ALESSANDRO BRUSA
CURRICULUM VITAE

PERSONAL INFORMATION

Full Name	**ALESSANDRO BRUSA**
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Nationality	Italian

WORK EXPERIENCE

• From 01/10/2024 (ongoing) — **Researcher in Tenure Track L. 79/2022 as winner of call 8016 of 20/12/2023**

• Name and address of employer — Alma Mater Studiorum – University of Bologna, School of Engineering, viale del Risorgimento 2, 40121, Bologna, Italy

• Description — Research Program entitled "Modeling, testing and control of propulsion systems with reduced environmental impact for road transportation".

• From 16/10/2023 (ongoing) — **National awards for research activity**

• Description — National Scientific Qualification (ASN) for Associate Professor for the scientific sector 09/C1 "Machines and systems for energy and the environment" – valid from 16/10/2023 to 16/10/2034 (art. 16, paragraph 1, Law 240/10), call D.D. 553/2021.

• From 01/11/2021 to 30/09/2024 — **Fixed-term researcher type A (junior) as winner of call 4887 of 22/07/2021**

• Name and address of employer — Alma Mater Studiorum – University of Bologna, School of Engineering, viale del Risorgimento 2, 40121, Bologna, Italy

• Description — Three-year Research Program entitled "Development of high-efficiency propulsion systems through the use of innovative technologies and fuels from a well-to-wheel perspective, for the reduction of CO_2 and polluting emissions".

• From 01/11/2020 to 31/10/2021 — **Research Fellow (Contract DIN Rep. 140 of 23/10/2020) – 12-month full-time assignment**

• Name and address of employer — Alma Mater Studiorum – University of Bologna, Department of Industrial Engineering, viale del Risorgimento 2, 40136, Bologna, Italy

• Description — Research activity in the field of testing of high-performance, spark-ignition engines, with a project entitled: "Development and experimental validation of model-based control systems for high-efficiency combustions through the use of innovative materials and technologies, with the aim of reducing CO_2 emissions for spark-ignition engines".

• From 01/11/2017 to 31/10/2020 — **Research Fellow (Contract Rep. 152 of 27/10/2017)**

• Name and address of employer — Alma Mater Studiorum – University of Bologna, Department of Industrial Engineering, viale del Risorgimento 2, 40137, Bologna, Italy

• Description — Research activity carried out during the attendance of the PhD Course in Mechanics and Advanced Engineering Sciences in the field of testing of high-performance, spark-ignition engines, with a research project entitled: "Solutions and technologies for increasing efficiency and knock control in spark-ignition engines"

• From 11/01/2020 (ongoing) — **Lecturer for teaching modules and contracts related to the Scientific and Disciplinary Sectors (SSD) 08 and 09**

• Description — Total teaching activities of about 500 hours, of which 270 of lectures and 330 of preparation of teaching materials and student support (presentations, office hours, mid-term tests and final

exams, participation in commissions and institutional commissions where required, assistance to students also in the preparation of final papers and theses):

- o **A.Y. 2024-25**:
  - Lecturer of Module 2 of the Master degree Course in INTERNAL COMBUSTION ENGINES (cod. 86496) for the Master degree in Advanced Powertrain of MUNER, at the second cycle of lectures – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
  - Lecturer of the Bachelor degree Course LABORATORIO DI MOTORI A COMBUSTIONE INTERNA (cod. 73096) at the first cycle of lessons – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
- o **A.Y. 2023-24**:
  - Lecturer of Module 2 of the Master degree Course in INTERNAL COMBUSTION ENGINES (cod. 86496) for the Master degree in Advanced Powertrain of MUNER, at the second cycle of lectures – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
  - Lecturer of the Bachelor degree Course LABORATORIO DI MOTORI A COMBUSTIONE INTERNA (cod. 73096) at the first cycle of lessons – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
- o **A.Y. 2022-23**:
  - Lecturer of Module 2 of the Master degree Course in INTERNAL COMBUSTION ENGINES (cod. 86496) for the Master degree in Advanced Powertrain of MUNER, at the second cycle of lectures – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
  - Lecturer of the Bachelor degree Course LABORATORIO DI MOTORI A COMBUSTIONE INTERNA (cod. 73096) at the first cycle of lessons – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
  - Lecturer of the PhD in Automotive Engineering for Intelligent Mobility entitled "An overview of the activity of development, calibration, and validation of a combustion control algorithm and its implementation in a Rapid Control Prototyping system for the engine test bench – Part 1 & 2", with 8 hours of frontal teaching (40 hours total). Conferment with minutes of the Teaching Board of 13 September 2022.
- o **A.Y. 2021-22**:
  - Lecturer of Module 2 of the Master degree Course in INTERNAL COMBUSTION ENGINES (cod. 86496) for the Master degree in Advanced Powertrain of MUNER, at the second cycle of lectures – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
  - Lecturer of the Bachelor degree Course LABORATORIO DI MOTORI A COMBUSTIONE INTERNA (cod. 73096) at the first cycle of lessons – 3 CFU. Frontal teaching activity of 30 hours (60 hours in total).
- o **A.Y. 2019-20**: from 11/01/2020 to 31/02/2020 holder of a teaching contract in the context of advanced training courses for Experis Motorsport Academy of Manpower Talent Solution Company S.r.l., which included 16 hours of lectures and 32 hours of preparation of laboratory material and devices for educational use (48 hours in total), on the following topics:
  - "Innovative Technologies for ICE"
  - "ECU Layout, Automotive Communication, Protocols and Hardware in the Loop Systems".

• From 14/11/2017 (ongoing)	**Supervisor of PhD students and theses in the field of SSDs 08 and 09**
• Description	Tutor for the PhD courses of the following candidates (6 years and 3 months total):

- o Eng. Davide Bassani – from 1/11/2024 ongoing. He is enrolled in the XL cycle of the PhD Course in Automotive Engineering for Intelligent Mobility with scholarships funded by Next Generation EU funds – PNRR pursuant to Ministerial Decree 629/2024 and 630/2024 and by Lamborghini SC, with a restricted topic "Analysis and Development of Innovative Architectures and Control Strategies for Hybrid Powertrains".
- o Eng. Mirco Lenzi – from 1/11/2024 ongoing. Enrolled in the XL cycle of the PhD Course in Automotive Engineering for Intelligent Mobility with a restricted topic "Development and implementation of predictive engine models for control and

simulation of high-performance hybrid powertrains powered by hydrogen, conventional, and synthetic fuels".

- o Eng. Fenil Panalal Shethia – from 1/11/2022 ongoing. Enrolled in the XXXVIII cycle of the PhD Course in Automotive Engineering for Intelligent Mobility with the research topic entitled "Analysis and advanced modeling of phenomena and technologies related to the implementation of new propulsion systems and fuels to reduce CO2 emissions".
- o Dr. Ing. Jacopo Mecagni – 1/11/2019 to 31/10/2022. Enrolled in the XXXV cycle of the PhD Course in Automotive Engineering for Intelligent Mobility with a research topic entitled "Development of model-based control systems for efficiency and performance improvement of GDI engines".

Supervisor and Co-supervisor of the following bachelor and master degree theses:

- o **A.Y. 2024-25**:
  - "Development and validation of a semi-physical approach for the accurate catalyst temperature estimation in high-performance, gasoline engines for both steady-state and dynamic operating conditions" – Alice Grossi – Master degree in Mechanical Engineering (cod. 5724)
  - "Analysis of 0-dimensional approaches for the predictive modeling of the temperature difference generated by a turbine in turbocharging systems, for modern reciprocating endothermic engines with high specific performance" – Nazar Severyn – Bachelor degree in Mechanical Engineering (cod. 0949)
- o **A.Y. 2023-24**:
  - "Control-oriented modeling of a light e-boosted, high performance, spark-ignition engine" – Davide Bassani – Master degree in Advanced Automotive Engineering (cod. 9239, class LM - 33)
  - "Development and implementation of regression tree ensemble learning-based engine models for the estimation of combustion indexes" – Mirco Lenzi – Master degree in Advanced Automotive Engineering (cod. 9239, class LM - 33)
  - "Development, implementation and calibration of both low-level and high-level parts of a single-cylinder engine control strategy for an electric hybrid, single-seater car" – Federico Omicini – Master degree in Advanced Automotive Engineering (cod. 9239, class LM - 33)
  - "Performance assessment of recurrent neural network-based engine models for the estimation of combustion indexes" – Emanuele Baldisserri – Master degree in Mechanical Engineering (cod. 5724)
  - "Modeling of synthetic combustion indices for alternative endothermic engines with data-driven ensemble learning algorithms" – Yasmine Falco – Bachelor degree in Mechanical Engineering (cod. 0949)
  - "Evaluation of the performance of LSTM Recurrent Neural Networks in the estimation of synthetic combustion indices for alternative endothermic engines" – Leonardo Liverani – Bachelor degree in Mechanical Engineering (cod. 0949)
- o **A.Y. 2022-23**:
  - "Performance assessment of recurrent neural network-based engine models for the prediction of combustion indexes under transient conditions" – Giovanni Busetti – Master degree in Advanced Automotive Engineering (cod. 9239, class LM - 33)
- o **A.Y. 2021-22:**
  - "Comparison of different solutions for the hybridization of a motorcycle engine for Formula Student applications and evaluation of the effectiveness on the simulated lap time" – Emanuele Barolo – Master degree in Mechanical Engineering (cod. 5724)
  - "Study of thermodynamic modeling of an ORC system for the recovery from internal combustion engines" – Gennaro Puca – Master degree in Mechanical Engineering (cod. 5724)
- o **A.Y. 2020-21:**
  - "Development and validation of an artificial intelligence-based, control-oriented simulator of a high-performance, turbocharged spark-ignition

engine" – Fenil Panalal Shethia – Master degree in Advanced Automotive Engineering (cod. 9239, class LM - 33)
- "Development and experimental validation of a control-oriented combustion phase model for high-performance spark-ignition engines" – Alessandro Di Cara – Master degree in Mechanical Engineering (cod. 5724)
- "Development and calibration of an analytical model of exhaust temperature for a high-performance spark-ignition engine and comparison with an approach based on neural networks" – Michele Vandi – Master degree in Mechanical Engineering (cod. 5724)

- **A.Y. 2019-20:**
  - "Analysis of the effects of the position and type of the sensor on the frequency content of the pressure signal in the combustion chamber" – Giorgio Fornai – Master degree in Mechanical Engineering (cod. 5724)
  - "1D model of an ORC system for heat recovery from Diesel engines in heavy duty applications" – Giuliano La Gaipa – Master degree in Mechanical Engineering (cod. 5724)

- **A.Y. 2018-19:**
  - "Study of the damage induced by knock and the average temperature of aluminum alloy pistons and development of an analytical model for the Real-Time calculation of the temperature of exhaust gases" – Beatrice D'Apote – Master degree in Mechanical Engineering (cod. 5724)

- **A.Y. 2017-18:**
  - "Control-oriented modeling of wall heat exchange for high-performance supercharged GDI engines" – Jacopo Mecagni – Master degree in Mechanical Engineering (cod. 5724)

• From 01/09/2018 (ongoing)	**Tutorship activities for university courses within the SSD 08 and 09 (about 850 hours in total)**
• Description	Winner of the following calls for contracts as an academic tutor of university courses (120 hours in total):

- **From 05/04/2021 to 30/09/2021**: Winner of call 60678 of 15/03/2021 for Academic Tutor for the course of ADVANCED AUTOMOTIVE ENGINEERING – 30 hours
- **From 20/04/2020 to 30/09/2020**: Winner of call 65482 of 25/03/2020 for Academic Tutor for the course of MACHINES AND ENERGY SYSTEMS T C.I. – 30 hours
- **From 18/09/2018 to 31/02/2019**: Winner of call 1787 of 30/07/2018 for Academic Tutor for the course of POWERTRAIN TESTING, CALIBRATION AND HOMOLOGATION – 60 hours

Lectures and laboratory sessions for the following courses within the Master Degree Courses of the University of Bologna (278 hours in total):
- 86462 – POWERTRAIN TESTING, CALIBRATION AND HOMOLOGATION, 250 hours total
- 86460 – MODELING AND CONTROL OF INTERNAL COMBUSTION ENGINES AND HYBRID PROPULSION SYSTEMS, 25 hours total
- 34616 – Energy Systems Management, 3 hours total

Support for the exams of the following courses taught within the Bachelor and Master Degree Courses of the University of Bologna (2 sessions per year, about 450 hours in total):
- 86460 – MODELING AND CONTROL OF INTERNAL COMBUSTION ENGINES AND HYBRID PROPULSION SYSTEMS
- 86462 – POWERTRAIN TESTING, CALIBRATION AND HOMOLOGATION
- 85780 – INTERNAL COMBUSTION ENGINES AND HYBRID ENGINES M
- 69492 – TESTING AND CALIBRATION OF INTERNAL COMBUSTION ENGINES M
- 33927 – M MACHINES
- 31399 – ENERGY SYSTEMS T
- 28658 – ENERGY MACHINERY AND SYSTEMS T-1
- 29674 – T MACHINES

• From 01/11/2017 (ongoing)	**Participation, organization, direction and coordination of activities, laboratories, research groups and funded projects**
• Description	Participation in 15 activities related to SSD 08 and 09 and coordination of 2 activities (for a total of 17) that are part of the development of control systems for propulsion systems for traditional, innovative and prototype vehicles:

1. **From 04/11/2024:** Participation in the research group on the modeling and control of the hybrid powertrain for a prototype of a racing car for the World Endurance Championship (WEC, LMDh class). The project is financed by Next Generation EU funds – PNRR pursuant to Ministerial Decrees 629/2024 and 630/2024 and by Lamborghini SC.

2. **From 02/08/2023:** Participation in the research group of the Moto Student of Unibo Motorsport, for the development of a prototype of an electric racing motorcycle that participates in the Moto Student Electric world championship. The project is funded by the University of Bologna and industrial partners.

3. **From 03/04/2023:** Coordination of the research group of the Department of Industrial Engineering of the University of Bologna for the development and calibration of the control function for the management of the cooling system of a high-performance engine. The activity is part of research contracts with Automobili Lamborghini Spa.

4. **From 10/01/2021:** Participation in the research group based on the collaboration between the Institute of Aachen RWTH, Germany, and the Department of Industrial Engineering of the University of Bologna. The topic addressed is that of the analysis and modeling of the knock process in a prototype engine for research, instrumented with multiple sensors facing different areas of the combustion chamber.

5. **From 01/11/2020:** Participation in the research group of the Department of Industrial Engineering of the University of Bologna on artificial intelligence/machine learning applied to the development and calibration of high-performance powertrains and vehicles. The activity is part of research contracts with Ferrari Auto S.p.a..

6. **From 01/12/2019:** Participation in the research group of the Department of Industrial Engineering of the University of Bologna for the development of prototype piezoelectric sensors for pressure measurement in combustion chambers oriented to car applications. The activity is part of research contracts with Ferrari Auto S.p.a.

7. **From 01/11/2019 to 31/7/2021**: Participation in the research group of the Department of Industrial Engineering of the University of Bologna for the development of a hydrogen fuel cell powered engine for the UniboA.T. project, funded by the University of Bologna and industrial partners.

8. **From 01/09/2019**: Participation in the research group of the Green Mobility Research Lab (GMRL), a joint Unibo-FEV laboratory, for the development of innovative strategies for the management and optimization of energy conversion in hybrid vehicles.

9. **From 01/04/2019 to 21/12/2019:** Participation in the research group of the Department of Industrial Engineering and the Institute of Metallurgy of the University of Bologna for the study of the damage induced by detonating combustion on the main components of the combustion chamber. The activity is part of research contracts with Ferrari Auto S.p.a.

10. **From 01/03/2019**: Participation in the Unibo Motorsport Formula Student research group, for the development and calibration of the spark-ignition engine of a prototype racing car. The project is funded by the University of Bologna and industrial partners.

11. **From 01/12/2018**: Coordination of a research group composed of several undergraduates and one-two PhD students, as Operational Manager of the engine test room of the Department of Industrial Engineering (DIN) of the University of Bologna.

12. **From 01/08/2018 to 31/01/2020:** Participation in the research group of the Department of Industrial Engineering of the University of Bologna for the development of hardware for the rapid prototyping of motor control systems compatible with the Simulink Real Time platform. The activity is part of research contracts with Ferrari Auto S.p.a.

13. **From 01/11/2017**: Participation in the research group of the Department of Industrial Engineering of the University of Bologna for the development of innovative combustion control systems for the increase of the efficiency of modern high-performance spark-ignition engines. The activity is part of research contracts with Ferrari Auto S.p.a.

14. **From 01/11/2017 to 31/04/2019**: Participation in the research group coordinated by the Department of Industrial Engineering of the University of Bologna for the development of innovative combustion control systems for the reduction of CO_2

emissions in modern spark-ignition engines. The activity is part of research contracts with Magneti Marelli S.p.a. and Marelli Holdings Co.

15. **From 01/11/2017 to 31/03/2018:** <u>Participation</u> in the joint research group of the Department of Industrial Engineering of the University of Bologna and the Department of Engineering of the University of Perugia for the development and validation of 1D and 3D models of a spark ignition engine equipped with Water Injection system. The activity is part of research contracts with Magneti Marelli S.p.a.

16. **From 01/02/2018 to 31/10/2018:** <u>Participation</u> in the research group of the Department of Industrial Engineering of the University of Bologna for the development of a predictive combustion model through the use of the open-source software OpenWam and subsequent comparison with the GT-Power commercial code.

17. **From 01/04/2017 to 31/10/2017**: <u>Participation</u> in the research group of the Department of Industrial Engineering of the University of Bologna for the modeling and control of prototype Water Injection systems for spark ignition engines.

• From 01/11/2017 (ongoing)	**Speaker at international congresses and conferences**
• Description	Participation in 5 international congresses in Italy and abroad as a speaker:

- o 16th International Conference on Engine and Vehicles, 10-14 September 2023, Capri, Naples, Italy (<u>presentation</u> of the paper "Performance Assessment of a Model-Based Combustion Control System to Decrease the Brake Specific Fuel Consumption" and chairperson in the ICE 602 - Controls for Hybrids and Electric Powertrains session on Monday 11 September)

- o 3rd International Conference on Sustainable Mobility, September 25-28, 2022, Catania, Italy (SAE Technical paper presentation 2022-24-0029)

- o International Meeting about Metals for Road Mobility, 21-22 November 2019, Kilometro Rosso, Bergamo, Italy (<u>presentation</u> of the research activity carried out in collaboration with the Department of Metallurgy, entitled "A systematic experimental approach to evaluate knocking induced damage on forged aluminum pistons after bench tests", A. Brusa, N. Cavina, B. D'Apote, R. Sola, University of Bologna, E. Balducci, F. Boccia, Ferrari S.p.A.)

- o 14th International Conference on Engine and Vehicles, 16-18 September 2019, Capri, Naples, Italy (presentation of SAE Technical Paper 2019-24-0002)

- o SAE World Congress, Detroit, Michigan, April 10-12, 2018 (SAE Technical Paper presentation 2018-01-0858)

• From 11/06/2018 to 31/01/2019	**Expert member of Fluid Machineries at the Italian Esame di Stato – 2 sessions (approx. 50 hours total)**
• Name and address of employer	Alma Mater Studiorum – University of Bologna, Department of Industrial Engineering, viale del Risorgimento 2, 40136, Bologna, Italy
• Description	Preparation of written tests and participation in oral interviews with candidates during the first and second session of the State Exam for the year 2018, as an expert member of Fluid Machines for the Industrial Engineering Sector.

• From 01/04/2017 to 31/10/2017	**Fixed-term contract as an engine control software developer**
• Name and address of employer	Alma Automotive s.r.l. – via Umberto Terracini 2/c, 40131, Bologna, Italy
• Description	Software-in-the-loop development and validation of a 1-D (GT Power) combustion model with water injection sensitivity. Development of an analytical model of knock intensity

EDUCATION

• From 01/11/2017 to 31/10/2020	**PhD in Mechanics and Advanced Engineering Sciences – Curriculum 2, "Machines, Systems for Energy and the Environment, Mechanics of Machines and Industrial Mechanical Plants", with final grade "excellent"**
• Name and type of education or training institution	Alma Mater Studiorum – University of Bologna, Department of Industrial Engineering, viale del Risorgimento 2, Bologna, 40137, Italy
• Research theme	Research activity carried out in the field of modeling, testing and control of modern spark-ignition engines.

Title of the PhD thesis: "Development and testing of innovative methodologies for modelling and control of normal and knocking combustion and implementation of novel rapid prototyping solutions"

• From 01/09/2014 to 14/03/2017	**Master degree in mechanical engineering (final grade of 110/110 cum laude)**
• Name and type of education or training institution	Alma Mater Studiorum – University of Bologna, Faculty of Engineering, viale del Risorgimento 2, Bologna, 40137, Italy
• Thesis topic	Thesis activity carried out within the research group of Prof. Ing. Nicolò Cavina, in the context of the development of innovative technologies to increase combustion efficiency in modern spark-ignition engines. Thesis title: Analysis in 1-D environment of water injection systems for the active knock control and experimental test
	Reference course: Internal combustion engines and hybrid engines – Prof. Ing. Nicolò Cavina

• From 01/09/2011 to 11/12/2014	**Bachelor degree in mechanical engineering (final grade of 98/110)**
• Name and type of education or training institution	Alma Mater Studiorum – University of Bologna, Faculty of Engineering, viale del Risorgimento 2, Bologna, 40137, Italy
• Thesis topic	Java code development for the creation of the Ravenna Technopole website. Supervisor Prof. Ing. Michele Bianchi, Prof. Ing. Francesco Melino

• From 01/02/2016 to 31/10/2020   **Courses and seminars – 80 hours total**

- o Full Field Strain Measurement by Digital Image Correlation, Speaker: Dr. Brugo (DIN-UNIBO), Date: 06/12/2019, Time: 9:00-13:00 (4h), Location: DIN Mechanical Lab - Umberto Terracini 24, Bologna.
- o Time Frequency Seminar. Place/Date: School of Engineering and Architecture of Forlì, 21-22/05/2019, 8h.
- o IV law. Place/Date: School of Engineering and Architecture of Bologna, 10/04/2019, 3h.
- o Microsoft AI Workshop. Place/Date: School of Engineering and Architecture of Bologna, 28/03/2019, 4h.
- o Intellectual Property. Place/Date: School of Engineering and Architecture of Bologna, 21-28/01/2019 04/02/2019, 16h.
- o Design of Experiment Seminar. Place/Date: School of Engineering and Architecture of Bologna, 9-25/01/2019, 8h.
- o Control Design & Real Time Testing of Mechatronics in Simulink. Place/Date: School of Engineering and Architecture of Bologna, 19/12/2018, 8h.
- o Simulink seminar. Place/Date: School of Engineering and Architecture of Bologna, 22/06/2018, 4h.
- o Uncertainty analysis for engineers. Place/Date: School of Engineering and Architecture of Forlì, 7-9/03/2018. Duration: 10 hours. Lecturers: Prof. Henrik Alfredsson, Dr. Antonio Segalini.
- o Worker Training: Specific Supplementary Training for teaching and research activities in the field of Industrial Engineering / Module 3.3. (8h) Place/Date: School of Engineering and Architecture of Bologna, 15/02/2018.
- o Worker Training: Specific Supplementary Training for teaching and research activities in the field of Industrial Engineering / Module 3.4. (8h) Place/Date: School of Engineering and Architecture of Bologna, 14/02/2018.
- o Worker Training: Specific Training – Part 2/ Module 3B2. (4h) Place/Date: School of Engineering and Architecture of Bologna, 06/07/2016.
- o Worker Training: Specific Training – Part 1/ Module 3B1. (4h) Place/Date: School of Engineering and Architecture of Bologna, 01/07/2016.

• From 19/07/2010 to 14/08/2010	**Summer school of EmbassyCES**
• Name and type of education or training institution	Oxford Study Centre, 21-27 George St, Oxford OX1 2AY, UK
•Description	English language course, level C1

• From 11/04/2009 to 29/04/2009	**Summer school of EmbassyCES**
• Name and type of education or training institution	Embassy CES Hastings, Saint Leonards-on-sea TN38 0QW, Hastings, UK
•Description	English language course, level B2

LIST OF PUBLICATIONS

• From 01/11/2017 (ongoing)

Author and co-author of articles published for international journals and conferences such as SAE, MDPI and IEEE. The publications are the result of important collaborations with the main automotive companies in the area, with the Department of Metallurgy of the Faculty of Engineering of the University of Bologna and with international universities and research centers.

The bibliometric profile is characterized by the following indicators (excerpts from the Scopus page on 04/01/2025):

- o 32 contributions, of which 19 in journals and 13 from international conferences
- o 206 total citations
- o h-index 9

Articles in international journals:

1. Ravaglioli V, Silvagni G, Ponti F, et al. Development of a control-oriented physical model for cylinder pressure peak estimation in SI engines. *International Journal of Engine Research*. 2025; 26(1):101-117. doi:10.1177/14680874241272904.
2. Brusa, A.; Shethia, F.P.; Petrone, B.; Cavina, N.; Moro, D.; Galasso, G.; Kitsopanidis, I. The Enhancement of Machine Learning-Based Engine Models Through the Integration of Analytical Functions. Energies 2024, 17, 5398. https://doi.org/10.3390/en17215398, CORRESPONDING AUTHOR.
3. Giovannardi, E., Brusa, A., Petrone, B., Cavina, N. et al., "AI-Based Virtual Sensing of Gaseous Pollutant Emissions at the Tailpipe of a High-Performance Vehicle," SAE Int. J. Engines 17(4):2024, https://doi.org/10.4271/03-17-04-0029.
4. Brusa, A., Shethia, F., Mecagni, J., and Cavina, N., "Advanced, Guided Procedure for the Calibration and Generalization of Neural Network-Based Models of Combustion and Knock Indexes," SAE Int. J. Engines 17(2):2024, https://doi.org/10.4271/03-17-02-0009, CORRESPONDING AUTHOR.
5. Brusa, A., Mecagni, J., Shethia, F., and Corti, E., "Model-Based Combustion Control to Reduce the Brake Specific Fuel Consumption and Pollutant Emissions under Real Driving Maneuvers," SAE Int. J. Engines 17(1):2024, https://doi.org/10.4271/03-17-01-0007, CORRESPONDING AUTHOR.
6. Lorenzo Brunelli, Alessandro Capancioni, Stella Canè, Giammarco Cecchini, Alessandro Perazzo, Alessandro Brusa, Nicolò Cavina, "A predictive control strategy based on A-ECMS to handle Zero-Emission Zones: Performance assessment and testing using an HiL equipped with vehicular connectivity", Applied Energy, Volume 340, 2023, 121008, ISSN 0306-2619, https://doi.org/10.1016/j.apenergy.2023.121008.
7. Brusa, A.; Corti, E.; Rossi, A.; Moro, D. Enhancement of Heavy-Duty Engines Performance and Reliability Using Cylinder Pressure Information. Energies 2023, 16, 1193. https://doi.org/10.3390/en16031193.
8. Mini, S.; Ponti, F.; Brusa, A.; Bertacin, R.; Betti, B. Prediction of Tail-Off Pressure Peak Anomaly on Small-Scale Rocket Motors. Aerospace 2023, 10, 169. https://doi.org/10.3390/aerospace10020169.
9. Stella Canè, Lorenzo Brunelli, Sara Gallian, Alessandro Perazzo, Alessandro Brusa, Nicolò Cavina, "Performance assessment of a predictive pre-heating strategy for a hybrid electric vehicle equipped with an electrically heated catalyst", Applied Thermal Engineering, Volume 219, Part A, 2023, 119341, ISSN 1359-4311, https://doi.org/10.1016/j.applthermaleng.2022.119341.
10. Brusa, A., Mecagni, J., Corti, E., and Silvestri, N., "Application of a Neural-Network-Based Algorithm for the Real-Time Correction of the In-Cylinder Pressure Signal Sensed with a Piezoelectric Washer," SAE Int. J. Engines 16(5):663-679, 2023, https://doi.org/10.4271/03-16-05-0039, CORRESPONDING AUTHOR.
11. Brusa A, Giovannardi E, Barichello M, Cavina N. Comparative Evaluation of Data-Driven Approaches to Develop an Engine Surrogate Model for NOx Engine-Out Emissions under Steady-State and Transient Conditions. Energies. 2022; 15(21):8088. https://doi.org/10.3390/en15218088, CORRESPONDING AUTHOR.

12. Corti, E., Raggini, L., Rossi, A., Brusa, A. et al., "Investigation of Aging Effects on Combustion and Performance Characteristics of Mining Engines," SAE Int. J. Engines 16(4):515-527, 2023, https://doi.org/10.4271/03-16-04-0030.
13. Mecagni, J., Brusa, A., Cavina, N., Ponti, F. et al., "Model-Based Exhaust Gas Temperature Control to Reduce the Mixture Enrichment at High Loads," *SAE Int. J. Engines* 16(3):2023, https://doi.org/10.4271/03-16-03-0020.
14. Corti, E., Raggini, L., Rossi, A., Brusa, A. et al., "Application of Low-Cost Transducers for Indirect In-Cylinder Pressure Measurements," SAE Int. J. Engines 16(2):2023, https://doi.org/10.4271/03-16-02-0013.
15. Brusa, A.; Cavina, N.; Rojo, N.; Mecagni, J.; Corti, E.; Moro, D.; Cucchi, M.; Silvestri, N. Development and Experimental Validation of an Adaptive, Piston-Damage-Based Combustion Control System for SI Engines: Part 2—Implementation of Adaptive Strategies. Energies 2021, 14, 5342. https://doi.org/10.3390/en14175342, CORRESPONDING AUTHOR.
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1. Presentation of the activity entitled "A systematic experimental approach to evaluate knocking induced damage on forged aluminum pistons after bench tests", A. Brusa, N. Cavina, B. D'Apote, R. Sola, University of Bologna, E. Balducci, F. Boccia, Ferrari S.p.A.), International Meeting about Metals for Road Mobility, 21-22 November 2019, Kilometro Rosso, Bergamo, Italy.

PERSONAL SKILLS AND COMPETENCIES

MOTHER TONGUE

ITALIAN

OTHER LANGUAGES

ENGLISH

• Reading skills	VERY GOOD
• Writing skills	VERY GOOD
• Oral expression skills	VERY GOOD

COMPUTER SKILLS AND COMPETENCIES

APPLICATIONS
- PTC Creo → Advanced User
- Matlab, Simulink, Simulink RT → Advanced User
- GT Power → Advanced User
- LabView → Good Command
- INCA → Advanced User
- OBI indicating system → Advanced User
- Microsoft Office → Advanced User

PROGRAMMING LANGUAGES
- Fortran → Advanced User
- C, C++ → Advanced User
- Java → Good Command

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