Kuala Lumpor, Malaysia.

27- A. Hansen*, M. Shahbakhti, J. K. Hedrick, " Impact of Implementation Imprecision on Sliding Mode Controller Design for Cold Start Automotive Emissions ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 17-19, 2012, Ft. Lauderdale, FL, USA. (Best Paper Award, ASME Automotive and Transportation Systems Technical Committee.)

26- M. Shahbakhti, J. Li*, J. K. Hedrick, " Early Model-Based Verification of Automotive Control System Implementation ", 6 pages, *American Control Conference*, Jun. 27-29, 2012, Montréal, Canada. (Selected as best presentation of the session)

25- A. Cranmer*, M. Shahbakhti, J. K. Hedrick, " Grey-Box Modeling of Rotational Dynamics in Automotive Engines ", 6 pages, *American Control Conference*, Jun. 27-29, 2012, Montréal, Canada.

24- B. Bahri*, A. A. Aziz, M. F. Muhamad Said, M. Shahbakhti, " Artificial Neural Network Model for Predicting Exhaust Temperature of an Ethanol-Fueled HCCI Engine ", 4 pages, *JSAE Annual Congress*, JSAE Paper No. 20125168, May 23-25, 2012, Yokohama, Japan.

23- M. Bidarvatan*, M. Shahbakhti, S. A. Jazayeri, " Model-Based Control of Combustion Phasing in an HCCI Engine ", *2012 SAE World Congress*, SAE Paper No. 2012-01-1137, 17 pages, Apr. 24-26, 2012, Detroit, USA.

22- M. Shahbakhti, A. Ghazimirsaied, C. R. Koch, " Modeling Ranges of Cyclic Variability for Ignition Timing Control of HCCI Engines ", *ASME Dynamic Systems and Control Conference*, 8 pages, Oct. 31 - Nov. 2, 2011, Arlington, USA.

21- S. Asami, A. Cranmer*, M. Shahbakhti, J. K. Hedrick, " Model-based Control via Balanced Realization for Automotive Cold Start Hydrocarbon Reduction ", *ASME Dynamic Systems and Control Conference*, 8 pages, Oct. 31 - Nov. 2, 2011, Arlington, USA.

20- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " Comparison of Crank Angle Based Ignition Timing Methods on an HCCI Engine ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2010-35087, 12 pages, Sept. 12-15, 2010, San Antonio, USA.

Exhibit 1003, Page 520
Petitioner MWE Investments, LLC, et al.

19- M. Shahbakhti, A. Ghazimirsaied, C. R. Koch, " Predicting the Distribution of Combustion Timing Ensemble in an HCCI Engine ", *ASME Internal Combustion Engine Division Spring Technical Conference*, Paper No. ICES2009-76007, 12 pages, May 3-6, 2009, Milwaukee, WI, USA.

18- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " Nonlinear Dynamics in Cyclic Variations of Combustion Phasing in an HCCI Engine ", *ASME Internal Combustion Engine Division Spring Technical Conference*, Paper No. ICES2009-76157, 7 pages, May 3-6, 2009, Milwaukee, WI, USA.

17- M. Shahbakhti, C. R. Koch, " Dynamic Modeling of HCCI Combustion Timing in Transient Fueling Operation ", Proceeding of *SAE World Congress*, SAE Paper No. 2009-01-1136, 16 pages, Apr. 20-23, 2009, Detroit, USA.

16- M. Shahbakhti, R. Lupul, C. R. Koch, " Sensitivity Analysis & Modeling of HCCI Auto-Ignition Timing", Proceeding of the *Fifth IFAC Symposium on Advances in Automotive Control*, pages 303 - 310, Aug. 20-22, 2007, Monterey Coast, California, USA.

15- M. Shahbakhti, C. R. Koch, " Control Oriented Modeling of Combustion Phasing for an HCCI Engine ", Proceeding of *2007 American Control Conference*, pages 3694-3699, Jul. 11-13, 2007, NewYork, USA.

14- M. Shahbakhti, R. Lupul, C. R. Koch, " Cyclic Variations of Ignition Timing in an HCCI Engine ", Proceeding of *Annual ASME/IEEE Joint Rail Conference (JRC) and the ASME Internal Combustion Engine Division (ICED) Conference*, Paper No. JRCICE2007/40032, 11 pages, Mar. 13-16, 2007, Pueblo, Colorado, USA.

13- M. Shahbakhti, R. Lupul, C. R. Koch, " Predicting HCCI Ignition Timing by Extending a Modified Knock-Integral Method ", Proceeding of *SAE World Congress*, SAE Paper No. 2007-01-0222, 13 pages, Apr. 16-19, 2007, Detroit, USA.

12- S. Sharifi Rad*, S. A. Jazayeri, M. Shahbakhti, " Automatic Driver Design and Longitudinal Dynamic Simulation for Passenger Cars ", Proceeding of *SAE World Congress*, SAE Paper No. 2006-01-1015, 9 pages, Apr. 3-7, 2006, Detroit, USA.

11- K. Swan, M. Shahbakhti, C. R. Koch, " Predicting Start of Combustion Using a Modified Knock-Integral Method for an HCCI Engine ", Proceeding of *SAE World Congress*, SAE Paper No. 2006-01-1086, 10 pages, Apr. 3-7, 2006, Detroit, USA.

10- S. Sharifi Rad*, S. A. Jazayeri, M. Shahbakhti, " Simulation of Vehicle Dynamics and Design of an Auto-driver for ECE Driving Cycles ", Proceeding of *4th International Conference on Internal Combustion Engines (ICICE)*, 9 pages, Nov. 16-17, 2005, Tehran, Iran.

9- M. Shahbakhti, S. A. Jazayeri, M. Ghafuri, A. R. Aslani, A. Sahraeian, S. Azadi, " A Novel Method to Estimate Parameters of the Wall-Wetting Fuel Model in MPFI Engines for Cold Start and Warm up Conditions ", Proceeding of *ASME Internal Combustion Engine Fall Technical Conference*, 12 pages, Oct. 24-27, 2004, Long Beach, CA, USA.

8- A. Sahraeian, M. Shahbakhti, A. R. Aslani, S. A. Jazayeri, S. Azadi, " Longitudinal Vehicle Dynamics Modeling on the Basis of Engine Modeling ", Proceeding of *SAE World Congress*, SAE Paper No. 2004-01-1620, 11 pages, Mar. 8-11, 2004, Detroit, USA.

7- A. R. Aslani, M. Shahbakhti, A. Sahraeian, S. M. Hoseinalipoor, S. A. Jazayeri, " Dynamic Modeling of a Port Fuel-Injected Engine with Sensitivity Analysis ", Proceeding of *SAE World Congress*, SAE Paper No. 2004-01-1771, 9 pages, Mar. 8-11, 2004, Detroit, USA.

6- M. Shahbakhti, S. A. Jazayeri, M. Ghafuri, A. R. Aslani, A. Sahraeian, S. Azadi, " Control Oriented Modeling of Mixture Formation in MPFI Engines to Predict Air-Fuel-Ratio in Transient Conditions ", Proceeding of 3rd *International Conference on Internal Combustion Engines (ICICE)*, 15 pages, Feb.17-19, 2004, Tehran, Iran.

5- A. Sahraeian, M. Shahbakhti, A. R. Aslani, " Development and Use of a Vehicle Power-train Simulation for Fuel Economy and Performance Studies ", Proceeding of *3rd International Conference on Internal Combustion Engines (ICICE)*, 11 pages, Feb. 17-19, 2004, Tehran, Iran.

4- A. R. Aslani, M. Shahbakhti, A. Sahraeian, S. M. Hoseinalipoor, " Control Oriented Modeling of Paykan Injection Engine ", Proceeding of *3rd International Conference on Internal Combustion Engines (ICICE)*, 9 pages, Feb. 17-19, 2004, Tehran, Iran. (Best paper award)

Exhibit 1003, Page 521
Petitioner MWE Investments, LLC, et al.

3- M. Shahbakhti, S. A. Jazayeri, A. R. Aslani, M. Ghafuri, S. Azadi, " Identification of Dynamic Fuel Parameters in PFI Engines for Different Thermal Conditions ", Proceeding of *7th International and 11th Annual Mechanical Engineering Conference*, ISME, Vol. 2, pages 743-760, 2003, Mashhad, Iran.

2- M. Shahbakhti, A. Mohsenian rad, S. A. Jazayeri, S. Azadi, " An Investigation into the Effective Methods to Reduce Emissions of Passenger Cars During Cold Start and Warm up Conditions ", Proceeding of *7th International and 11th Annual Mechanical Engineering Conference*, ISME, Vol. 2, pages 702-718, 2003, Mashhad, Iran.

1- A. R. Aslani, M. Shahbakhti, S. M. Hoseinalipoor, S. A. Jazayeri, A. Ohadi, S. Azadi, " Dynamic Modeling of a Port Fuel Injection Engine for Air/Fuel Ratio Determination ", Proceeding of *7th International and 11th Annual Mechanical Engineering Conference*, ISME, Vol. 2, pages 773-785, 2003, Mashhad, Iran.

Submitted Conference Papers

1- L. Jiang*, S. Moghadasi*, M. Shahbakhti, " Energy Management of Large-Spacing Platooning with Hybrid Electric Trucks ", *IFAC Modeling, Estimation and Control Conference (MECC)*, 6 Pages, Oct. 5-8, 2025, Pittsburgh, PA, USA.

Abstract/Extended-abstract Refereed Conference Papers (6-9 page long conference papers)

16- H. Abediasl*, C.R. Koch, M. Shahbakhti, " Tailpipe Emissions of a Plug-in Hybrid Electric Vehicle in Cold Climate ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 14-16, 2025, Calgary, AB, Canada.

15- H. Mehnatkesh*, E. Sperling, J. Kheyrollahi, M. Shahbakhti, D. Gordon, and C.R. Koch, " Emission Analysis in Data-Driven Model Predictive Control of Hydrogen/Diesel Dual-Fuel Engines ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 13-16, 2024, Kingston, ON, Canada.

14- L. Jiang*, M. Shahbakhti, " Cooperative Truck Platooning on Canadian Public Roads during a Winter Season ", Proceeding of *28th IAVSD International Symposium on Dynamics of Vehicles on Roads and Tracks*, 9 pages, Aug. 21-25, 2023, Ottawa, ON, Canada.

13- J. McNally*, D. Gordon, E. Sperling, M. Shahbakhti, C.R. Koch, " Performance and Emission Investigation of Hydrogen Diesel Dual Fuel Combustion ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 15-18, 2023, Edmonton, AB, Canada.

12- N. Balazadeh, G. McTaggart-Cowan, S. Munshi, M. Shahbakhti, " Evaluating the Transient Performance of a Direct Injection of a Natural Gas Engine using a Phenomenological Combustion Model ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 15-18, 2023, Edmonton, AB, Canada.

11- S. Shahpouri*, A. Norouzi*, C. Hayduk, R. Rezaei, C. R. Koch, M. Shahbakhti, " Modeling of a Single-Fuel Hydrogen Spark ignition and a Dual-Fuel Diesel-Hydrogen Engines ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 16-19, 2022, Ottawa, ON, Canada.

10- A. Solouk*, M. Shahbakhti, " Fuel Economy Benefits of Electrified Powertrains with Advanced Combustion Engines: Mild to Strong HEV Applications ", 7 pages, *2017 SIA Int. Powertrain Conference*, Jun. 7-8, 2017, Versailles, France.

9- K. Ebrahimi, M. Shahbakhti, C. R. Koch, " Comparison of Butanol/n-Heptane to PRF Blended Fuels in HCCI Engines ", *2011 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS11-34, 6 pages, May 8-11, 2011, Winnipeg, Canada.

8- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " Ignition Timing Criteria for Partial Burn Operation in an HCCI Engine", *2011 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS11-33, 6 pages, May 8-11, 2011, Winnipeg, Canada.

7- M. Shahbakhti, A. Ghazimirsaied, C. R. Koch, " Combustion Characteristics of Butanol/n-Heptane Blend Fuels in an HCCI Engine ", *2010 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS10-A018, 6 pages, May 9-12, 2010, Ottawa, Canada.

Exhibit 1003, Page 522
Petitioner MWE Investments, LLC, et al.

6- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " Recognizing Partial Burn Operation in an HCCI Engine", *2010 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS10-A017, 6 pages, May 9-12, 2010, Ottawa, Canada.

5- M. Shahbakhti, A. Ghazimirsaied, C. R. Koch, " The Effect of Operating Conditions on HCCI Exhaust Gas Temperature ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS-A02, 6 pages, May 10-13, 2009, Montréal, Canada.

4- A. Ghazimirsaied, M. Shahbakhti, C. R. Koch, " Partial-Burn Crank Angle Limit Criteria Comparison on an Experimental HCCI Engine ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS-A52, 6 pages, May 10-13, 2009, Montréal, Canada.

3- A. Ghazimirsaied, M. Shahbakhti, A. Audet, C. R. Koch, " HCCI Engine Cyclic Variation Characterization Using Both Chaotic and Statistical Approach ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 12-14, 2008, Toronto, Canada.

2- M. Shahbakhti, R. Lupul, A. Audet, C. R. Koch, " Experimental Study of HCCI Cyclic Variations for Low-Octane PRF Fuel Blends ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 13-16, 2007, Banff, Canada.

2- M. Shahbakhti, C. R. Koch, " Thermo-kinetic Combustion Modeling of an HCCI Engine to Analyze Ignition Timing for Control Applications ", Proceeding of *Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 13-16, 2007, Banff, Canada.

Non-refereed Conference Papers

1- B. Chen, D. Robinette, M. Shahbakhti, K. Zhang, J. Naber, " Connected Vehicles and Powertrain Optimization ", Invited article, 9 pages, *ASME Dynamic System Control Magazine*, 2017.

2- J. K. Hedrick and M. Shahbakhti, " Model-based Verification of Automotive Control System Implementation ", Keynote paper, 8 pages, *Int. Conference on Advanced Vehicle Technologies and Integration (VTI)*, Jul. 16-19, 2012, Changchum, China.

Abstract-refereed Conference Presentations

23- M. Shahbakhti, B. Bahri, J. Rao, " Alberta Zero Emission Hydrogen Transit Bus Winter Performance Results in the Edmonton Region", *Canadian Hydrogen Convention*, Apr. 23-25, 2024, Edmonton, AB, Canada.

22- A. Ansari*, H. Abediasl*, M. Shahbakhti, " Effect of Cold Climate on Energy Consumption of a Plug-in Hybrid Electric Vehicle ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

21- L. Jiang*, J. Kheyrollahi, C. R. Koch, M. Shahbakhti, " Cooperative Truck Platooning Trials on Canadian Public Roads under a Commercial Operation in Winter Driving Conditions ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

20- D. C. Gordon, A. Norouzi*, S. Shahpouri*, M. Shahbakhti, C. R. Koch, " Deep Reinforcement Learning for Emission Control in Diesel Engines ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

19- Y. Long*, L. Jiang*, S. Moghadasi*, S. Munshi, G. McTaggart-Cowan, M. Shahbakhti, " Performance Analysis of a Heavy-Duty Hybrid Electric Truck with a MicroPilot Natural Gas Engine in Real-World Highway Driving Conditions ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

18- A. Norouzi*, S. Shahpouri*, D. C. Gordon, A. Winkler, E. Nuss, J. Andert, M. Shahbakhti, C. R. Koch, " Deep Learning and Nonlinear Model Predictive Control Integration for Compression Ignition Engine Emission Reduction ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

17- N. Balazadeh, S. Munshi, M. Shahbakhti, G. McTaggart-Cowan, " High Efficiency Natural Gas Engine Modeling for Commercial Vehicle Studies ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

16- S. Shahpouri*, A. Norouzi, C. Hayduk, A. Fandakov, R. Rezaei, C. R. Koch, M. Shahbakhti, " Laminar Flame Speed Modeling of Hydrogen, Methanol, and Ammonia using Machine Learning ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

15- S. Shahpouri*, A. Norouzi, C. Hayduk, A. Fandakov, R. Rezaei, C. R. Koch, M. Shahbakhti, " Machine Learning Modeling of Soot Emissions in Diesel Engines ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

14- S. Moghadasi*, Y. Long*, S. Munshi, G. McTaggart-Cowan, M. Shahbakhti, " Investigation of Davis Dam Drive Cycle Application for Performance Assessment of Electrified and Conventional Long-Haul Trucks ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

13- H. Abediasl*, V. Hosseini, N. Balazadeh, C. R. Koch, M. Shahbakhti, " Impact of Cold Climate on Emissions and Fuel Consumption of Vehicles: Knowledge Gap Synthesis ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

12- J. Mcnally*, D. Gordon, A. Norouzi, M. Shahbakhti, C. R. Koch, " Experimental Study of Hydrogen Diesel Dual Fuel Engine Characterization ", *Canadian Society of Mechanical Engineers (CSME) 2022 International Congress*, Jun. 5-8, 2022, Edmonton, AB, Canada.

11- S. Batool*, J. D. Naber, M. Shahbakhti, " Machine Learning Approach for Identification of Heat Release Shapes in a Low Temperature Combustion Engine", *2022 SAE World Congress*, Apr. 5-7, 2022, Detroit, MI, USA.

10- A. Norouzi*, M. Shahbakhti, C.R. Koch, " Machine Learning-based Diesel Engine-out Emissions Model and Control Using the Learning-based Control Technique ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.

9- S.A. Nadeem*, P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Model Predictive Control of an Automotive Driveline for Optimal Torque Delivery with Minimal Oscillations during Torque Converter Slipping Conditions ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.

8- B. Khoshbakht*, A. Basina*, J. Valeni, H. Borhan, J. Naber, M. Shahbakhti, " Control-oriented Modeling of Maximum Pressure Rise Rate in RCCI Engines ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.

7- S. Batool*, J. Naber, M. Shahbakhti, " Closed-loop Predictive Control of a Multi-mode Engine Including HCCI, PPCI, and RCCI Combustion Modes ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.

6- S. Hemmati*, N. Doshi*, D. Hanover*, C. Morgan, M. Shahbakhti, " Integrated HVAC and Powertrain Control for a Connected Plug-in Hybrid Electric Vehicle ", *2019 SAE Thermal Management Systems Symposium (TMSS)*, Oct. 15-17, 2019, Plymouth, MI, USA.

5- B. S. Mahadevan*, J. H. Johnson, and M. Shahbakhti, " Development of a MPF Model with a Kalman Filter State Estimator for Simulation and Control of Particulate Matter Distribution of a CPF for Aftertreatment System Control Applications ", 2017 CLEERS (Cross-Cut Lean Exhaust Emissions Reduction Simulations) Workshop, Oct. 3-5, 2017, Ann Arbor, MI, USA.

4- A. Solouk*, M. Shahbakhti, " Potential of Low Temperature Combustion (LTC) Engine Technology for Range Extender Vehicles ", *2016 SAE Range Extenders for Electric Vehicles Symposium*, Nov. 2-3, 2016, Knoxville, TN, USA.

3- M. Nazemi*, S. Polat*, M. Shahbakhti, "Advanced Combustion Model of LTC Engines", 2014 *CONVERGE™ User Group Meeting*, Sept. 23-25, 2014, Madison, Wisconsin, USA.

2- M. Shahbakhti, K. Edelberg*, S. Pan*, A. Hansen*, J. Li*, J. K. Hedrick, " Model-Based Verification and Real-Time Validation of Automotive Controller Software ", *ASME Verification and Validation Symposium*, May 22-24, 2013, Las Vegas, NV, USA.

1- K. Edelberg*, M. Shahbakhti, J. K. Hedrick, " Modeling and Incorporation of Software Implementation Uncertainty to Realize Easily Verifiable Automotive Controllers ", *ASME Verification and Validation Symposium*, May 22-24, 2013, Las Vegas, NV, USA.

Technical Posters

9- B. Bahri*, M. Shahbakhti, AZEHT team, " Preliminary Winter Performance Results of AZEHT Project in Edmonton, Alberta ", Canadian Hydrogen Convention, April 25-27, 2023, Edmonton, AB, Canada.
8- J. McNally, E. Sperling, D. Gordon, J. Kheyrollahi, C.R. Koch, M. Shahbakhti, " Hydrogen-Diesel Dual-Fuel Combustion Testing ", Canadian Hydrogen Convention, April 25-27, 2023, Edmonton, AB, Canada.
7- N. Balazadeh Meresht, S. Munshi, M. Shahbakhti, G. Mctaggart-Cowan, " Predictive Combustion Modeling of HPDI Natural Gas Engine for Class-8 Commercial Vehicle Applications ", 39th International Symposium on Combustion, July 24-29, 2022, Vancouver, BC, Canada.
6- S. Vafaeenezhad, A. R. Hanifi, M. Cuglietta, A. R. Razmi*, A. Khaled Elkashat*, M. Shahbakhti, P. Sarkar, T. H. Etsell, " High-Efficiency and Stable Solid Oxide Fuel Cells and Electrolysis Cells ", Canadian Hydrogen Convention, April 26-28, 2022, Edmonton, AB, Canada.
5- M. Mashkournia, A. Ghazimirsaied, J. Boddez, M. Shahbakhti, D. Achtymichuk, D. Handford, " Flexible Operation of HCCI Combustion Using Intelligent Control ", Canada Auto21 HQP Conference, May 26-28, 2009, Hamilton, ON, Canada.
4- S. Varnhagen, A. Audet, M. Shahbakhti, D. Handford, A. Ghazimirsaied, " Flexible Operation of HCCI Combustion Using Intelligent Control ", Canada Auto21 HQP Conference, Jun. 1-4, 2008, London, ON, Canada.
3- A. Audet, R. Lupul, M. Shahbakhti, V. Hosseini, A. Ghazimirsaied, P. Kongsereeparp, X. Yao, " Electronic Control for VVT and HCCI Combustion ", Canada Auto21 HQP Conference, Jun. 11-13, 2007, Windsor, ON, Canada.
2- R. Chladny, R. Lupul, M. Shahbakhti, V. Hosseini, P. Kongsereeparp, Y. Gao, " Electronic Control for VVT and HCCI Combustion ", Canada Auto21 HQP Conference, May 15-17, 2006, Barrie, ON, Canada.
1- R. Chladny, V. Hosseini, S. Chung, K. Frank, P. Kongsereeparp, M. Shahbakhti, " Electronic Control for VVT and HCCI Combustion ", Canada Auto21 HQP Conference, May 10-12, 2005, Oshawa, ON, Canada.

Teaching/Mentoring Experience

New Course Development

Department of Mechanical Eng., University of Alberta

- MECE 442: Vehicle Propulsion Systems
- MECE 610: Machine Learning Control for Engineering Applications

Principal Instructor

Department of Mechanical Eng., University of Alberta

- MECE 442: *Vehicle Propulsion Systems*, 17 students, Winter 2025
- MECE 610: *Machine Learning Control for Engineering Applications*, 16 students, Fall 2024
- MECE 541: *Combustion Engines*, 21 students, Fall 2024
- MECE 541: *Combustion Engines*, 27 students, Winter 2024
- MECE 610: *Machine Learning Control for Engineering Applications*, 21 students, Fall 2023
- MECE 541: *Combustion Engines*, 28 students, Fall 2023
- MECE 442: *Vehicle Propulsion Systems*, 7 students, Winter 2023

Exhibit 1003, Page 525
Petitioner MWE Investments, LLC, et al.

- MECE 610: *Machine Learning Control for Engineering Applications*, 5 students, Fall 2022
- MECE 541: *Combustion Engines*, 44 students, Fall 2022 (student evaluation*: 4.6/5)
- MECE 541: *Combustion Engines*, 43 students, Winter 2022 (student evaluation*: 4.3/5)
- MECE 541: *Combustion Engines*, 36 students, Fall 2021 (student evaluation*: 4.6/5)
- MECE 340: *Applied Thermodynamics*, 70 students, 2021 (student evaluation*: 4.8/5)
- MECE 541: *Combustion Engines*, 14 students, Winter 2021 (student evaluation*: 4.9/5)
- MECE 340: *Applied Thermodynamics*, 74 students, Spring-Summer 2020 (student evaluation*: 4.9/5)

* The course rating system at the University of Alberta ranks responses to the USRI question 221 "Overall, this instructor was excellent" on a scale of 1 – 5, with 1 being "strongly disagree" and 5 being "strongly agree".

Department of Mechanical Eng.-Eng. Mechanics, Michigan Tech. University

- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 28 students, Spring 2019 (student evaluation: 4.64/5)
- MEEM 2201: *Energy-Thermal-Fluids I*, 80 students, Fall 2018 (student evaluation: 4.4/5)
- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 45 students, Spring 2018 (student evaluation: 4.74/5)
- MEEM 2201: *Energy-Thermal-Fluids I*, 85 students, Fall 2017 (student evaluation: 4.61/5)
- MEEM 2201: *Energy-Thermal-Fluids I*, 85 students, Fall 2016 (student evaluation: 4.66/5)
- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 37 students, Spring 2016
- MEEM 2201: *Energy-Thermal-Fluids I*, 96 students, Fall 2015 (student evaluation: 4.57/5)
- MEEM 2201: *Energy-Thermal-Fluids I*, 76 students, Spring 2015 (student evaluation: 4.35/5)
- MEEM 2200: *Thermodynamics*, Spring 2014, two sections, 85 students (student evaluation – ave. of two sections: 4.3/5)
- MEEM 2200: *Thermodynamics*, Spring 2013, 26 students (student evaluation: 4.36/5)
- MEEM 5990/6990 Special Topics (graduate courses):
    - *Optimal and Model Predictive Controls*, 7 students, Fall 2013
    - *Design, Instrumentation, Control of HEV-LTC Powertrain Setup*, 20 students, 2013-2016
    - *Experiment and Simulation of LTC Engine in HEV Powertrain*, 4 students, Spring 2013
    - *HCCI Engine Control*, 1 student, Fall 2012

Department of Mechanical Engineering, KNT University of Technology

- ME16-31: *Deign of Combustion Engines*, Winter 2010, 28 students (student evaluation: 3.61/4)
- ME19-31: *Environmental Pollution Control*, Winter 2010, 32 students (student evaluation: 3.94/4)

Department of Mechanical Engineering, University of Alberta

- MECE 541: *Combustion Engines and Alternative Fuels*, Fall 2008, 28 students (student evaluation: 4.7/5)
- MECE 541: *Combustion Engines and Alternative Fuels*, Fall 2009, 50 students (student evaluation: 4.4/5)

Teaching Assistant

Department of Mechanical Engineering, University of Alberta

- MECE 420: *Feedback Control Design of Dynamic Systems*, Winter 2005, Winter 2006
- MECE 330: *Fluid Mechanics*, Fall 2004, Fall 2005, Fall 2006, Winter 2007, Winter 2008

- MECE 541: *Combustion Engines*, Winter 2009

Teaching Professional Development

- University Teaching Program, University of Alberta, 2004 - 2009
  - Completed 50 hours of formal classroom training which covers a wide range of theoretical teaching topics through seminars and workshops.

Supervising/Mentoring

- **Research Associates (3)**
  - Dr. M. Cuglietta, Research Associate (100%), Simulation and design of Solid Oxides Fuel Cell stacks, University of Alberta, 2024 - present.
  - Dr. P. Sarkar, Research Associate - Principal Advisor in Fuel Cell (100%), Design and fabrication of Solid Oxides Fuel Cell stack, University of Alberta, 2024 - present.
  - Dr. A. Hanifi, Research Associate (100%), Solid Oxides Fuel Cell stack design and fabrication, University of Alberta, 2022 - present.
- **Postdoctoral Scholars (9)**
  - Dr. A. Razmi, Postdoctoral Researcher (100%), Techno-Economic Analysis of Hydrogen Energy Solutions, University of Alberta, 2025 - present.
  - Dr. S. A. Sobhi, Postdoctoral Researcher (100%), Data Analytics and Software Development, University of Alberta, 2024 - present.
  - Dr. M. Fakouri Hasanabadi, Postdoctoral Researcher (100%), Design, Experimentation, and Analysis of Fuel Cell Stacks, University of Alberta, 2023 - present.
  - Dr. M. Ezzat, Postdoctoral Researcher (100%), Modeling and Assessment of Hydrogen Fueled Heavy-Duty Vehicles, University of Alberta, 2022 - present.
  - Dr. B. Bahri, Postdoctoral Researcher (100%), Analysis and Assessment of City of Edmonton and Strathcona County Fuel Cell, Electric, and Diesel Buses, University of Alberta, 2022 - present.
  - Dr. S. Vafaeenezhad, Postdoctoral Researcher (60%; joint with C.R. Koch), Experimental study of Solid Oxides Fuel Cells, University of Alberta, 2022 - 2023.
  - Dr. O. Wine, Postdoctoral Researcher (50%; joint with A. Osornio Vargas), Transportation Health Impact in Cold Climates, University of Alberta, 2020 - 2021.
  - Dr. H. Solmaz, Postdoctoral Researcher (100%), Experimentation and Analysis of LTC Regimes in a Light-duty Engine, Michigan Tech University, 2015 - 2016.
  - Dr. M. Razmara, Research Engineer (50%; joint with R. Robinett), Building-to-Grid Demand Response Optimization, Michigan Tech University, 2016 - 2017.
- **PhD Students (37)**

  <u>Thesis advising (26)</u>
  - N. Fadaei Mobarhan, PhD thesis co-adviser (joint with A. Hakkaki-Fard), Modeling and analysis of solid oxides fuel cell operation, Laval University, 2024 - present.
  - A. Shabani, PhD thesis adviser (40%; joint with A. Nouri), Analysis of airborne particles in HVAC channels for Covid-virus filter disinfection units, University of Alberta, 2022 - present.
  - A. Vafamand, PhD thesis adviser (60%; joint with C.R. Koch), Machine learning control of battery electric systems, University of Alberta, 2022 - present.
  - A. Salahi, PhD thesis adviser (40%; joint with C.R. Koch), Control of fuel cell systems, University of Alberta, 2022 - present.

- A. Mirzazadeh Akbarpoor, PhD thesis adviser (50%; joint with A. Nouri), Low-cost Technology for Risk Mitigation of Pathogenic Infection in HVAC Systems, University of Alberta, 2022 - present.
- A. Yasami, PhD thesis adviser (40%; joint with C.R. Koch), Intelligent fleet management using artificial intelligence, University of Alberta, 2022 - present.
- S. Moghadasi, PhD thesis adviser (100%), Optimization and modeling of natural gas fueled hybrid electric trucks, University of Alberta, 2021 - present.
- Z. Salehi, PhD thesis adviser (40%; joint with C.R. Koch), Diagnostics of solid oxide fuel cell degradation using methods of machine learning, University of Alberta, 2021 - present.
- M. Tofigh, PhD thesis adviser (60%; joint with C.R. Koch), Fault diagnostics of solid oxide fuel cell systems using methods of machine learning, University of Alberta, 2021 - present.
- L. Jiang, PhD thesis adviser (100%), Experimental analysis and control of platooning trucks, University of Alberta, 2021 - present.
- H. Abediasl, PhD thesis adviser (60%; joint with C.R. Koch), Optimization of university fleet vehicles to minimize GHG and energy consumption, University of Alberta, 2020 - present.
- A. Razmi, PhD thesis adviser (100%), Design and optimization of hydrogen fueled thermodynamic cycles, University of Alberta, 2020 - present.

Graduated (15):

- A. Razmi, PhD thesis adviser (100%), Design, Techno-Economic Assessment, and Comparison of Clean Hydrogen Production/Utilization Technologies Based on High-Temperature Solar Thermal Energy, University of Alberta, 2020 - 2025.
- B. Khoshbakht Irdmousa, PhD thesis adviser (40%; joint with J. Naber), Modeling and control of natural gas-diesel RCCI engines, Michigan Tech University, 2016 - 2023.
- S. Shahpouri, PhD thesis adviser (60%; joint with C.R. Koch), Machine learning for emission modeling of fossil-fueled and hydrogen-fueled internal combustion engines, University of Alberta, 2020 - 2023.
- S. Batool, PhD thesis adviser (60%; joint with J. Naber), Dynamic modeling and control of a multi-mode combustion engine, Michigan Tech University, 2018 - 2023.
- A. Norouzi Yengeje, PhD thesis adviser (40%; joint with C.R. Koch), Machine learning and deep learning for modeling and control of internal combustion engines, University of Alberta, 2020 - 2022.
- P. Reddy, PhD thesis adviser (80%; joint with D. Robinette), Design and real-time implementation of optimal model-based torque shaping automotive control systems, Michigan Tech University, 2018 - 2022.
- V. B. Vinhaes, PhD thesis adviser (50%; joint with J. Naber), Combustion development of a high efficiency micro pilot diesel natural gas engine, Michigan Tech University, 2016 - 2022.
- C. R. Reddy, PhD thesis adviser (70%; joint with R. Robinett III), Model predictive control of energy systems for heat and power applications, Michigan Tech University, 2017 - 2022.
- A. A. Khameneian, PhD thesis adviser (50%; joint with J. Naber), Model-based engine-out emissions analysis for a gasoline turbocharged direct injection spark-ignition engine in elevated HEV (hybrid electric vehicle) cranking speed, Michigan Tech University, 2016 - 2021.
- M. R. Amini, PhD thesis adviser (100%), Easily verifiable controller design with application to automotive powertrains, Michigan Tech University, 2013 - 2017.
- A. Solouk Mofrad, PhD thesis adviser (100%), Model-based control of hybrid electric powertrains integrated with LTC engines, Michigan Tech University, 2013 - 2017.
- B. Mahadevan, PhD thesis adviser (50%; joint with J. Johnson), Development of a Multi-Zone Catalyzed Particulate Filter Model and Kalman Filter Estimator for Simulation and Control of Particulate Matter Distribution of a CPF for Engine ECU Applications, 2014 - 2017.
- M. Razmara, PhD thesis adviser (60%; joint with R. Robinett III), Predictive control of power grid-connected energy systems based on energy and exergy metrics, Michigan Tech University, 2012 - 2016.

- M. Bidarvatan, PhD thesis adviser (100%), Physics-based modeling and control of powertrain systems integrated with low temperature combustion engines, Michigan Tech University, 2012 - 2015.
- B. Bahri, PhD thesis adviser (30%; joint with A.A. Aziz), Investigation of HCCI engines fueled with ethanol blends, University Technology Malaysia, 2010 - 2013.

Visiting students (7)

- Y. Long, Visiting PhD candidate from Wuhan University of Technology in China, Modeling a MicroPilot NG Engine and Integration into a Plug-in Hybrid Electric Truck, University of Alberta, May 2021 – April 2022.
- M. Toub, co-hosted by Prof. R. Robinett, Visiting PhD candidate from Mohammed V University in Morocco, Modeling and control of concentrated solar power (CSP) for building energy management and building-to-grid operation, Michigan Tech University, Sep. 2016 – 2018.
- P. Ahmadizadeh, Visiting PhD candidate from Iran University of Science and Technology, Two-mode power split hybrid electric powertrain, Michigan Tech University, Feb. 2016 – Oct. 2016.
- K. Poorghasemi, Visiting PhD candidate from Sahand University of Tech in Iran, RCCI engine combustion modeling, Michigan Tech University, Feb. - Aug. 2015.
- M. Baloo, co-hosted by Prof. S.Y. Lee, Visiting PhD candidate from Amir Kabir University of Tech in Iran, Experimental combustion diagnosis, Michigan Tech University, Sep. 2014 – Jan. 2015.
- S. Polat, Visiting PhD candidate from Gazi University in Turkey, Modeling and experimental study of an HCCI engine, Michigan Tech University, Jan. 2014 – Mar. 2015.
- M. Pčolka, co-hosted by Prof. R. Robinett, Visiting PhD candidate from Czech Tech University in Prague, Building energy controls, Michigan Tech University, Jan. 2013 – May 2013.

Mentoring (4)

- S. Hemmati, PhD student, Control of connected and automated hybrid electric vehicles, Michigan Tech University, 2018 - 2019.
- S. Pan, PhD candidate, Adaptive sliding controller design with robustness to implementation imprecision, University of California, Berkeley, 2012.
- R. Salehi, Visiting PhD candidate from Sharif University in Iran, Hybrid switching controller for cold start emission reduction, University of California, Berkeley, 2012.
- Y. Chen, Visiting PhD candidate from Jilin University in China, Control of engine emissions during cold start, University of California, Berkeley, 2010 - 2011.

- **MSc Students (77)**

Thesis advising (33)

- M. Moghtader, MSc thesis adviser (40%; joint with A. Nouri), Use of radiative heating for HVAC filter disinfection, University of Alberta, 2023 - present.
- E. Rasouli, MSc thesis adviser (40%; joint with A. Nouri), CFD modeling of airborne particles in HVAC channels for Covid-virus filter disinfection units, University of Alberta, 2022 - present.
- Y. Ma, MSc thesis adviser (100%), Modeling and analysis of City of Edmonton fuel cell transit buses, University of Alberta, 2022 - present.

Graduated (30):

- A. Ansari, MSc thesis adviser (100%), Fuel consumption estimation and analysis of the University of Alberta fleet vehicles, University of Alberta, 2020 - 2023.
- A. Khaled, MSc thesis adviser (100%), CFD modeling and analysis of anode supported solid oxide fuel cells, University of Alberta, 2021 - 2023.
- L. Yang, MSc thesis adviser (100%), Driving cycle and driver behavior analysis for University of Alberta fleet vehicles, University of Alberta, 2021 - 2023.

- H. Heidarifar, MSc thesis adviser (100%), Energy optimization of a residential building using occupancy prediction via sensor fusion and machine learning algorithms, University of Alberta, 2020 - 2023.
- N. Samadi, MSc thesis adviser (100%), Modeling and control of an HVAC system to minimize COVID-19 virus transmission, University of Alberta, 2020 - 2022.
- S. A. Nadeem, MS thesis main adviser (90%; joint with D. Robinette), Design of an anti-jerk controller for both locked and slipping torque converter conditions in a vehicle, Michigan Tech University, 2019 - 2020.
- R. Sitaraman, MS thesis main adviser (60%; joint with J. Naber), Identification of heat release shapes and combustion control of an LTC engine, Michigan Tech University, 2018 - 2020.
- R. Moharjan, MS thesis adviser (100%), Optimization of diesel engine and after-treatment system for a series hybrid forklift application, Michigan Tech University, 2018 - 2019.
- A. Basina, MS thesis adviser (100%), Modeling and control of maximum pressure rise rate in RCCI engines, Michigan Tech University, 2018 - 2019.
- N. Doshi, MS thesis main adviser (80%; joint with D. Robinette), Modeling of thermal dynamics in Chevrolet Volt GEN II hybrid electric vehicle for integrated powertrain and HVAC optimal operation through connectivity, Michigan Tech University, 2018 - 2019.
- K. Darokar, MS thesis main adviser (80%; joint with D. Robinette), Automotive driveline backlash state and size estimator design for anti-jerk control, Michigan Tech University, 2018 - 2019.
- P. Reddy, MS thesis main adviser (60%; joint with D. Robinette), Control oriented modeling of an automotive drivetrain for anti-jerk control, Michigan Tech University, 2017 - 2018.
- R. Yadav, MS thesis main adviser (70%; joint with D. Robinette), Modeling and analysis of energy consumption in Chevrolet Volt Gen II Hybrid Electric Vehicle, Michigan Tech University, 2017 – 2018.
- A. Abhay Raut, MS thesis adviser (100%), Model-based control of an RCCI engine, Michigan Tech University, 2016 - 2017.
- N. Kondipati, MSc thesis adviser (100%), Experimental Study, Modeling and Controller Design for an RCCI Engine, Michigan Tech University, 2015 - 2016.
- J. Arora, MSc thesis adviser (100%), Design of Real-Time Combustion Feedback System and Experimental Study of an RCCI Engine for Control, Michigan Tech University, 2015 - 2016.
- K. Kannan, MSc thesis adviser (100%), An Experimental Investigation of Low Temperature Combustion Regimes in a Light Duty Engine, Michigan Tech University, 2014 - 2016.
- J. Dobbs, MSc thesis adviser (100%), Model Predictive Control of Building Energy Management Systems in a Smart Grid Environment, Michigan Tech University, 2013 - 2015.
- K. Khodadadi, MSc thesis adviser (100%), Modeling and Control of Combustion Phasing of an RCCI Engine, Michigan Tech University, 2013 - 2015.
- M. R. Nazemi, MSc thesis adviser (100%), Modeling and Analysis of Reactivity Controlled Compression Ignition (RCCI) Engine Combustion, Michigan Tech University, 2013 - 2015.
- M. Paranjape, MSc thesis adviser (100%), Optimal Control of Building Energy with Smart Grid Interaction, Michigan Tech University, 2013 - 2014.
- H. Saigaonka, MSc thesis adviser (100%), An Investigation of Variable Valve Timing Effects on HCCI Engine Performance, Michigan Tech University, 2013 - 2014.
- D. Kothari, MSc thesis adviser (100%), Experimental Setup and Controller Design for an HCCI Engine, Michigan Tech University, 2013 - 2014.
- V. Thakkar, MSc thesis adviser (100%), Modeling and Experimental Setup of an HCCI Engine, Michigan Tech University, 2013 - 2014.

- A. Soloukmofrad, MS thesis adviser (50%; joint with M. Mahjoob), Modeling and control of a hybrid electric powertrain using an HCCI engine, University of Tehran, 2011 - 2013.
- M. Amini, MSc thesis co-adviser (50%; joint with A. Ghaffari), Model-based Control of Cold Start Hydrocarbon Emissions in SI Engines, KNT University, 2010 - 2012.
- M. Boodaghi, MSc thesis co-adviser (50%; joint with S.A. Jazayeri), Strategies of Misfire Detection in Gasoline-CNG Bi-fuel Engines, KNT University, 2010 - 2011.
- M. Marami, MSc thesis co-adviser (50%; joint with S.A. Jazayeri), Simulation of Oil Circuit in an SI Engine at Cold Start Transient Conditions, KNT University, 2010 - 2011.
- M. Dehghani, MSc thesis co-adviser (50%; joint with S.A. Jazayeri), Thermodynamic Modeling of HCCI Exhaust Temperature, KNT University, 2010 - 2011.
- M. Bidarvatan, MSc thesis co-adviser (50%; joint with S.A. Jazayeri), Control of Combustion Phasing in an HCCI Engine, KNT University, 2010 - 2011.

Technical report advising (11)

Graduated (11):

- K. Shah, MEng Capstone project adviser, Data collection and analysis of City of Edmonton buses to determine passenger comfort, University of Alberta, 2024.
- C. Niu, MEng Capstone project adviser, Alberta residential building's energy consumption simulation and optimization, University of Alberta, 2021 - 2022.
- Z. Luan, MEng Capstone project adviser, Performance analysis of alternative heavy-duty transit buses, University of Alberta, 2021 - 2022.
- M. Owais, MEng Capstone project adviser, Measurement and analysis of fuel consumption, wind velocity and angle from a class 8 truck, University of Alberta, 2021.
- P. Rakeshkumar, MEng Capstone project adviser, Real-time fuel consumption of university's vehicle fleet using on-board diagnostic (OBD) sensor, University of Alberta, 2021.
- S. Bhasme, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling Chevy Vol Gen II supervisory controller in charge sustaining operation, Michigan Tech University, 2018 - 2019.
- V. B. Vinhaes, MS technical report co-adviser (50%), Combustion development of a high efficiency diesel micro pilot natural gas engine, Michigan Tech University, 2016 - 2018.
- K. Surresh, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling and analysis of Chevy Volt Gen II hybrid vehicle in electric mode, Michigan Tech University, 2017 - 2018.
- P. Lakhani, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling and analysis for driveline jerk control, Michigan Tech University, 2017 - 2018.
- A. Soloukmofrad, MS technical report adviser, Energy management of hybrid electric powertrains integrated with low temperature combustion engines, Michigan Tech University, 2013 - 2015.
- M. Razmara, MS technical report main adviser (co-adviser: Dr. Rush Robinett III), Model Predictive Control of Building HVAC Systems, Michigan Tech University, 2012 - 2014.

Mentoring (33)

- R. Khonsarian, Short term scholar, Modeling and control of connected and automated vehicles (CAVs), University of Alberta, 2019-2020.
- V. Prasaad Raghupathy, Short term scholar, Study and analysis of HVAC systems in Electric Vehicles, Michigan Tech University, 2019-2020.

Exhibit 1003, Page 531
Petitioner MWE Investments, LLC, et al.

- A. Mahapatra, Short term scholar, Simulation of CNT materials for three-way catalyst cold start heating, Michigan Tech University, 2019.
- R. Kamaraj, Short term scholar, Investigations into state-of-the-art hybrid electric vehicles powertrain configurations, Michigan Tech University, 2018.
- A. Somasundaram, Short term scholar, Modeling of mode switching control strategies of Chevy Volt II plug-in hybrid electric vehicle, Michigan Tech University, 2018.
- J. Tripp, Short term scholar, Modeling of powertrain and vehicle dynamics for Chevy Volt II, Michigan Tech University, 2017.
- M. Darji, Short term scholar, Electrification of high-efficiency engines, Michigan Tech University, 2017.
- K. C. Dhankani, Short term scholar, LPV modeling of an RCCI engine, Michigan Tech University, 2016.
- D. B. Lodaya, Short term scholar, Modeling and optimization of two-mode power split hybrid electric powertrain, Michigan Tech University, 2016.
- G. Ramanathan, D. Dhanraj, Short term scholars, Control of robot's electric motor for throwing ball and demonstration for MTU's Summer Youth Program, Michigan Tech University, 2016.
- J. Dwivedi, V. Ghadge, E. Malik, D. Dhanraj, Short term scholars, Calibration and torque control of 100-kW E-motor for hybrid electric powertrain test bed, Michigan Tech University, 2015 – 2016.
- R. R. Zakkam, H. Nutulapati, M. Cheruvathur, Short term scholars, Experimental setup for a LTC engine and hybrid electric powertrain, Michigan Tech University, 2014.
- F. Ahmed, G. Xiong, A. Ketkale, A. Kondra, A. Girase, and H. Su, Short term scholars, Experimental setup for low temperature combustion engine research, Michigan Tech University, 2013 - 2014.
- Z. Han, S. Viswanathan, Z. Huang, and N. Ghike, Short term scholars, Control of electric motor and Lithium-ion battery for HEV powertrain, Michigan Tech University, 2013 - 2014.
- B. Moridian, Short term scholar, Adaptive parameter/state estimation for building energy control, Michigan Tech University, 2012 - 2013.
- A. Hansen, Visiting M.Sc. student from Technische Universität Hamburg-Harburg, Discrete sliding mode control of automotive controllers, University of California, Berkeley, 2012.
- K. Edelberg, MSc student, Robust model-based controller design using implementation imprecision bounds, University of California, Berkeley, 2012.
- A. Cranmer, MSc student, Modeling HC tailpipe emissions from an SI engine, University of California, Berkeley, 2010 - 2011.
- S. Sharifirad, Visiting MSc student from KNT University, Automatic driver controller design for standard driving test cycles simulation, Iran Khodro Engine Research Center, 2003 - 2004.

- **BSc Students (34)**

Thesis advising (8)

- A. Solouk Mofrad, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), On-board diagnosis of catalytic converters in SI engines, KNT University, 2010.
- A. Kazemi Taskoh, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Control strategies to reduce cold start and warm-up emissions from passenger cars, KNT University, 2010.
- M. Aliramezani, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Control strategies of Anti-lock Braking Systems (ABS) in passenger cars, KNT University, 2010.
- J. Rezaee, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Experimental study of an HCCI engine running with butanol blended fuels, KNT University, 2010.
- A. Shahrokhshahi and H. Zamani, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Strategies to control/monitor evaporative emissions in passenger cars, KNT University, 2010.

- H. Jafarian, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Simulation of bearings of a SI engine using AVL-EXCITE software, KNT University, 2010.
- M. Amereh, BSc thesis co-adviser (50%; joint with S.A. Jazayeri), Numerical modeling of the flow under engine's hood of Samand vehicle using Fluent software, KNT University, 2010.

Co-op (6)

- C. D. Reyes, Co-op student, SOFC planar cell fabrication, University of Alberta, Winter 2025.
- K. Kunkle-Reed, Co-op student, Test setup design and fabrication for a fuel cell stack, University of Alberta, Winter-Summer 2025.
- J. Sathya Sai, Co-op student, Data collection and synchronization for analysis of two platooning trucks, University of Alberta, Fall 2021.
- S. Virk, Co-op student, Design of a vehicle data acquisition system for two platooning trucks, University of Alberta, Summer-Fall 2021.
- E. Stewart, Co-op student, co-supervised with Prof. Bob Koch, Vehicle OBD setup and data analysis for reducing vehicle fuel consumption from the UAlberta fleet vehicles, University of Alberta, Fall 2020.
- H. Holzer, Co-op student, co-supervised with Prof. Bob Koch, Vehicle OBD setup, University of Alberta, Summer 2020.

Mentoring (20)

- M. Khani, Short term scholar, Vehicles data processing and analysis, University of Alberta, 2024 - present.
- D. Hanover, Short term scholar, PV Panel modeling, HVAC modeling for an MTU building and a Chevy Volt Vehicle, Michigan Tech. University, 2015 – 2018.
- A. Krisztian, Short term scholar, Analysis of the experimental data from Chevy Volt Gen 2 vehicle, Michigan Tech. University, Summer 2017.
- R. P. Robles, Short term scholar, Sizing Analysis of Energy Storage Systems and Solar PV Panels for Commercial Buildings, Michigan Tech. University, 2016.
- S. Hedblom, Student project as part of The Honors Institute, Skiing's mechanical efficiency, Michigan Tech. University, 2015.
- T. Kovach, Short term scholar, Experimental study of building energy efficiency, Michigan Tech. University, 2014.
- A. Soneji, R. Bhasin, A. Neti, N. Neti, A. Hayashi, S. Bigdeli, S. Raghunathan, Mech. Eng. undergraduate students, Modeling, control and testing of a 2.4-liter Toyota engine and exhaust aftertreatment system, University of California, Berkeley, 2012.
- J. Li, and A. Cheng, Senior Mech. Eng. undergraduate students, Verification and hardware-in-the-loop testing of automotive controllers, University of California, Berkeley, 2012.
- M. Muller, P. Sang Cho, and R. Sze, Senior Mech. Eng. undergraduate students, Model analysis and control trajectory modification for reducing hydrocarbon emissions in SI engines, University of California, Berkeley, 2011.
- S. Varnhagen, NSERC summer student, HCCI experimental study, University of Alberta, 2008.
- K. Swan, NSERC summer student, HCCI combustion modeling, University of Alberta, 2006.

- **Lab Engineers (3)**

- L. Yamarte, Lab Engineer (100%), Fabrication of Solid Oxides Fuel Cells, University of Alberta, 2024 - present.
- S. Hanifi, Lab Engineer (100%), Experimentation, Testing, and Analysis of Solid Oxides Fuel Cells, University of Alberta, 2024 - present.

- Sh. Sharifi, Lab Engineer (60%), Fabrication, Testing, and Analysis of Solid Oxides Fuel Cells, University of Alberta, 2022 - 2023.

University/Community Service

Theses/Proposals (examination committee member)

PhD committees (30):

- Prasoon Garg, PhD thesis exam, "Intelligent Data-Driven Control Calibration For Automotive Powertrains", Eindhoven University of Technology, 2024.
- Fan Wu, PhD thesis exam, "Traffic Management in Mixed Autonomy with CAVs: Sensing, Signal Optimization, and Trajectory Control", University of Alberta, 2024.
- Ramin Fathian, PhD candidacy exam, "Evaluating the Prevalence of Shoulder Injury Among Manual Wheelchair Users", University of Alberta, 2024.
- Wenkang Zhang, PhD thesis defense, "Scheduling of Remanufacturing Systems based on Metaheuristic Methods", University of Alberta, 2023.
- Navid Balazadeh Meresht, PhD proposal exam, Simon Fraser University, 2023.
- David Gordon, PhD thesis defense, "Realtime Machine Learning based In-Cycle Control of Homogeneous Charge Compression Ignition", University of Alberta, 2023.
- Ajay Singh, PhD thesis defense, "Deterministic Characteristics of Cyclic Combustion Dynamics of Conventional and Advanced Reciprocating Engines", Indian Institute of Technology - Ropar, 2022.
- Wenkang Zhang, PhD candidacy exam, "Process Planning and Scheduling for a Flexible Job-shop-type Remanufacturing System based on Metaheuristic Methods", University of Alberta, 2022.
- Sajad Vafaeenezhad, PhD thesis defense, "Studying the Microstructure of electrodes for Low-Temperature Solid Oxide Fuel Cell and Electrolysis Applications", University of Alberta, 2022.
- Fan Wu, PhD candidacy exam, "V2X Technology Supported Traffic Management System for Signalized Arterials", University of Alberta, 2022.
- Mudasser Seraj, PhD thesis defense, "Mobility and Safety Implications of Automated Vehicles in Mixed Traffic by Recognizing Behavioral Variations of Drivers", University of Alberta, 2021.
- Zhihao Zhao, PhD thesis defense, "High Injection Pressure Impinging Diesel Spray Characteristics and Subsequent Soot Formation in Reacting Conditions", Michigan Tech University, 2021.
- Alireza Noamani, PhD candidacy exam, "Development of Wearable Technologies for Standing and Sitting Balance Evaluation", University of Alberta, 2020.
- Jihoon Lim, PhD thesis defense, "Gain-scheduling and Preview Control of Selective Catalytic Reduction Systems in Diesel Engines", The University of British Columbia (Vancouver), 2020.
- Xin Wang, PhD proposal and thesis defense, "A Study of Model-based Control Strategy for a Gasoline Turbocharged Direct Injection Spark Ignited Engine", Michigan Tech University, 2015-2020.
- David Gordon, PhD candidacy exam, "Realtime Machine Learning based In-Cycle Control of Homogeneous Charge Compression Ignition for Combustion Stability and Emissions Improvement", University of Alberta, 2020.
- Mudasser Seraj, PhD candidacy exam, "Mobility and Safety Implications of Automated Vehicles in Mixed Traffic by Recognizing Behavioral Variations of Drivers", University of Alberta, 2019.
- Xin Ma, PhD proposal and thesis defense, "Connected Vehicle-Based Distributed Machine Learning for Adaptive Fuel Consumption and Eco-Driving", University of Massachusetts at Lowell, 2016-2019.
- Mufaddel Dahodwala, PhD proposal and thesis defense "Experimental and Computational Investigation of Dual Fuel Diesel-Natural Gas RCCI Combustion in a Heavy-Duty Diesel Engine", Michigan Tech University, 2016-2018.
- Zhihao Zhao, PhD proposal, "Study of High Injection Pressure Impinging Diesel Spray and Combustion Processes" Michigan Tech University, 2018.
- Mojtaba Bahramgiri, PhD oral exam, Michigan Tech University, 2018.

- Guna R. Bharati, PhD proposal, and thesis defense, "Hierarchical Optimization for Vehicle-to-Grid and Building-to-Grid Integration" Michigan Tech University, 2015-2017.
- Yanyu Wang, PhD proposal, and thesis defense, "The Interaction of Ignition and In-Cylinder Flow on Flame Kernel Development and Combustion Variability in an Optically Accessible Direct Injection Engine", Michigan Tech University, 2014-2017.
- Ehsan Ansari, PhD proposal, and thesis defense, "Combustion, Emissions, and Performance Optimization in a DI/PFI-RCCI Diesel/Natural Gas Turbocharged Engine", Michigan Tech University, 2014-2017.
- Bin Zhou, PhD proposal entitled "Hybrid Electric Vehicle Battery Aging Estimation and Optimization based on Energy Consumption Minimization Strategy", Michigan Tech University, 2017.
- Amir Rezaei, PhD proposal, and thesis defense, "Optimal Energy Management Strategies for Hybrid Electric Vehicles", Michigan Tech University, 2015-2017.
- Jiongxun Zhang, PhD proposal entitled "Experimental Characterization of Spark Ignited Direct Injection Gasoline Engine Injection Processes", Michigan Tech University, 2015.
- Mufaddel Dohodwala, committee member for PhD qualifying exam, Michigan Tech University, 2014.
- Zhuyong Yang, committee member for PhD qualifying exam, Michigan Tech University, 2014.
- Eva Žáčeková, PhD thesis entitled "Identification for Model Predictive Control under Closed-loop Conditions", Czech Technical University, 2013.

MSc committees (31):

- Lap Quan Au-Yeung, MSc thesis entitled "Applications of Machine Learning in Drop Impact Dynamics and Drug Discovery", University of Alberta, 2024.
- Lalitha Ganesh Prabhu Komaragiri, MSc thesis entitled "Study of Dynamics of Water Droplet Freezing", University of Alberta, 2024.
- Jakub McNally, MSc thesis entitled "Hydrogen-Diesel Dual Fuel Combustion Characterization for an Internal Combustion Engine", University of Alberta, 2023.
- Caitlyn Shum, MSc thesis entitled "Addressing Urban Climate Hazard Vulnerability in Canada through Building Retrofit Techniques and Strategies", University of Alberta, 2023.
- Amir Hossein Ebrahimnezhad, MSc thesis entitled "Deep Learning in Autonomous UAV Pursuit", University of Alberta, 2023.
- Michael E. Nicol-Seto, MSc thesis entitled "Investigation of a Drive Mechanism Modification to Increase Thermodynamic Power of a Low Temperature Differential Gamma Type Stirling Engine", University of Alberta, 2021.
- Habiba Imam, MSc thesis entitled "Towards an Autonomous Robot-based Laser Cladding Repair Process: A Framework for Damage Detection, Localization and Path Planning", University of Alberta, 2021.
- Aditya Kodkani, MSc thesis entitled "Numerical Analysis of a Hybrid Cooling Tower and its Plume", University of Alberta, 2021.
- Ali Lotfi, MSc thesis entitled "Study of Light-duty Gasoline Vehicle Cold Climate NOx and Particulate Number Emissions in Real-world Driving Conditions", University of Alberta, 2020.
- Ali Alizadeh, MSc thesis entitled "Assessment of Co-processing Hydrodeoxygenated Fast Pyrolysis Oil and Vacuum Gas Oil in a Fluid Catalytic Cracking Unit", University of Alberta, 2020.
- Jason Philip Michaud, MSc thesis entitled "Low Temperature Difference Alpha-Type Stirling Engine for the Experimental Determination of Optimal Parameters to maximize Shaft Power", University of Alberta, 2020.
- Mario Alberto Soriano Morales, MSc thesis entitled "Multi-Sensor Data Fusion and Reconfigurable Measurement System: A Machine Learning Approach", University of Alberta, 2019.
- Muralidhar Nischal, MSc thesis entitled "Application of Sensor Fusion for SI Engine Diagnostics and Combustion Feedback", Michigan Tech University, 2019.

- Anurag Kamal, MSc thesis entitled "Physical Modeling of Lithium-Ion Aging for Automotive Applications", Michigan Tech University, 2018.
- Gaurav Bagwe, MSc technical report entitled " Video Frame Reduction in Autonomous Vehicles ", Michigan Tech University, 2018.
- Huanqing Wang, MSc thesis entitled " Development of Dynamic Programming and Receding Horizon Control Strategies for GM Volt II Multi-mode Hybrid Electric Vehicle ", Michigan Tech University, 2018.
- Kovid_Sachdeva, MSc technical report entitled " Development of Optimal Operating Point maps and Mode Shift Strategy for Chevrolet Volt Gen II Plug-in Hybrid Electric Vehicle ", Michigan Tech University, 2018.
- Kaushik Prabhu, MSc thesis entitled " Sensor Fusion for Spark Ignited Engines ", Michigan Tech University, 2018.
- Yash Borghate, MSc thesis entitled " Cold Start Analysis and Modeling of a Direct-Injection Gasoline Engine ", Michigan Tech University, 2018.
- Abhishek Jadav, MSc thesis entitled "Experimental and Modeling Study of Particulate Matter Oxidation under Loading Conditions for a SCR Catalyst on a Diesel Particulate Filter ", Michigan Tech University, 2017.
- Sandesh S. Rao, MSc thesis entitled "An Experimental Investigation on the Effect of Dual Coil Ignition Discharges on Dilute Combustion in a Spark Ignition Engine ", Michigan Tech University, 2017.
- Omkar Dilip Rane, MSc thesis entitled "Multi Resonant Feedback Control of Wave Energy Converters using Recursive Least Squares", Michigan Tech University, 2017.
- Biswajit Barik, MSc thesis entitled "Designing a Real-time Velocity Predictor for Powertrain Optimization of Connected and Automated Vehicles", Michigan Tech University, 2017.
- Reem Merchant, MSc thesis entitled "New Model to Predict Heat Transfer Coefficient for Flow Boiling in Microfin Tubes", Michigan Tech University, 2016.
- Arya Yazdani, MSc thesis entitled "Air Charge Estimation for an SI Engine using In-cylinder Pressure Sensor", Michigan Tech University, 2016.
- Rui Hu, MSc thesis entitled "State of Charge Balancing Droop Control", Michigan Tech University, 2015.
- Prathamesh Chendvankar, MSc technical report entitled "1D Simulation of Direct Water Injection in a Spark Ignited Engine", Michigan Tech University, 2015.
- Jiongxun Zhang, MSc technical report entitled "Optical Access Engine Setup and Validation", Michigan Tech University, 2015.
- Ritam Misra, MSc thesis entitled "Impact of Plug-in Electric Vehicles and Wind Generators on Harmonic Distortion of Electric Distribution Systems", Michigan Tech University, 2014.
- Zhe Huang, MSc technical report entitled "SVPWM Switching Pattern for Z-Source Inverter, Simulation and Application in HEV/EV Motor Drive", Michigan Tech University, 2014.
- Dustin Loveland, MSc thesis entitled "Development of a Predictive Combustion Model of a Spark Ignited Engine with Gasoline Direct Injection, Variable Valve Timing, Duration and Lift Technologies", Michigan Tech University, 2012.

University Service

- Member of University of Alberta's Institutional Advisory and Oversight Committee on Equity, Diversity and Inclusion (EDI), 2024 – present
- Member of the Association of Academic Staff of the University of Alberta (AASUA) Finance Committee, University of Alberta, 2020 – present

Exhibit 1003, Page 536
Petitioner MWE Investments, LLC, et al.

- Member of Review and Adjudication Committee for Killam/Notley Postdoctoral Fellowships, University of Alberta, 2025
- Member of AASUA Equity & Diversity Committee, University of Alberta, 2020 – present
- Member of Faculty Hiring Committee for Mechatronics position, Department of Mechanical Engineering, University of Alberta, 2023
- Member of University of Alberta District Energy System - Master Energy Plan Advisory Committee, 2022 – 2024
- Judge for Faculty of Engineering Graduate Research Symposium, University of Alberta, 2022, 2023
- Volunteer for the Engineering Booth at U of A Open House 2022, University of Alberta, 2022
- Co-adviser of Alternative Energy Enterprise (AEE), Michigan Tech. University, 2018 - 2019
- MTU Review Committee to Assess Participation into National APLU (Association of Public and Land-grant Universities) Program to Increase the Diversity of STEM Faculty, Michigan Tech. University, Fall 2017.
- Member of MEEM Department Seminar Committee, Michigan Tech. University, 2012 – 2016.
- Judge for MEEM Senior Capstone Design Critical Design Review, Michigan Tech. University, Spring 2017.
- Facilitator at the MEEM and Graduate School Orientation, Michigan Tech. University, 2016.
- Member of MEEM Department Faculty Development Committee, Michigan Tech. University, 2014.
- Judge for Undergraduate Research Expo, Michigan Tech. University, 2015.
- Review panel for Research Excellence Fund - Mentoring Grant Proposals, Michigan Tech. University, 2014.
- Judge in Graduate Research Colloquium (GRC), Michigan Tech. University, 2013, 2015.
- Faculty host for two of the MTU's Leading Scholar Award Finalists, Michigan Tech. University, 2012, 2013.

Community Service

- Led and co-organized a half-day workshop on "Controls and Robotics" in Michigan Tech's Summer Youth Program -- ME: Design the Future, high school students in grades 9-12, Jul. 27, 2016.
- Mentoring FIRST® Robotics Competition Team on motor controller design, Houghton High School, 2016
- Judge in Western UP Science Fair, Houghton, MI, March 23, 2015.
- Judge in Canada-Wide Youth Science Fair, Ottawa, May 10-18, 2008.
- Member of University of Alberta Student Life Advisory Committee for graduate students, 2008-2009.
- Student representative of the University of Alberta graduate students in the Council of Faculty of Graduate Studies and Research (FGSR), 2007-2009.
- Member of University of Alberta Grant Selection Committee for graduate students, 2007-2008.
- Elected Vice-President Events of Mechanical Engineering Graduate Students Association (MEGSA), University of Alberta, 2007-2008.
- One of the main coordinators for 2008 GSA (Graduate Students Association) Universal Orientation for over 400 new graduate students recruited to the University of Alberta in September 2008.
- Judge in Edmonton Regional Science Fair, Northern Alberta Institute of Technology (NAIT), Edmonton, April 9, 2007.

EXHIBIT 1004

DuroMax
NEXT GENERATION POWER SYSTEMS

DUAL FUEL



DUAL FUEL HYBRID ELITE XP4400EH

Product Support (Product: information, application, service info & warranty questions)

Please email us at support@duromaxgenerators.com
or call 1-800-629-3325 (option 3) Monday -Thursday 6am to 6:30pm and Fridays 6am to 5pm. PST

This manual provides information regarding the operation and maintenance of these products.
We have made every effort to ensure the accuracy of the information in this manual.
We reserve the right to change this product at any time without prior notice.

FEATURES

- **Dual Fuel Option, LPG or Gasoline.**
- **Durable 7.0 HP, Air Cooled Overhead Valve Engine.**
- **Heavy Duty Steel Frame with Four Point Fully Isolated Motor Mounts for Smooth and Quiet Operation.**
- **Wheel and Handle Kit for Easy Transporting.**
- **Full Power Panel with Engine Shutoff Switch, Volt Meter, Circuit Breaker and Power Outlets.**
- **(2) Fully Protected 120V Outlets & (1) 120V/240V Twist-Lock Outlet.**
- **8 Hour Run Time.**
- **All Steel 4.0 Gal. Fuel Tank with EZ-Read Gauge.**
- **Low Oil Shut-Off Protects Engine.**
- **Super Quiet Muffler Reduces Engine Noise.**
- **Meets EPA and CARB Emission Standards.**

This manual provides information regarding the operation and maintenance of these products.
We have made every effort to ensure the accuracy of the information in this manual.
We reserve the right to change this product at any time without prior notice.

Notice Regarding Emissions

Engines that are certified to comply with California and U.S. EPA emission regulations for SORE (Small Off Road Equipment), are certified to operate on regular unleaded gasoline, and may include the following emission control systems: (EM) Engine Modifications and (TWC) Three-Way Catalyst (if so equipped).

GENERAL SAFETY PROCEDURES

Please familiarize yourself with the following safety symbols and words:
The safety alert symbol ⚠ is used with one of the safety words (**DANGER, CAUTION,** or **WARNING**) to alert you to hazards. Please pay attention to these hazard notices both in this manual and on the generator.

DANGER: Indicates a hazard that will result in serious injury or death if instructions are not followed.

WARNING: Indicates a strong possibility of causing serious injury or death if instructions are not followed.

CAUTION: Indicates a possibility of personal injury or equipment damage if instructions are not followed.

⚠DANGER: This generator produces poisonous carbon monoxide gas when running. This gas is both odorless and colorless. Even if you do not see or smell gas, carbon monoxide may still be present. Breathing this poison can lead to headaches, dizziness, drowsiness, and eventually death.

- Use outdoors **ONLY** in non-confined areas.
- Keep several feet of clearance on all sides to allow proper ventilation of the generator.

⚠ **WARNING: The exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

⚠ **WARNING: This generator may emit highly flammable and explosive gasoline vapors, which can cause severe burns or even death. A nearby open flame can lead to explosion even if not directly in contact with gas.**

- Do not operate near open flame.
- Do not smoke near generator.
- Always operate on a firm, level surface.
- Always turn generator off before refueling. Allow generator to cool for at least 2 minutes before removing fuel cap. Loosen cap slowly to relieve pressure in tank.
- Do not overfill gas tank. Gas may expand during operation. Do not fill to the top of the tank.
- Always check for spilled gas before operating.
- Empty the gasoline tank before storing or transporting the generator.
- Before transporting, turn fuel valve to off and disconnect the spark plug.

⚠ **WARNING: This generator produces powerful voltage, which can result in electrocution.**

- ALWAYS ground the generator before using it (see the "*Grounding the Generator*" portion of the "*PREPARING THE GENERATOR FOR USE*" section).
- Generator should only be plugged into electrical devices, either directly or with an extension cord. NEVER connect to a building electrical system without a qualified electrician. Such connections must comply with local electrical laws and codes. Failure to comply can create a backflow of power, which may result in serious injury or death to utility workers.
- Use a ground fault circuit interrupter (GFCI) in highly conductive areas such as metal decking or steel work. GFCIs are available in-line with some extension cords.
- Do not use uncovered in rainy or wet conditions.
- Do not touch bare wires or receptacles (outlets).
- Do not allow children or non-qualified persons to operate.

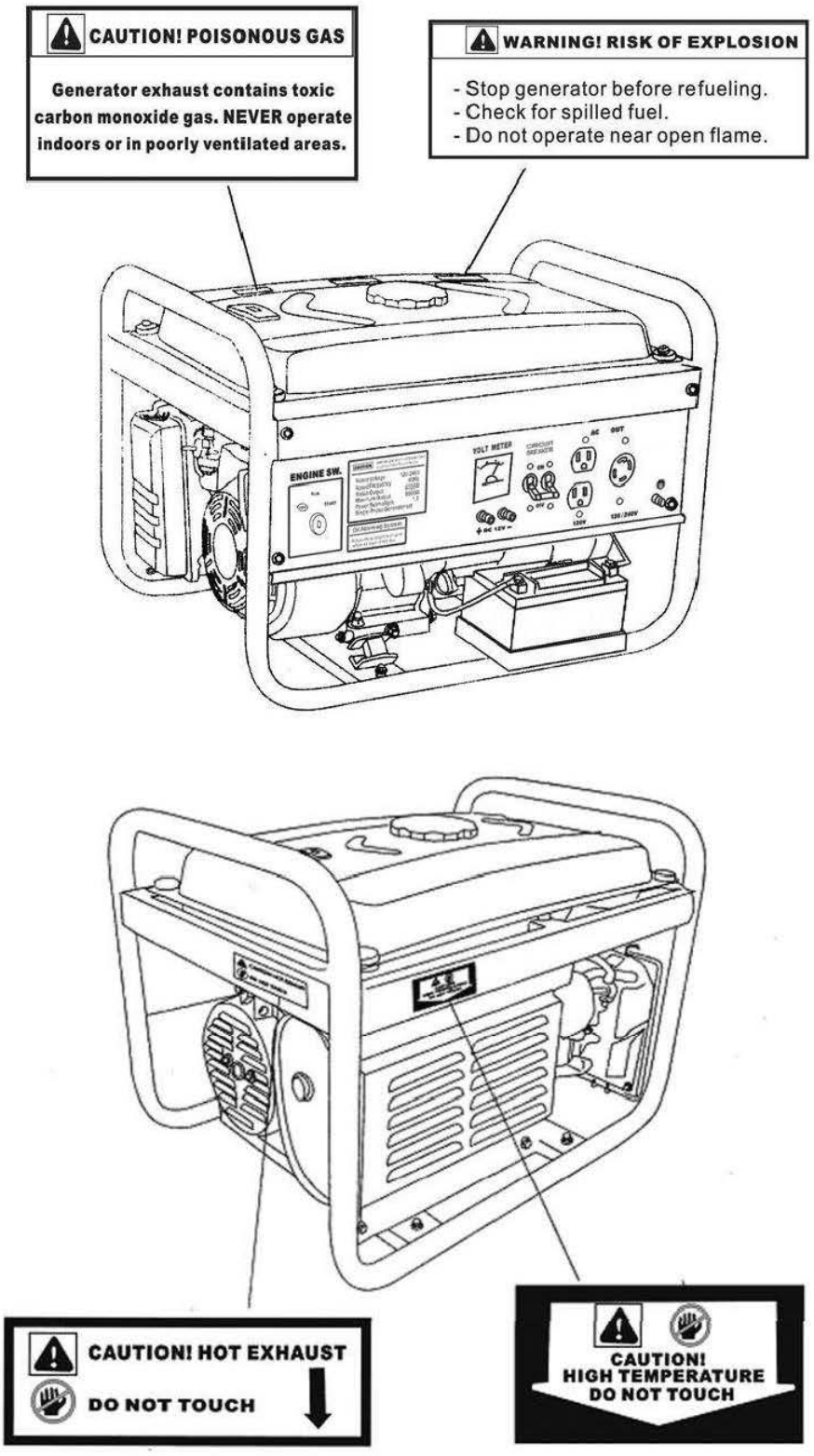
⚠ **WARNING: This generator produces heat when running. Temperatures near exhaust can exceed 150°F (65°C).**

- Do not touch hot surfaces. Pay attention to warning labels on the generator denoting hot parts of the machine.
- Allow generator to cool several minutes after use before touching engine or areas which heat during use.

CAUTION: Misuse of this generator can damage it or shorten its life.

- Use the generator only for its intended purposes.
- Operate only on dry, level surfaces.
- Allow generator to run for 3 - 5 minutes before connecting any electrical devices.
- Shut off and disconnect any malfunctioning devices from generator.
- Do not exceed the Wattage capacity of the generator by plugging in more electrical devices than the unit can handle (see "*PRECAUTIONS-OVERLOADING THE GENERATOR*").
- Do not turn on electrical devices until after they are connected to the generator.
- Turn off all connected electrical devices, and turn off the breaker, before stopping the generator.

In addition to the above safety notices, please familiarize yourself with the safety and hazard markings on the generator.



PACKAGE CONTENTS

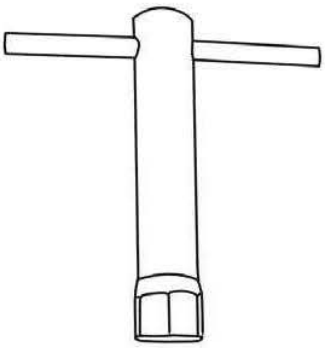
Your generator comes with the items listed below. Please check to see that all of the following items are included with your generator.



Screw driver



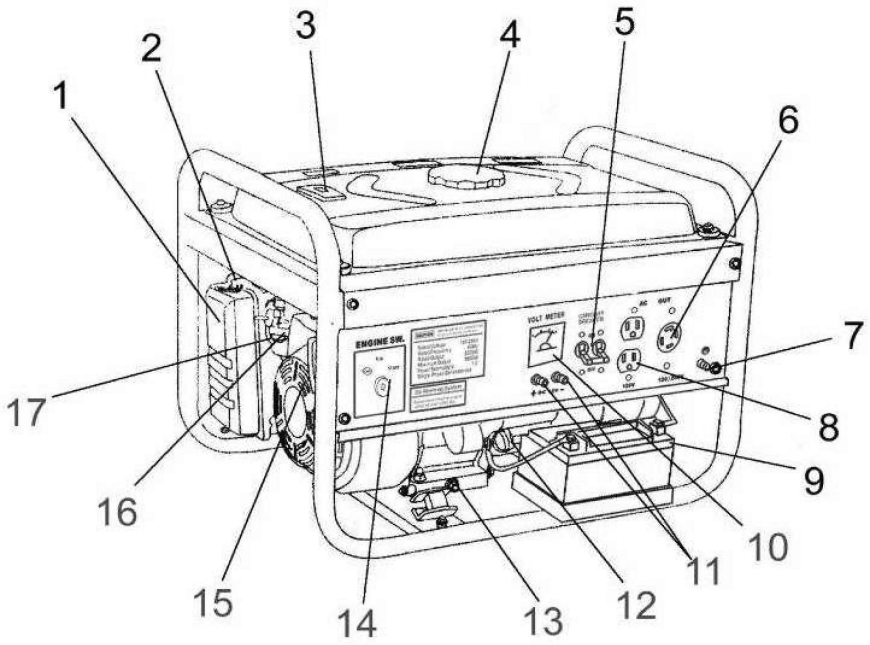
Spanner

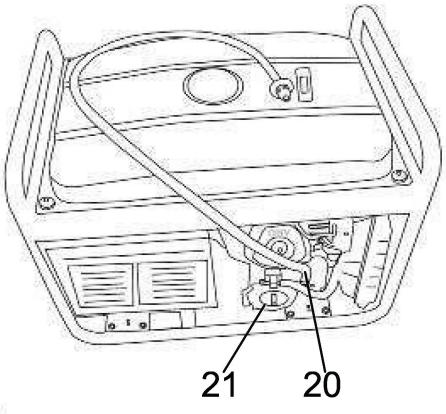


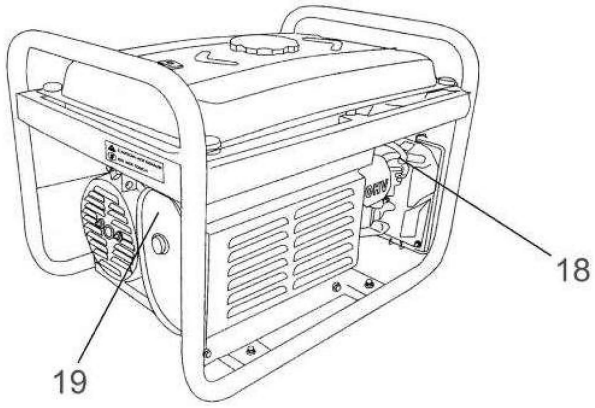
Spark plug wrench

GENERATOR COMPONENTS

Please familiarize yourself with the locations and functions of the various components and controls of your generator.







1. **Air cleaner -** a removable, cleanable, sponge-like element that limits the amount of dirt pulled into the engine.
2. **Choke lever -** Adjusts the amount of air let into the engine.
3. **Fuel Gauge -** Indicates the amount of fuel in the tank.
4. **Fuel Cap -** Access to the fuel tank for adding fuel.
5. **Circuit Breaker -** Reset switch that protects the generator from electrical overload.
6. **120/ 240 Volt AC Receptacle -** Use to connect electrical devices that run 120 and/or 240 Volt, 60Hz, single phase, AC current (NEMA L14-30).
7. **Ground Terminal -** Connect grounding wires here to properly ground unit.
8. **120 Volt AC Receptacle -** Use to connect electrical devices that run 120 Volt, 60 Hz, single phase, AC current (2×duplex GFCI).
9. **12V DC Battery.**
10. **Volt Meter -** Provides reading of voltage output.
11. **12v DC Receptacle-** Use for charging 12 Volt automotive-type batteries only.

12. **Oil Filler Cap-** Use to Add oil or checking the oil.
13. **Oil Fill and Dipstick-** Location for checking and filling engine oil.
14. **Engine Switch-** Used to start/stop engine.
15. **Recoil Starter-** Pull-cord for starting engine.
16. **Fuel Filter Cup-** Traps dirt and water from fuel before it enters the engine.
17. **Fuel valve-** Allows fuel to enter engine.
18. **Spark plug-** Provides proper engine ignition.
19. **Muffler-** Reduces engine noise.
20. **Hose connector-** Connect liquid propane gas to generator.
21. **Pressure Release Valve-** Provides regulated liquid propane gas supply.

PREPARING THE GENERATOR FOR USE

Using the Generator for the First Time
If you are using the generator for the first time, there are a few steps you must take to prepare it for operation.

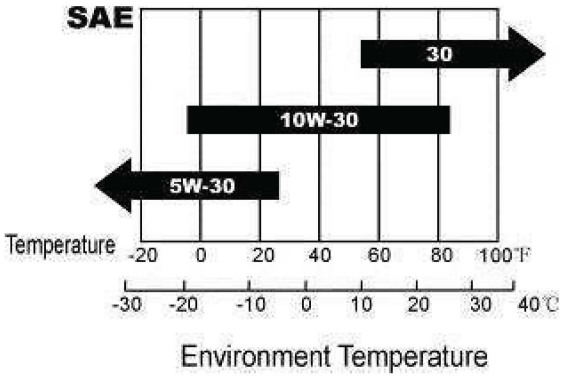
Step 1 - Add oil

The generator requires engine oil to operate properly. The generator, when new from the package, contains no oil in the crankcase. You must add the proper amount of oil before operating the generator for the first time. This amount, which is equal to the oil capacity of the engine crankcase, can be found on the chart in *figure 1*. When filling the engine with oil in the future, please refer to this chart.

Model number	**XP4400H**	**XP4400EH**
Engine oil capacity	20 fluid oz.	

Figure 1- Generator Oil Capacity

CAUTION:
- **Do not apply engine oil with additives or 2-stroke gasoline engine oil,** as they haven't enough lubrication, which may shorten the engine's service life.
- **Engine oil recommended: SAE 10W-30.** As viscosity varies with regions and temperatures, so the lubricant has to be selected in accordance with our recommendation.



To add oil, follow these steps:
1. Make sure the generator is on a level surface.
2. Unscrew the oil filler/dipstick cap from the engine as shown in *figure 2*.
3. Using a funnel, add the appropriate amount of oil, as found in *figure 1*, into the crankcase. You will know the crankcase is full when the oil level has reached the lower lip of the opening you have just poured the oil into (see *figure 3*).
4. Replace oil filler cap.

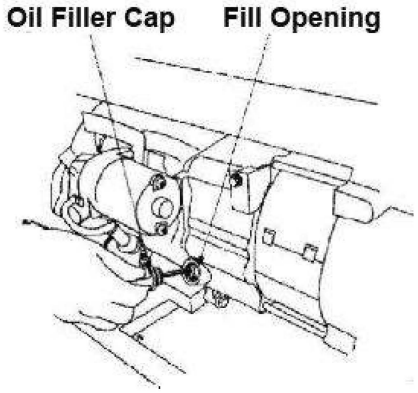


Figure 2- Unscrewing the oil cap



Figure 3 - Adding oil

Step 2 - Add Gasoline

⚠ **WARNING: Gasoline and gas fumes are highly flammable.**

- **Do not fill tank near an open flame.**
- **Do not overfill. Always check for fuel spills.**

To ensure that the generator runs smoothly use only FRESH, UNLEADED GAS WITH AN OCTANE RATING OF 87 OR HIGHER.

To add gasoline:

1. Make sure the generator is on a level surface.
2. Unscrew gas cap and set aside (NOTE: the gas cap may be tight and hard to unscrew).
3. Slowly add unleaded gasoline to the fuel tank. Be careful not to overfill. Please refer to the chart in *figure 4* to find the gas capacity of your generator model. The fuel gauge on the top of the gas tank indicates how much gasoline is in the generator gas tank. **NOTE: Gas can expand. Do not fill the gas tank to the very top.**
4. Replace fuel cap and wipe up any spilled gasoline with a dry cloth.

IMPORTANT:

- Never use an oil/gasoline mixture.
- Never use old gas.
- Avoid getting dirt or water in the fuel tank.
- Gas can age in the tank and make it hard to start up the generator in the future.
- Never store generator for extended periods of time with fuel in the tank.

Model number	**XP4400H**	**XP4400EH**
Gas tank capacity	15L (3.96 US Gallons)	

Figure 4 - Gas Tank Capacity

Step 3 - Ground the Generator

⚠ **WARNING: Failure to properly ground the generator can result in electrocution.**

Ground the generator by tightening the grounding nut against a grounding wire (see *figure 5*). A generally acceptable grounding wire is a No. 12 AWG (American Wire Gauge) stranded copper wire. This grounding wire should be connected at the other end to a copper or brass-grounding rod

that is driven into the earth. Grounding codes can vary by location. Please contact a local electrician to check the grounding regulations for your area.

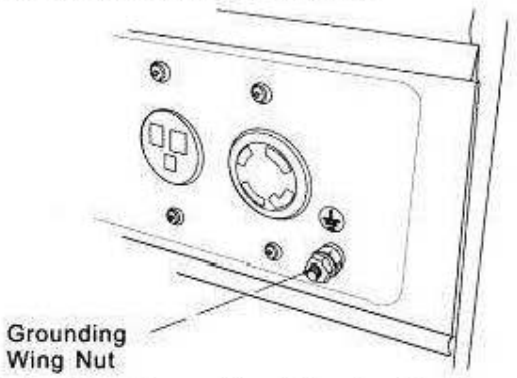


Figure 5 – Attaching the Grounding Wire to the Generator

Subsequent Use of the Generator

If this is not your first time using the generator there are still steps you should take to prepare it for operation.

IMPORTANT: At this point you should be familiar with the procedures described in the first portion of this section entitled "*Using the Generator for the First Time.*" If you have not yet read this section, go back and read it now.

Step 1- Check the oil

The generator is equipped with an automatic shutoff to protect it from damage due to low oil. Nonetheless, you should check the oil level of the engine before each use to ensure that the engine crankcase has a sufficient amount.

To check the oil level:

1. Make sure the generator is on a level surface.
2. Unscrew the oil filler/dipstick cap.
3. With a dry cloth, wipe the oil off of the stick on the inside of the cap.
4. Insert the dipstick as if you were replacing the cap and then remove again. There should now be oil on the stick. If there is no oil on the stick, or oil only at the very end of the stick, you should add oil until the engine crankcase is filled (see "*Adding Oil*" portion of the "*Maintenance*" section).
5. Be sure to replace the cap when finished checking oil.

NOTE: The oil capacity for your generator can be found in the "*Specifications*" section of this manual.

Step 2 - Check the Gas Level

Before starting the generator, check to see that there is sufficient gasoline in the gas tank. The fuel gauge on top of the generator will indicate the gas level in the tank. Add gas if necessary according to the steps in the "Adding Gasoline" portion of the "Maintenance" section.

⚠ WARNING: Gasoline and gasoline fumes are highly flammable.

- Do not fill tank near an open flame.
- Always allow engine to cool for several minutes before refueling.
- Do not overfill (check the "Specifications" section for the tank capacity of your generator). Always check for fuel spills.

⚠ IMPORTANT:

- Use only UNLEADED gasoline with an octane rating of 87 or higher.
- Do not use old gas.
- Never use an oil/gasoline mixture.
- Avoid getting dirt or water in the fuel tank.
- Never store generator for extended periods of time with fuel in the tank.

Step 3- Ground the Generator

⚠ **WARNING: Failure to properly ground the generator can result in electrocution.** Ground the generator by tightening the grounding nut against a grounding wire (see figure 5). A generally acceptable grounding wire is a No. 12 AWG (American Wire Gauge) stranded copper wire. This grounding wire should be connected at the other end to a copper or brass-grounding rod that is driven into the earth.

Grounding codes can vary by location. Please contact a local electrician to check the grounding regulations for your area.

STARTING THE GENERATOR - Gasoline or LPG separately

⚠ CAUTION:

When using gasoline, LPG must be shut off! When using LPG, gasoline must be shut off!

⚠ **Disconnect all electrical loads from the generator before attempting to start!**

To start your generator with gasoline, perform the following steps:

1. Make sure no electrical devices are connected to the generator. Such devices can make it difficult for the engine to start.
2. Check that the generator is properly grounded (see page 13, "*Ground the Generator*").
3 Turn the gasoline fuel valve to the "ON" position
4. Move the choke lever to the "CLOSED" position (see *figure 7*).
5. Set the engine switch to the "ON" position.
6. Pull on the recoil starter handle slowly until a slight resistance is felt (see *figure 8*). Then pull quickly to start the engine. Return cord gently into the machine. Never allow the cord to snap back.
7. If engine fails to start, repeat step 4. NOTE: After repeated attempts to start the engine, please consult the troubleshooting guide before attempting again.
8. Once the engine has started and run for about a minute, move the choke lever about half way towards the "OPEN" position. Wait another 30 seconds and then move the choke lever all the way to the "OPEN" position.
9. Allow the generator to run for several minutes before attempting to connect any electrical devices.

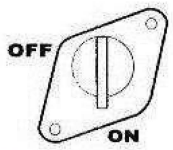


Figure 6 - fuel valve in the "on" position



Figure 7 - Choke in the close position



Figure 8 - Pulling the recoil start.

To start your generator with LPG, perform the following steps:

1. Make sure no electrical devices are connected to the generator.
2. Check that the generator is properly grounded (see page 13, "*Ground the Generator*").
3. Turn the gasoline fuel valve to the "OFF" position (see *figure 6*).
4. Connect the propane gas hose to the regulator (see figure B).
5. Connect the regulator to the liquid propane gas supply and then turn on the liquid propane gas supply, making sure there are no leaks (see figure C).
6. Open the clasp connected to the Pressure Release Valve (see figure C).
7. Press the button on Pressure Release Valve two to three times before starting the engine. (see figure D)
8. When starting the engine:
   a. If the engine is warm (The unit was run recently) start with the choke half open.
      i. Wait another 30 seconds and then move the choke lever all the way to the "OPEN" position.
   b. If the engine is cold (The unit has not been run for half an hour or more) start with the choke open. (see figure E & F).
9. Pull on the recoil starter handle slowly until a slight resistance is felt (see *figure 8*). Then pull quickly to start the engine. Return cord gently into the machine. Never allow the cord to snap back.
10. Allow the generator to run for several minutes before attempting to connect any electrical devices.

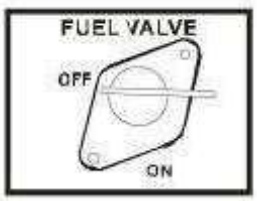


Figure A - Fuel Valve in the "OFF" position


Figure B - Connect the Hose


To LPG Supply

Figure C-Connect Valve



Figure D -Button on Presssure Release Valve


Figure F - Start with LPG(Liquid Propane Gas)

⚠ WARNING: WHEN USING THE GENERATOR WITH LPG

MAKE SURE THERE IS NO POSSIBLE IGNITION SOURCE CLOSE TO THE GENERATOR.

1. Before using, make sure all of the connectors and hoses are well connected and sealed.
2. Connect electrical devices to generator ONLY after the engine runs smoothly. (There may be remnant gasoline in the carburetor; this can cause unsteady engine performance for several minutes)
3. If the propane gas leaks, shut off the LPG supply first and then quickly unplug or turn off any electrical devices powered by the unit.
4. When stopping the engine, unplug or turn off any electrical devices and then turn off the LPG CLASP (see figure C). After the engine has stopped, turn the KEY to 'OFF" position, then shut off the LPG supply.

USING THE GENERATOR

Once you have allowed the engine to run for several minutes, you may connect electrical devices to the generator.

AC Usage

You may connect electrical devices running on AC current according to their wattage requirements. The chart in figure 9 shows the rated and surge wattage of your generator according to its model number.

The *rated wattage* corresponds to the maximum wattage the generator can output on a continuous basis.

The *surge wattage* corresponds to the maximum amount of power the generator can output for a short period of time. Many electrical devices such as refrigerators require short bursts of extra power, in addition the rated wattage listed by the device, to stop and start their motors. The surge wattage ability of the generator covers this extra power requirement.

Model Number	Rated (Running) Wattage	Surge Wattage
XP4400	3500	4400
XP4400E	3500	4400

Figure 9-generator wattage by model number

The total running wattage requirement of the electrical devices connected to the generator should not exceed the rated wattage of the generator itself. To calculate the total wattage requirement of the electrical devices you wish to connect, find the rated (or running) wattage of each device. This number should be listed somewhere on the device or in its instruction manual.

If you cannot find this wattage, you may calculate it by multiplying the Voltage requirement by the Amperage drawn: Watts = Volts × Amperes. If these specifications are not available you may estimate the Watts required by your device by using the chart in *figure 10*.

Tool or Appliance	Rated (Running) Watts	Additional Surge Watts
Electric water heater (40 gal)	4000	0
Hot plate	2500	0
Saw-radial arm	2000	2000
Electric stove	1500	0
Saw-circular	1500	1500
Air compressor (1HP)	1500	3000
Window air conditioner	1200	1800
Saw-miter	1200	1800
Microwave	1000	2000
Well water pump	1000	1500
Reciprocating saw	960	1040
Sump pump	800	1200
Refrigerator freezer	800	1200
Furnace blower	800	1300
Computer	800	0
Electric drill	600	900
Television	500	0
Deep freezer	500	800
Garage door opener	480	600
Stereo	400	0
Box fan	300	600
Clock radio	300	0
Security system	180	0
DVD player/VCD	100	0
Common light bulb	75	0

Figure 10- Estimated wattage requirements of common electrical devices.

Once you have found the rated wattage requirement of each electrical device, add these numbers to find the total rated wattage you wish to draw from the generator. If this number exceeds the rated wattage of the generator, **DO NOT** connect all these devices. Select a combination of electrical devices, which has a total rated wattage lower than or equal to the rated wattage of the generator.

CAUTION - The generator can only run at its surge wattage capacity for a short time. Connect only electrical devices requiring a rated (running) wattage equal to or less than the rated wattage of the generator. Never connect devices requiring a rated wattage equal to the surge wattage of the generator.

NOTE: The above wattage figures are estimates only. Try to check the wattage listed on your electrical devices before consulting this chart.

Once you have determined what electrical devices you will be powering with the generator, connect these devices according to the following procedure:

1. Plug in each electrical device with the device turned off.
    a. NOTE: Be sure to attach appliances to the correct receptacle (outlet). Connect standard 120 Volt, single phase, 60 Hz loads only to the 120 Volt receptacles.
    b. Connect 120/240 Volt, single phase, 60Hz loads with NEMA L14-30 plug **only** to the 120/240 Volt receptacle See *Figure 11* for a depiction of each of these receptacles.
2. Switch the circuit breaker to the "ON" position.
3. Turn on the connected electrical devices in the order of the amount of power they require beginning with the device with the highest rated Wattage requirement.

⚠ **CAUTION: Do not connect 50Hz or 3-phase loads to the generator.**

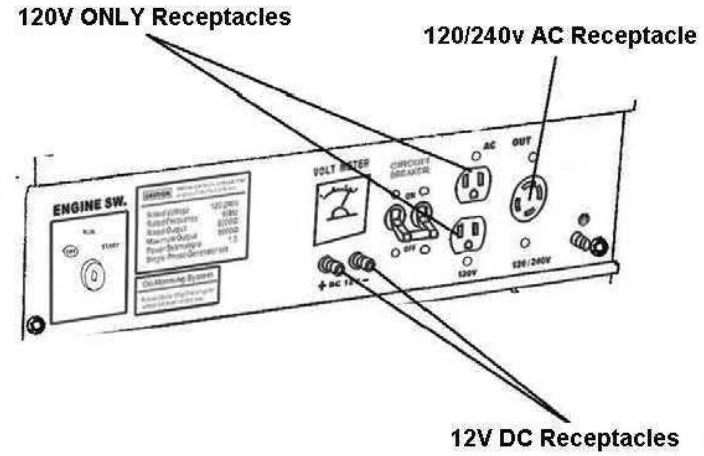


Figure 11- Receptacles available on the generator

VOLTAGE SELECTOR SWITCH

The voltage selector switches the dual 120v AC windings of the generator to produce "120V ONLY" or "120/240V". If a 240V appliance is connected to the 4-prong receptacle, the switch must be in the "120/240V" position. If only 120V appliances are being connected to the generator select the "120V ONLY" position to double the 120v amperage.

WARNING:

Only change the Voltage Selector Switch with the main AC circuit breaker OFF. The generator can be seriously damaged if the Voltage Selector Switch is changed with the breaker ON.

SOME NOTES ABOUT POWER CORDS

Long or thin cords can drain the power provided to an electrical device by the generator. When using such cords, allow for a slightly higher rated wattage requirement for the electrical device. See *Figure 12* for recommended cords based on the power requirement of the electrical device.

Device Requirements			Max. Cord Length (ft.) by Wire Gauge				
Amps	Watts (120V)	Watts (240V)	#8 wire	#10 wire	#12 wire	#14 wire	#16 wire
2.5	300	600	NR	1000	600	375	250
5	600	1200	NR	500	300	200	125
7.5	900	1800	NR	350	200	125	100
10	1200	2400	NR	250	150	100	50
15	1800	3600	NR	150	100	65	NR
20	2400	4800	175	125	75	50	NR
25	3000	6000	150	100	60	NR	NR
30	3600	7200	125	65	NR	NR	NR
40	4800	9600	90	NR	NR	NR	NR

*NR= not recommended

Figure 12 - Maximum Extension Cord Lengths by Power Requirement

DC Usage

- ⚠ **CAUTION: The DC receptacle is for recharging 12 Volt automotive-type batteries only. Do not connect any other device to this receptacle.**
- ⚠ **CAUTION: Never try to jump start a car with your generator.**

To connect 12 Volt batteries to the DC receptacle:

1. Connect one charging wire to the positive terminal on the battery and the other charging wire to the negative terminal on the battery.
2. Connect the free end of the positive wire to the positive receptacle (outlet) on the generator.
3. Start the generator.
4. Carefully connect the free end of the negative wire to the negative receptacle on the generator.
5. When disconnecting, always disconnect the wires from the generator first to avoid a spark.

⚠ **DANGER: Storage batteries emit highly explosive hydrogen gas when charged. Batteries also contain acid, which can cause severe chemical burns.**

- ⚠ **Do not allow open flames or cigarettes nearby for several minutes after charging a battery.**
- ⚠ **Always wear protective goggles and rubber gloves when charging a battery.**
- ⚠ **If battery acid gets on your skin, flush with water.**
- ⚠ **If battery acid gets in your eyes, flush with water and call a physician immediately.**
- ⚠ **If battery acid is swallowed, drink large quantities of milk and call a Physician immediately.**

If your generator is the electric start model, once running, it will charge the battery on the generator automatically. While charging, you can see the recharge indicator light lit, after the battery is full, the light will turn off.

STOPPING THE GENERATOR

To stop the generator:

1. Power down, and then unplug all connected electrical devices.
2. Switch the main AC circuit breaker to the "OFF" position.
3. Allow the generator to run for several more minutes with no electrical devices connected. (This helps stabilize the temperature of the generator.)
4. Turn the engine switch to the "OFF" position.
5. Turn the fuel valve to the "OFF" position.

⚠ **WARNING**: Allow the generator to cool for several minutes before touching areas that become hot during use.

⚠ **CAUTION**: Allowing gas to sit in the generator tank for long periods of time without use can make it difficult to start the generator in the future. Never store generator for extended periods of time with fuel in the tank.

MAINTENANCE /CARE

Proper routine maintenance of your generator will help prolong the life of your machine. Please perform maintenance checks and operations according the schedule in *figure 13*.

⚠ **CAUTION:** Never perform maintenance operations while the generator is running.

Recommended Maintenance schedule

		Each use	Every month or	Every 3 months or	Every 6 months or	Every year or
Engine oil	Check level	×				
	Replace		×			
Air cleaner	Check	×				
	Clean			×		
Fuel filter cup	Clean				×	
Spark plug	Check/clean				×	
Gas tank	Check gas level	×				
	Clean		×			×

Figure 13 - Recommended maintenance schedule

Cleaning the Generator

Always try to use your generator in a cool dry place. However, in the event your generator becomes dirty you may clean the exterior with one or more of the following:

- A damp cloth
- A soft brush

- A vacuum
- Pressurized air

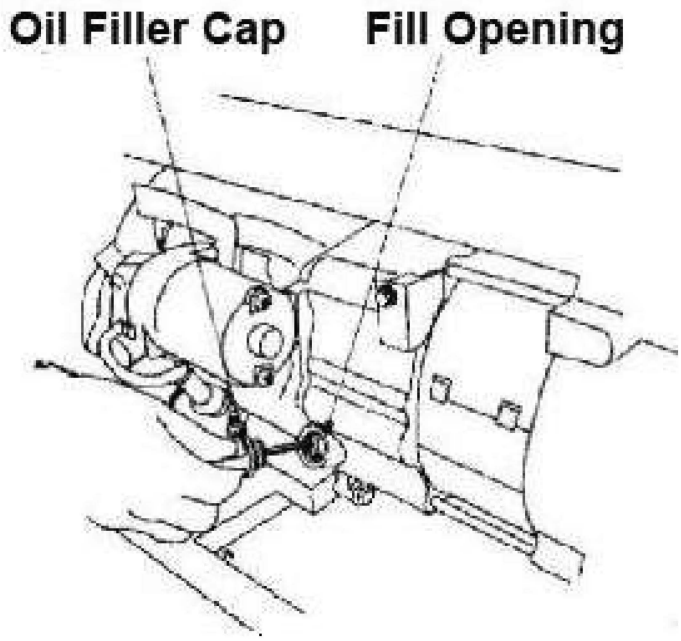
⚠ **Never** clean your generator with a bucket of water or a hose. Water can get inside the working parts of the generator and cause a short circuit or corrosion.

Checking the Oil

The generator is equipped with an automatic shutoff to protect it from running on low oil. Nonetheless, you should check the oil level of the generator before each use to ensure that the generator crankcase has a sufficient amount.

To check the oil level:

1. Make sure the generator is on a level surface.
2. Unscrew the oil filler/dipstick cap (see *figure 14*).
3. With a dry cloth, wipe the oil off of the stick on the inside of the cap.
4. Insert the dipstick as if you were replacing the cap and then remove again. There should now be oil on the stick. If there is no oil on the stick, or oil only at the very end of the stick, you should add oil until the engine crankcase is filled. See "*Changing/ Adding Oil*" in this section.
5. Be sure to replace cap when you are finished checking the oil.



You should check the oil level of your generator according to the maintenance schedule in *figure 13*. When the oil level is low you will need to add oil until the level is sufficient to run the generator. The oil capacity of your generator engine is listed in *figure 15*.

Model number	**XP4400**	**XP4400E**
Engine oil capacity	20 fluid oz.	20 fluid oz.

Figure 15- Engine Oil Capacity.

It is only necessary to drain the oil from the crankcase, other than for regular oil changes if it has become contaminated with water or dirt. In this case, you can drain the oil from the generator according to the following steps:

1. Place an approved oil disposal container underneath the generator to catch oil as it drains.
2. Using a 10 mm hex wrench, unscrew the oil drain plug, which is located on the crankcase underneath the oil filler/dipstick cap (see *figure 16*). Allow all the oil to drain from the generator.
3. Replace the oil drain plug and tighten with a 10 mm hex wrench.

To add oil to the crankcase, follow these steps:

1. Make sure the generator is on a level surface.
2. Unscrew the oil filler/dipstick cap from the engine as shown in *figure 14* above.
3. Using a funnel, add motor oil to the crankcase. We recommend SAE 10W30 motor oil for general use. When full, the oil level should come close in the top of the oil fill opening (*see figure 17*).

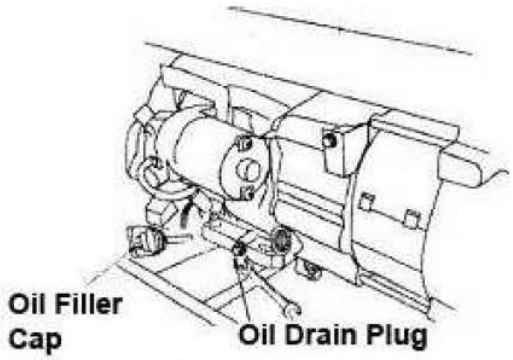


Figure 16: Draining Oil



Figure 17: Adding Oil

NOTE: Never dispose of used motor oil in the trash or down a drain. Please call your local recycling center or auto garage to arrange oil disposal.

Air Cleaner Maintenance

Routine maintenance of the air cleaner helps maintain proper airflow to the carburetor. Occasionally check that the air cleaner is free of excessive dirt.

1. Unhinge the clasps at the top and bottom of the air cleaner cover (see *figure 18*).
2. Remove the sponge-like elements from the casing.
3. Wipe the dirt from inside the empty air cleaner casing.
4. Wash the sponge-like elements in household dish detergent and warm water.
5. Allow the elements to dry completely.
6. Soak the dry elements in a small amount of engine oil. Ring out any excess oil.
7. Replace the sponge-like elements in the air cleaner casing and replace the cover.

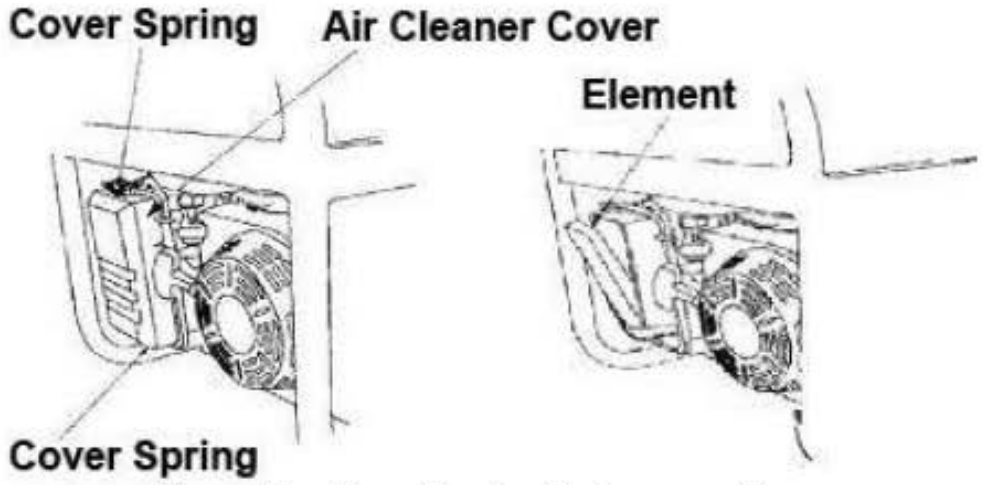


Figure 18 – Removing the air cleaner casing.

Fuel Filter Cup Cleaning

The fuel filter cup is a small well underneath the fuel valve. It helps to trap dirt and water that may be in your fuel tank before it can enter the engine.

To clean the fuel filter cup:

1. Turn the fuel valve to the "OFF" position.
2. Unscrew the fuel filter cup from the fuel valve using a wrench. Turn the valve toward you to unscrew (*see figure 19*).
3. Clean the cup of all sediment using a rag or brush.
4. Reinstall the fuel filter cup.

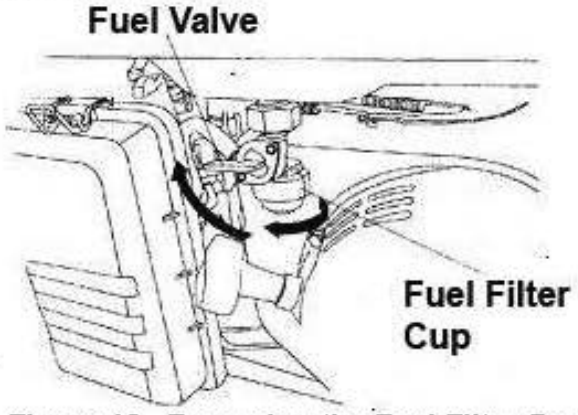


Figure 19 –Removing the Fuel Filter Cup

Spark Plug Maintenance

The spark plug is important for proper engine operation. A good spark plug should be intact, free of deposits, and properly gapped.

To inspect you spark plug:

1. Pull on the spark plug cap to remove it.
2. Unscrew the spark plug from the generator using the spark plug wrench included with this product (see *figure 20*).
3. Visually inspect the spark plug. If it is cracked or chipped, discard and replace with a new spark plug. We recommend using a F6RTC spark plug such as NGK BPR5ES.
4. Measure the plug gap with a gauge (see *figure 21*). The gap should be 0.7-0.8 mm (0.028-0.031 in).
5. If you are re-using the spark plug, use a wire brush to clean any dirt from around the spark plug base and then re-gap the spark plug.

6. Screw the spark plug back into its place on the generator using the spark plug wrench.
7. Replace the spark plug cap.

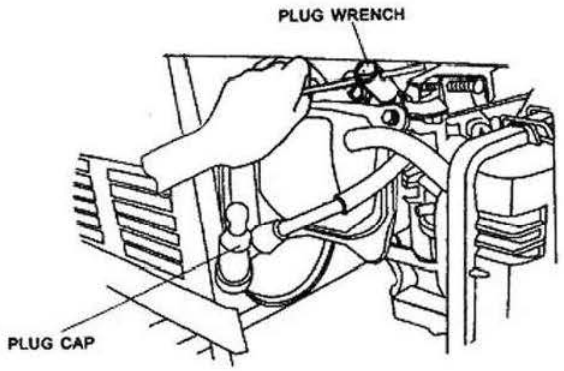


Figure 20- Removing the spark plug

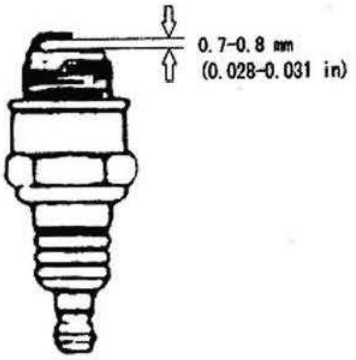


Figure 21- Measuring the spark plug gap

Emptying the Gas Tank

Before storing your generator for extended periods of time, you should drain your generator of gasoline.

To drain the generator of gas:

1. Turn the fuel valve to the "OFF" position.
2. Remove the fuel filter cup (see "*Removing the Fuel Filter Cup*" earlier in this section.
3. Empty the fuel filter cup of any fuel.
4. With a receptacle underneath the generator to catch the gas, turn the fuel valve to the "ON" position. Drain all the gas from the generator.
5. Turn the fuel valve to the "OFF" position.
6. Replace the fuel filter cup.
7. Store the emptied gasoline in a suitable place.

⚠CAUTION: Do not store fuel from one season to another.

STORAGE/TRANSPORT PROCEDURES

⚠ Caution: Never place any type of storage cover on the generator while it is still hot.

When transporting or storing your generator for extended periods of time:

- Empty the gas tank (see "*Emptying the Gas Tank*" in the "*Maintenance*" section).
- Disconnect the spark plug.
- Do not obstruct any ventilation openings.
- Keep the generator in a cool dry area.

GENERATOR SPECIFICATIONS

AC Output

	XP4400H	XP4400EH
Rated Wattage	3500W	3500W
Surge Wattage	4400W	4400W
Rated Voltage	120/240V	120/240V
Rated Frequency	60Hz	60Hz
Phase	Single	Single

DC Output

	XP4400H	XP4400EH
Voltage	12V	12V
Amperage	8.3A	8.3A
Dimensions (in):	Length=23.2 Width=17 Height=17	Length=23.2 Width=17 Height=17

Engine

	XP4400H	XP4400EH
Engine type	4-stroke OHV single cylinder with forced air cooling system	
Ignition system	Non-contact transistor	
Displacement	200cc	
Starting type	Recoil	Electric
Fuel tank capacity:	15L(3.96US gal.)	
Oil capacity	0.6L(20fl oz.)	
Run time on 50% load	14hrs	12 hrs
Noise Level	< 69dB	

TROUBLESHOOTING

Problem	Cause	Solution
Engine will not start	Engine switch is set to “OFF”.	Set engine switch to “ON”.
	Fuel valve is turned to “CLOSED”.	Turn fuel valve to “OPEN” position.
	Choke is open.	Close the choke
	Engine is out of gas.	Add gas.
	Engine is filled with contaminated or old gas	Change the gas on the engine.
Engine will	Spark plug is dirty.	Clean spark plug.
not start (continued from page 19)	Spark plug is broken.	Replace spark plug.
	Generator is not on level surface.	Move generator to a level surface to prevent low oil shutdown from triggering.
	Oil is low	Add or replace oil.
Engine runs but there is no electrical output	Circuit breaker is off.	Set the circuit breaker to the “ON” position.
	Bad connecting wires/cables.	If you are using an extension cord, try a different one.
	Bad electrical device connected to generator.	Try connecting a different device.
Generator runs but does not support all electrical devices connected.	Generator is overloaded	Try connecting fewer electrical loads to the generator.
	Shorten one of the connected devices.	Try disconnecting any faulty or short-circuited electrical loads.
	Air cleaner is dirty.	Clean or replace air cleaner.

GENERATOR ASSEMBLY AND MOUNTING

Generator is supplied with a wheel kit. If you want to install the wheel kit on your unit, please follow the instructions below. If you will not be using the wheel kit, skip this section.

1. Place the bottom of the generator cradle on a flat, even surface. Temporarily place unit on blocks to ease assembly.
2. Secure the support leg to the cradle with cap screws (M8 x 16) and lock nuts (M8) (see *figure 22*).
3. Secure the axle to the cradle with cap screws (M8 x 16) and lock nuts (M8) (see *figure 23*).
4. Slide a wheel over the axle, then secure the wheel with a retaining pin. (see *figure 24,Figure 25, Figure 26*).
5. Position the handles on the cradle and attach, cap screws (M8 x 16) and lock nuts (M8) (*Figure 27,Figure 28*).
6. Check that all fasteners are tight.



Figure 22



Figure 23



Figure 24



Figure 25



Figure 26



Figure 27

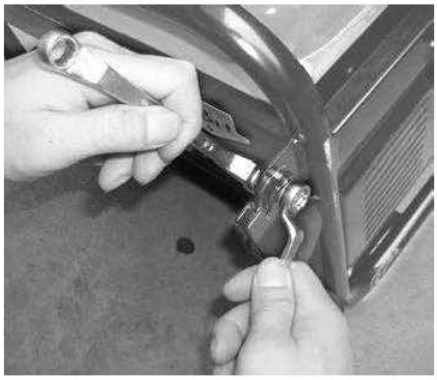
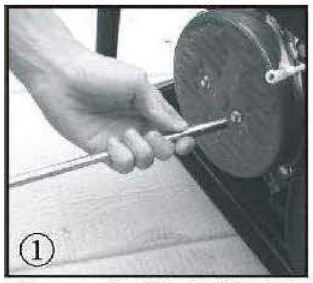
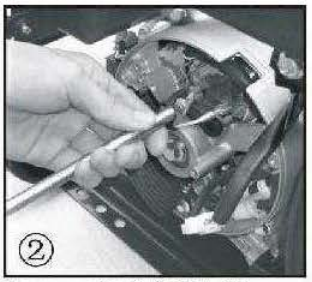


Figure 28

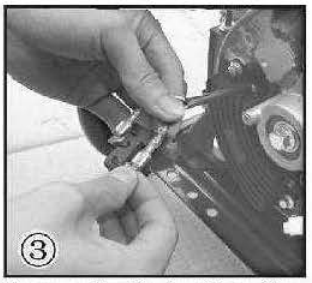
CHANGE THE CARBON-BRUSH



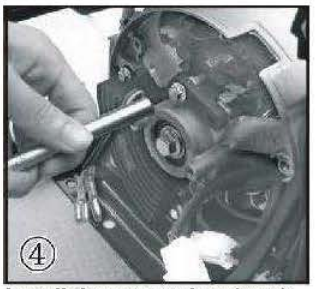
Remove the 2 bolts (M5x12) on the generator back-cover



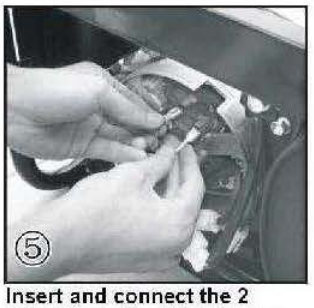
Remove the bolt (M5x16) holding the carbon brush.



Remove the 2 wires from the AVR on the carbon brush.



Install the new carbon brush with bolt (M5x16)

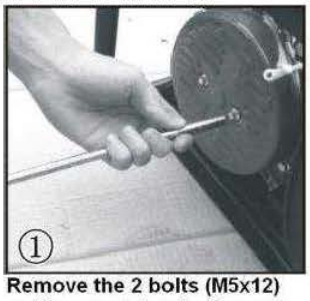


Insert and connect the 2 wires from the AVR, be sure to connect + and - correctly.



Replace the back cover of the generator and secure with the 2 bolts (M5x12)

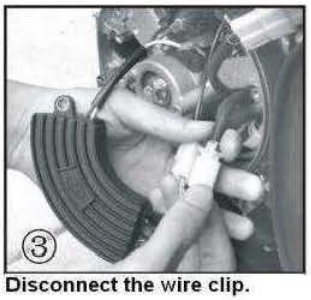
CHANGE THE AVR



Remove the 2 bolts (M5x12) on the generator back cover.



Remove the 2 bolts (M5x16) holding the AVR.



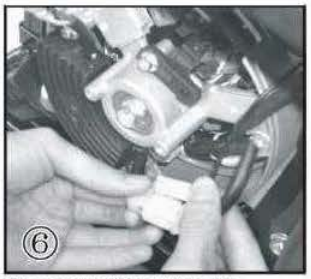
Disconnect the wire clip.



Remove the 2 wires of the AVR from the carbon brush.



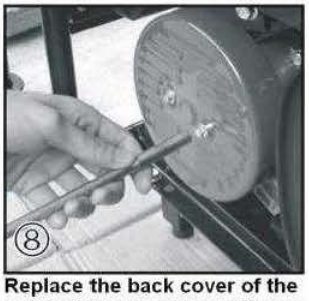
Install the new AVR with the 2 bolts (M5x16).



Reconnect the wire clip.

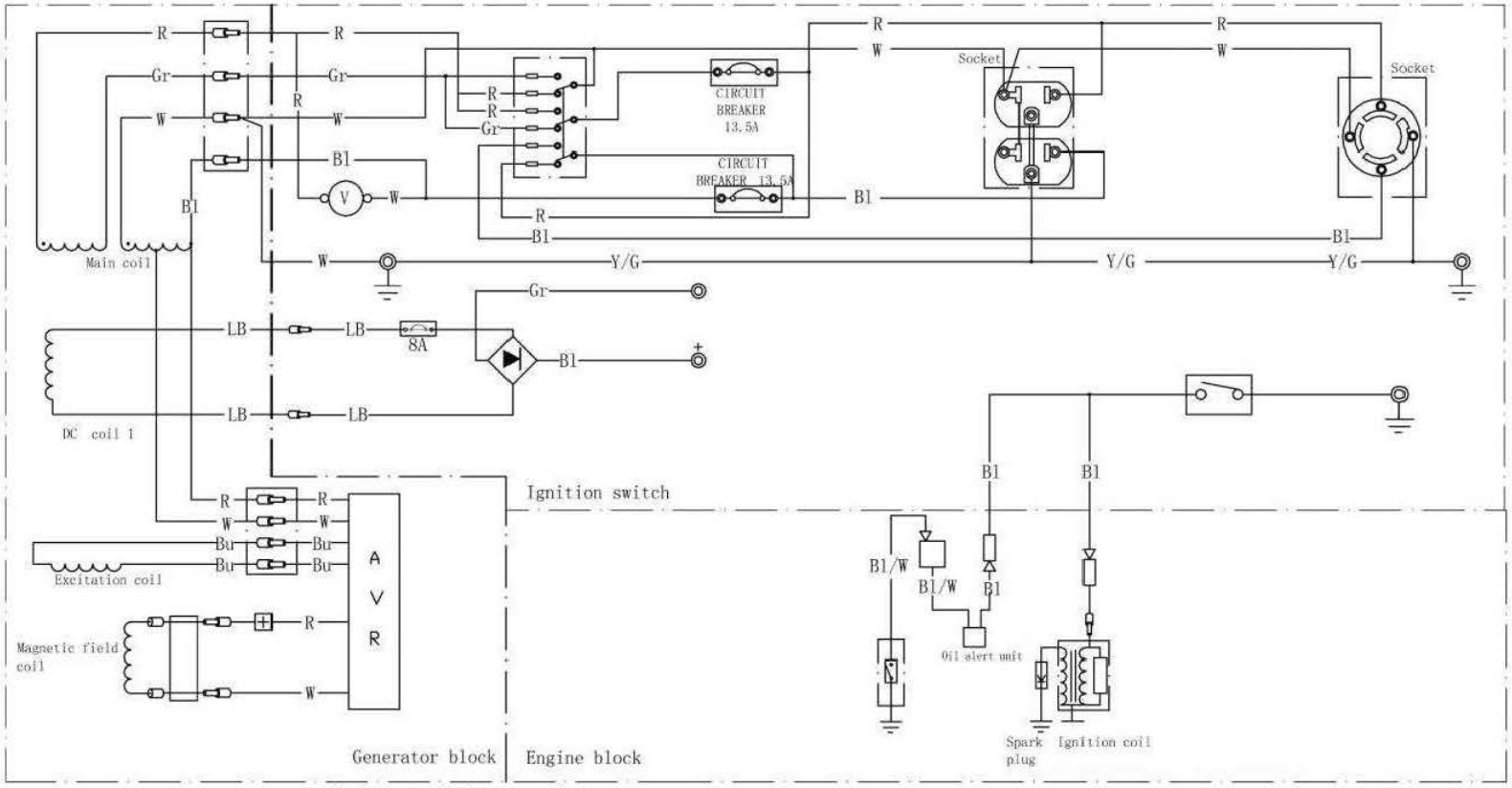


Connect the 2 wires to the carbon brush, be sure to connect the + and - correctly.



Replace the back cover of the generator and secure with the 2 bolts (M5x12).

WIRING DIAGRAM (XP4400H)



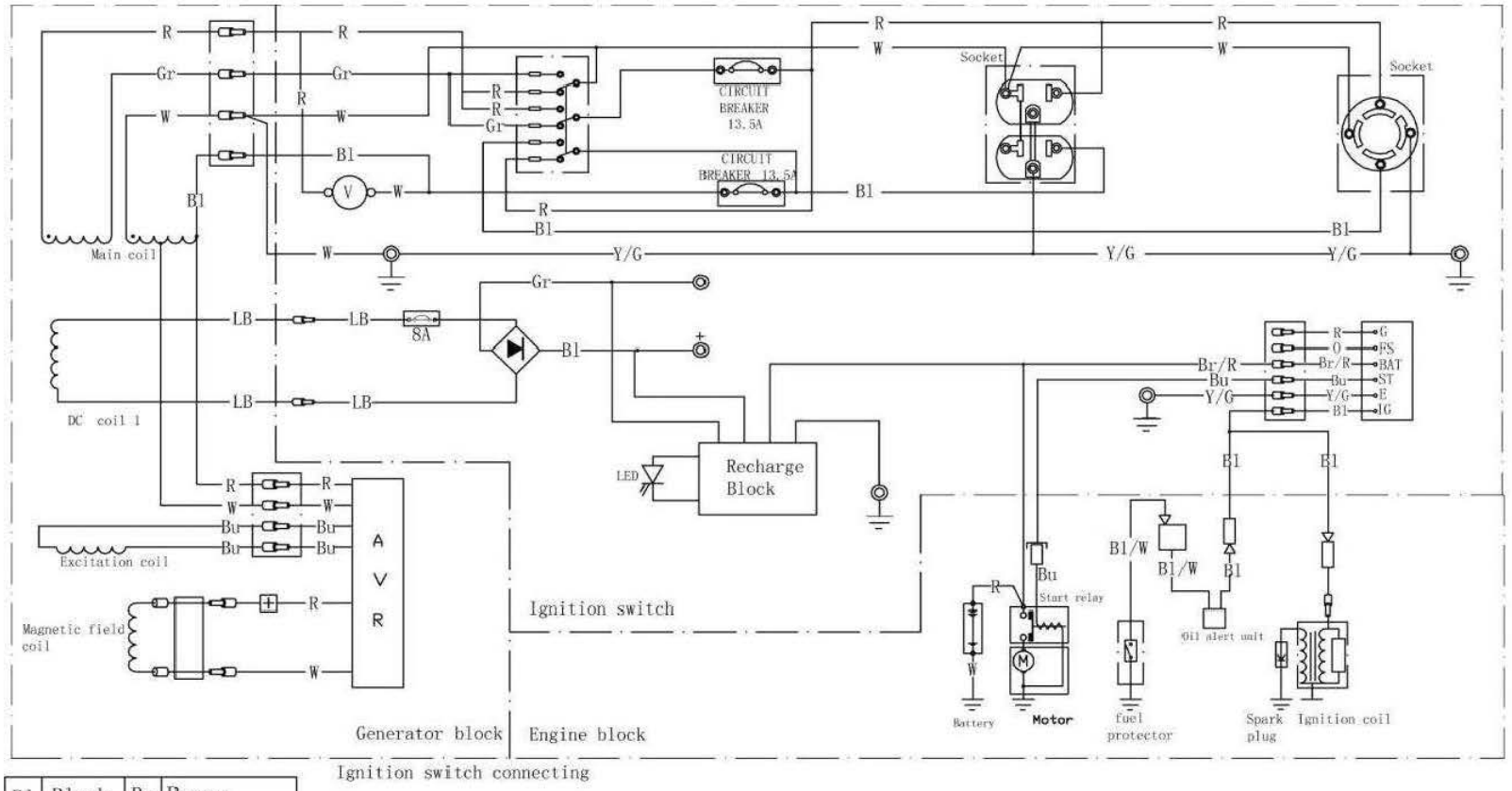
Bl	Black	Br	Brown
O	Orange	Br/R	Brown/Red
Bu	Blue	LB	Light blue
Gr	Gray	Y/G	Yellow/Green
R	Red	W	White

	IG	E	BAT	ST	FS	G
OFF	o	o				o
ON						
Start				o	o	

WIRING DIAGRAM OF 120V/240V GENERATOR SET

Exhibit 1003, Page 564
Petitioner MWE Investments, LLC, et al.

WIRING DIAGRAM (XP4400EH)



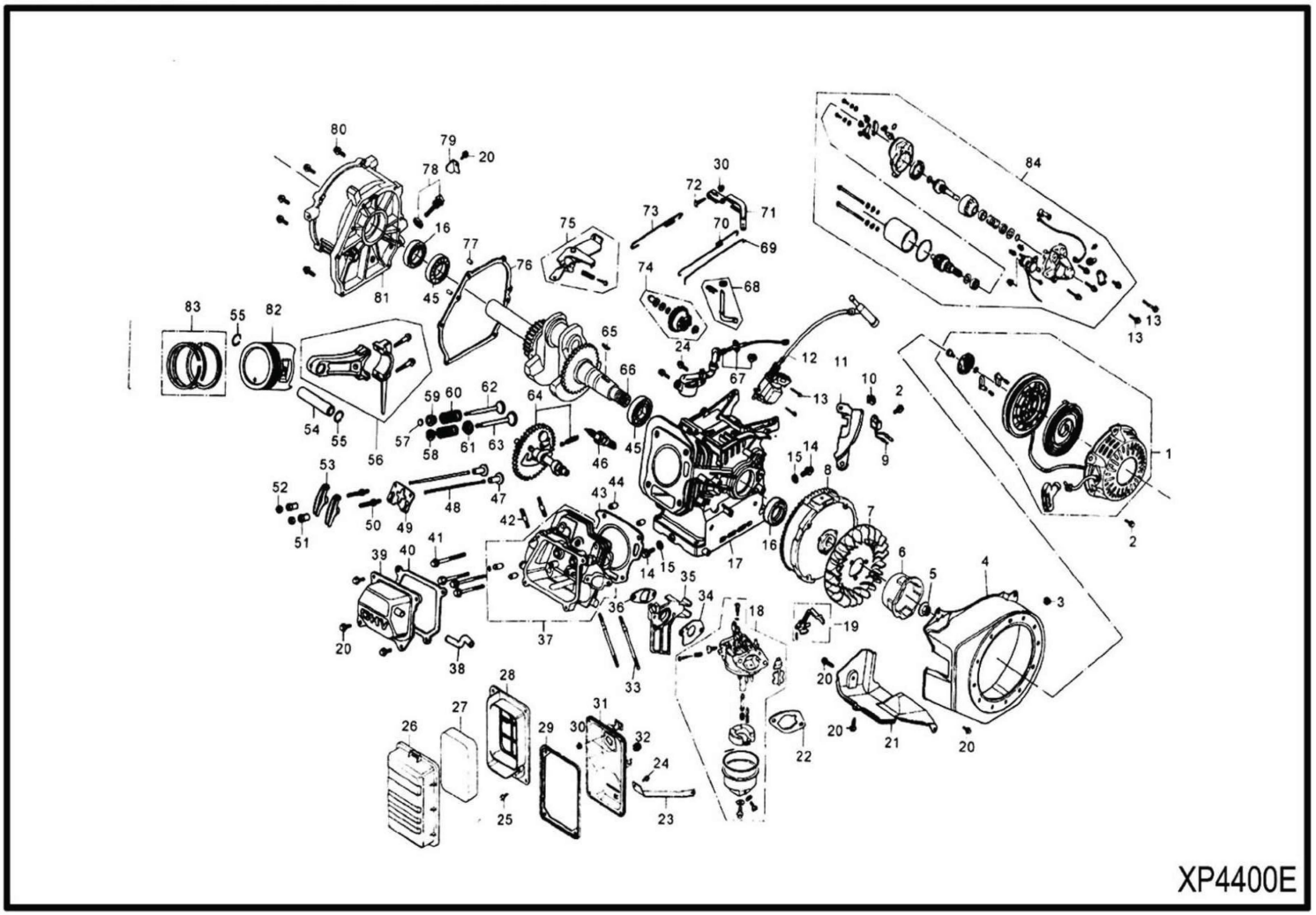
Bl	Black	Br	Brown
O	Orange	Br/R	Brown/Red
Bu	Blue	LB	Light blue
Gr	Gray	Y/G	Yellow/Green
R	Red	W	White

	IG	E	BAT	ST	FS	G
OFF	o	o				o
ON						
Start				o	o	

WIRING DIAGRAM OF 120V/240V GENERATOR SET

Exhibit 1003, Page 565
Petitioner MWE Investments, LLC, et al.

XP4400E ENGINE EXPLODED

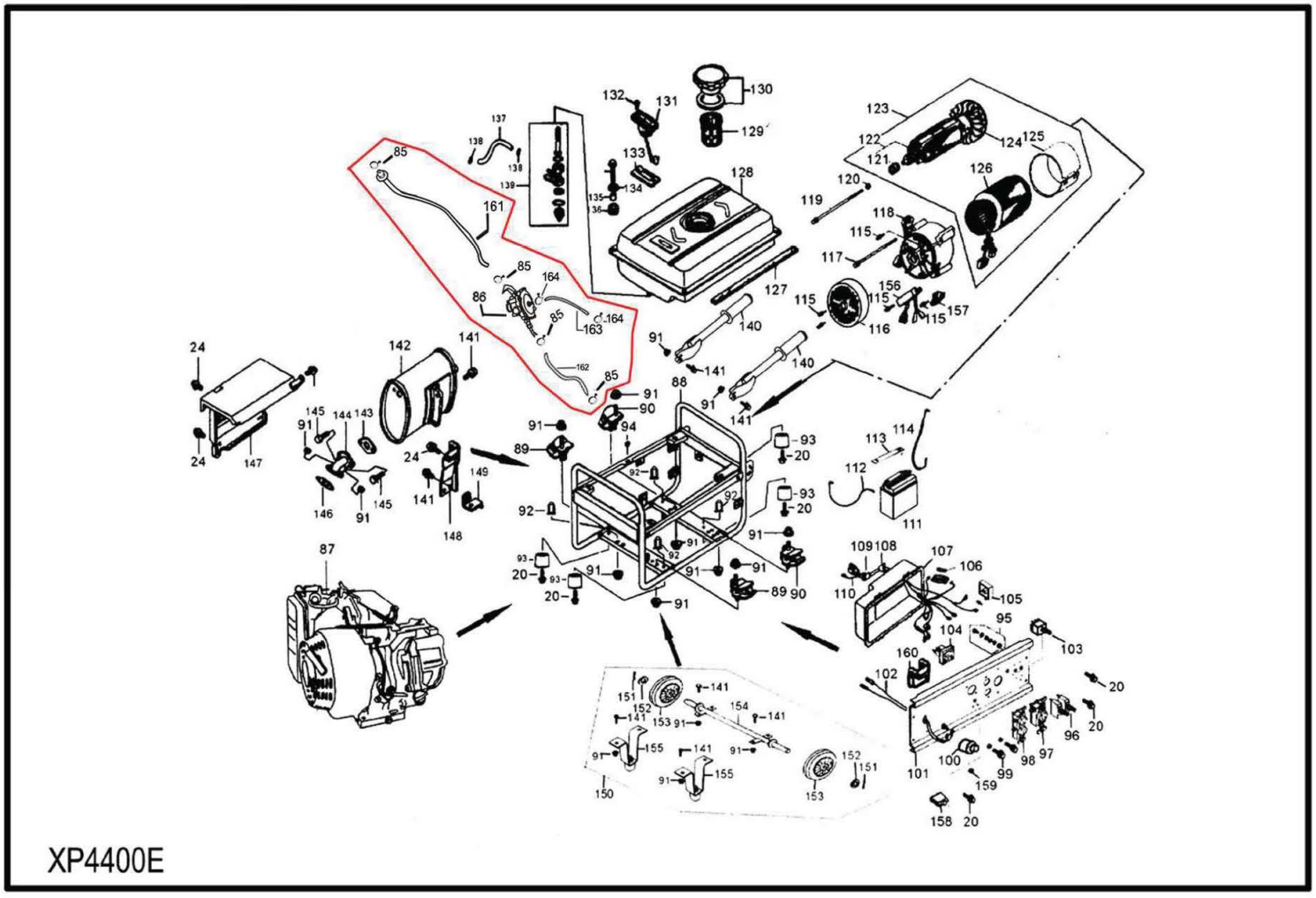


PARTS LIST

Part No.	Article Name	Qty	Cross Reference	Reference No.
1	Recoiler COMP	1	DJ168F-16121-K	XP4400E-1
2	Flange Bolt.M6*8	4	GBT5787-B6-8	XP4400E-2
3	Grommet Drain Hole	1	DJ168F-16118	XP4400E-3
4	Covering Fan COMP	1	DJ170N-16121-A	XP4400E-4
5	Flange, Nut M14	1	GBT6177/10-N-14	XP4400E-5
6	Starting Pulley	1	DJ168F-16000-A	XP4400E-6
7	Cooling Fan	1	DJ168F-16002-A	XP4400E-7
8	Flywheel COMP	1	DJ168F-16200-I	XP4400E-8
9	Oil Blocker	1	DJ168F-18300-A	XP4400E-9
10	**Clip, Oil blocker**	**1**	****SEE REF NO.**	**XP4400E-10**
11	Side Plate	1	DJ170S-11400-A	XP4400E-11
12	Coil ASSY, Ignition	1	DJ168F-18100-C	XP4400E-12
13	Flange Bolt M6*25	2	GBT5787-B6-25	XP4400E-13
14	Bolt, Drain plug	2	DJ168F-11004-A	XP4400E-14
15	Washer, Drain plug	2	DJ168F-11005-A	XP4400E-15
16	Oil seal, 25*41*6	2	DJ168F-11014-A	XP4400E-16
17	Crank Case ASSY	1	DJ170F-11100-C	XP4400E-17
18	**LPG Carburetor ASSY**	**1**	**DJ170FD-14100-C**	**XP4400E-18**
19	Lever COMP, Choke	1	DJ168F-14119	XP4400E-19
20	Flange Bolt M6*12	11	GBT5787-B6-16	XP4400E-20
21	Shroud COMP	1	DJ168F-11012-A	XP4400E-21
22	Gasket, Carburetor to Air cleaner	1	DJ168F-14027-A	XP4400E-22
23	Stay, Air cleaner	1	DF2500H-14205-A	XP4400E-23
24	Flange Bolt M6*12	3	GBT5787-B6-12	XP4400E-24
25	Bolt,M5*12	4	GBT5787-B5-14	XP4400E-25
26	Cover COMP, Air cleaner	1	DJ168F-14204	XP4400E-26
27	Element, Air cleaner	1	DJ170F-14201	XP4400E-27
28	Seperator, Air cleaner	1	DJ168F-14202	XP4400E-28
29	Seal, air cleaner	1	DJ168F-14206	XP4400E-29
30	Flange nut M6	2	GBT6177-N-6	XP4400E-30
31	Case COMP, air cleaner	1	DJ168F-14205-A	XP4400E-31
32	Grommet Fender	1	DJ168F-14014-A	XP4400E-32
33	Bolt Head, 6*94	2	DJ168FD-14001-A	XP4400E-33
34	Gasket,Carburetor	1	DJ168F-14005-A	XP4400E-34
35	Heat Isolator,Carburetor	1	DJ168F-14004-A	XP4400E-35
36	Packing, Heat isolator	1	DJ168F-14003-B	XP4400E-36
37	Cylinder Head COMP	1	DJ170F-11200-B	XP4400E-37
38	Breather	1	DJ168FD-11013-A	XP4400E-38
39	Cover COMP, Cylinder head	1	DJ168F-11300-C	XP4400E-39
40	Gasket,Cylinder head	1	DJ168F-11011-A	XP4400E-40
41	Flange Bolt M8*60	4	GBT5787-B8-60	XP4400E-41
42	Bolt Head, M8*32	2	DJ168F-14002-A	XP4400E-42
43	Gasket,Cylinder head	1	DJ170F-11010-C	XP4400E-43
44	Pin,Dowel 10*16	2	DJ168F-11009-A	XP4400E-44
45	Radial Ball Bearing(6025)	2	GB276-89-6205	XP4400E-45

Part No.	Article Name	Qty	Cross Reference	Reference No.
46	Spark Plug	1	DJ168F-18500-A	XP4400E-46
47	Valve Lifter	2	DJ170F-13009-A	XP4400E-47
48	Push Rod	2	DJ170F-13008-B	XP4400E-48
49	Plate,Push rod guide	1	DJ168F-13300-A	XP4400E-49
50	Bolt,Pivot	2	DJ168F-13202-A	XP4400E-50
51	Nut,Valve rocker am	2	DJ168F-13203-A	XP4400E-51
52	Nut, Pivot Adjust	2	DJ168F-13204-A	XP4400E-52
53	Valve Rocker Am	2	DJ168F-413201-A	XP4400E-53
54	Piston Pin	1	DJ170F-12002-A	XP4400E-54
55	Clip, Piston pin	2	DJ168F-12003-A	XP4400E-55
56	Connecting Rod ASSY	1	DJ170F-12200-B	XP4400E-56
57	Valve Rocker	1	DJ168F-13006-A	XP4400E-57
58	Retainer,Intake Valve spring	1	DJ168F-13004-A	XP4400E-58
59	Retainer,EX.Valve spring	1	DJ168F-13005-A	XP4400E-59
60	Valve Spring	2	DJ168F-13003-A	XP4400E-60
61	Valve Spring Seat	1	DJ168F-13010-A	XP4400E-61
62	Valve Exhaust	1	DJ168F-13001-A	XP4400E-62
63	Valve,Intake	1	DJ168F-13002-A	XP4400E-63
64	Camshaft	1	DJ168F-13100-B	XP4400E-64
65	Key,25*18	1	DJ168F-12104	XP4400E-65
66	Crankshaft	1	DJ168F-12100-BB	XP4400E-66
67	Switch ASSY, Oil level	1	DJ168F-18200-A	XP4400E-67
68	Governor Shaft	1	DJ168F-15001-A	XP4400E-68
69	Rod,Governor arm	1	DJ168F-15006-A	XP4400E-69
70	Spring, Throttle return	1	DJ170F-15008-A	XP4400E-70
71	Governor Arm	1	DJ168F-15004-A	XP4400E-71
72	Bolt, Governor arm	1	DJ168F-15005-A	XP4400E-72
73	Governor Spring	1	DJ170F-15007-A	XP4400E-73
74	Governor ASSY	1	DJ168F-15100-A	XP4400E-74
75	Control ASSY	1	DJ168FD-15200-A	XP4400E-75
76	Packing, Case cover	1	DJ170F-11003-B	XP4400E-76
77	Pin,Dowel 8*14	2	DJ168F-11002-F	XP4400E-77
78	Cap, Oil filler	1	DJ168F-11007-A	XP4400E-78
79	Plat	1	DF1800H-33016-A	XP4400E-79
80	Flange Bolt M8*32	6	GBT5787-B8-35	XP4400E-80
81	Crankcase Cover	1	DJ168FD-11001-C	XP4400E-81
82	Piston	1	DJ170F-12001-B	XP4400E-82
83	Piston Ring Set	1	DJ170F-12300-A	XP4400E-83
84	Start Motor	1	DJ168F-18600-A	XP4400E-84

XP4400E OTHERS EXPLODED



PARTS LIST

Part No.	Article Name	Qty	Cross Reference	Reference No.
85	**Clip, Tube**	**4**	****SEE REF NO.**	**XP4400E-85**
86	**Pressure Release Valve**	**1**	****SEE REF NO.**	**XP4400E-86**
87	Gasoline engine,Whole set	1	DJ170FD-BD	XP4400E-87
88	Frame COMP	1	XP4400E-31100-B	XP4400E-88
89	Bottom Rubber A	2	DF2500H-31201-A	XP4400E-89
90	Bottom Rubber B	2	DF2500H-31202-A	XP4400E-90
91	Flange Nut M8	18	DBT6177-N-8	XP4400E-91
92	Flange Nut M6	4	GBT889-N-8	XP4400E-92
93	**Cushion.Frame**	**4**	****SEE REF NO.**	**XP4400E-93**
94	Rubber Pad, Frame	2	DF2500H-14304-A	XP4400E-94
95	Earth Terminal Set	1	34107	XP4400E-95
96	Circuit Breaker	1	34206-100	XP4400E-96
97	Receptacle (30A)	1	34204-003	XP4400E-97
98	Receptacle (20A)	2	34204-005	XP4400E-98
99	DC Output Post	2	34204-038	XP4400E-99
100	Engine Switch	1	34203-002	XP4400E-100
101	Control Panel	1	XP4400E-34101-A	XP4400E-101
102	Sub Hamess	1	34213-002	XP4400E-102
103	Voltage Option Switch	1	34202-006	XP4400E-103
104	Voltage Meter	1	34205-001	XP4400E-104
105	Diode ASSY	1	34210-001	XP4400E-105
106	**Fuse**	**1**	****SEE REF NO.**	**XP4400E-106**
107	Cortrol Panel Case	1	34102-A	XP4400E-107
108	Boot, Main Wire Hamess	1	34109	XP4400E-108
109	Boot, AC Output Wire	1	34117	XP4400E-109
110	Wire Harness ASSY	1	34212-001	XP4400E-110
111	Battery	1	31300-001	XP4400E-111
112	Positive Wire.Battery	1	31038-001	XP4400E-112
113	Battery Cover	1	DF1800H-31033-A	XP4400E-113
114	Negative Wire,Battery	1	31040-001	XP4400E-114
115	Flange Bott M5*12	2	GBT5789-B5-16	XP4400E-115
116	Alternator Cover	1	DF1800H-33006-B	XP4400E-116
117	Flange Bolt M6*125	4	DF3500H-33015-A	XP4400E-117
118	Supporting Stand	1	DF1800H-33005-A	XP4400E-118
119	Bolt M8*180	1	DF3500H-33003-A	XP4400E-119
120	Plain Washerφl0	1	GBT93-LW-8	XP4400E-120
121	Bearing 6204-2RS	1	GB276-89-6204	XP4400E-121
122	Rotator COMP	1	DF3500H-33110-B	XP4400E-122
123	Stator & Rotator ASSY	1	DF3000H33103-B-23602	XP4400E-123
124	Generator Fan	1	DF2500H-33023	XP4400E-124
125	Stator Cover	1	DF3500H-33129	XP4400E-125
126	Stator ASSY	1	DF3500H-33120	XP4400E-126
127	Stripe, Fuel Tank	1	DF2500H-14322-D	XP4400E-127
128	Fuel Tank	1	DF2500H-14300-B	XP4400E-128
129	Fuel Filter	1	14307	XP4400E-129

PartNo.	Article Name	Qty	Cross Reference	Reference No.
130	Cap	1	14306	XP4400E-130
131	Fuel Sensor	1	14303	XP4400E-131
132	Screw M5*10	2	GBT819-B-5	XP4400E-132
133	Gasket, Fuel Tank	1	14313	XP4400E-133
134	Washer	4	14311	XP4400E-134
135	Collar	4	14305	XP4400E-135
136	Cushion	4	14304	XP4400E-136
137	Outlet Pipe φ4.5*165	1	DF168FD-14007-C	XP4400E-137
138	Tube Clip	2	DJ168F-14008-A	XP4400E-138
139	Fuel Cock	1	DF2500H-14302-A	XP4400E-139
140	Handles	2	DF63800H-31058-C	XP4400E-140
141	Flange Bolt M8*16	17	GBT889-N-8X20	XP4400E-141
142	Muffler	1	DF2500H-14400-E	XP4400E-142
143	Muffler Gasket	1	DJ168F-14006-A	XP4400E-143
144	Exhaust Pipe COMP	1	DJF2500H-14009	XP4400E-144
145	Flange Bolt M8*25	2	GB5787-B-6	XP4400E-145
146	Exhaust Pipe Gasket	1	DJ188F-14010-A	XP4400E-146
147	Muffler Guard	1	DF2500H-14018-B	XP4400E-147
148	**Muffler Stay**	**1**	****SEE REF NO.**	**XP4400E-148**
149	**Supporting Plate**	**1**	****SEE REF NO.**	**XP4400E-149**
150	Wheel ASSY	1	XP4400E-WK	XP4400E-150
151	Pin	2	DF2500H-31019-B	XP4400E-151
152	**Washer φ20**	**2**	****SEE REF NO.**	**XP4400E-152**
153	Wheel COMP	2	31017-F	XP4400E-153
154	Well Shaft	1	DF3000H-31018-F	XP4400E-154
155	Bracket	2	DF3000H-31070-E	XP4400E-155
156	Voltage Regulator	1	DF2500H-33011-A	XP4400E-156
157	Brush ASSY	1	DF3500H-33001	XP4400E-157
158	Circuit Protector (10A)	1	34208-004	XP4400E-158
159	**Recharge Indicator**	**1**	****SEE REF NO.**	**XP4400E-159**
160	OC 12V Voltage Regulator	1	34224-001	XP4400E-160
161	**Gas tube**	**1**	****SEE REF NO.**	**XP4400E-161**
162	**Intake tube, carburetor**	**1**	****SEE REF NO.**	**XP4400E-162**
163	**Pressure tube**	**1**	****SEE REF NO.**	**XP4400E-163**
164	**Clipφ8**	**2**	****SEE REF NO.**	**XP4400E-164**