Curriculum Vitae (Academic)
Fabrizio D'Errico
(M.Sc. Mech. Eng., Aggregate Professor, Senior Material Researcher)

Contacts

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Industry and EU research projects

2020 - 2022	**STEEDER project** under EU-EIT Raw Materials**.** Secondary aluminum alloys casting by special electromagnetic filtering and cleaning process.
2016 - 2019	**CRAL project** under EU-LIFE Programme**.** Secondary aluminum and Eco-Mg alloys in low-impacting semisolid die-casting process.
2018 - 2020	**RADIUS Project** under EU-EIT Raw Materials project for the realization of recycled Al / Si alloys for the application of lightened brake discs with reduced environmental impact (Project Manager on behalf of INNSIGHT srl, project partner).
2017-2018:	**SSM Lab Project.** Design and development of an innovative foundry island for Brembo's R&D department obtained by introducing vertical injection systems of Al and Mg alloys in isothermal semi-solid conditions.
2011- 2013:	**InGRID** project under EU-Energy-2 EU Programme, best project in Europe on hydrogen application for sustainability. Development and construction of innovative systems for back-up and storage of unlimited renewable energy produced at large wind and solar parks.
2009 -2012:	**Green Metallurgy Project** under EU LIFE+ Programme. Industrial pilot project for lean integrated process cycle for eco-sustainable production of high performing magnesium components.
2005- 2006	**Simulating Trench Test Materials for SAIPEM-ENI** pipeline to be installed in the SHELL's Sakhalin Island extraction plant (Russia**)**. Project Manager for the carrying out of complex industrial research activity lead by Politecnico di Milano as main subcontractor of SAIPEM, ENI Group for modeling and conducting non-standard experimental test campaign to test various filling materials to be introduced in the realization of pipeline for gas transportation in highly seismic area.
2005-2007:	Optimization and selection of alternative material and surface hardening processes for Rollon S.p.A products.

2005-2009: Failure Analyst Scientific Consultant, support to Advanced Materials R&D Advanced Materials Dpt at Brembo S.p.A.

2005-2009: Scientific coordination of metallurgy laboratory at Colmegna Spa, industrial heat treatments of steels for mechanical applications.

Main Research themes

Low environmental impact processes for the manufacture of high-performance magnesium and aluminum alloys.

Product innovation. Research for the definition of a new formalized method for the generation and development of industrial projects for the development of innovative products and processes. Development and application of a new analysis model of the innovation content based on the "customer-based supplying" approach.

Sustainability and Environmental Impact Analysis of industrial processes. Development of new guidelines for LCA in automotive weigthsaving strategy [F.D'Errico, L.Ranza, *"Guidelines for the market competitiveness of sustainable lightweight design by magnesium solution: a new Life Cycle Assessment integrated approach",* IMA's 72nd World Magnesium Conference, 2015]. Life Cycle Assessment studies on EU co-financed projects:

- Cresim: LIFE11 ENV/IT/000095, Energy-efficient CFRP remanufacture from regenerated carbon fibres, using fast demoulding high pressure spray injection
- Ipan: FP7 308630, INNOVATIVE POPLAR LOW DENSITY STRUCTURAL PANEL
- Pla4coffee: LIFE 14 ENV/IT/000744, up scaling of an innovative coffee capsules production process, using the new PLA and maintaining critical product performance
- Ecotiles: LIFE14 ENV/IT/000801, ECO innovative methodologies for the valorisation of construction and urban waste into high grade TILES
- Demeter: H2020-BBI-PPP-2015 720714, Demonstrating more efficient enzyme production to increase biogas yields

Research activity is sustained with around 90 papers and three monographies concerning on the main research themes.

Education

2010: Oxford University - Said Business School - *Executive Course* for Knowledge Management in Scientific Rsearch (UK)

2008: SDA Bocconi, Business and Management School – *Executive course* "Research and Development Manager " (Italy)

1999: M.Sc. in Mech. Eng. Politecnico di Milano, Milan (Italy) "Super Plastic Forging of Aluminum Composite Alloys Al2121 4-SiCp"

Professional Career

2015 – to date Scientific director for research and development lines in the field of innovative metal alloys and advanced metallurgical processes for Innsight srl.

2010 – to date Aggregate Professor of Metallurgy at Department of Mechanical Engineering, Politecnico di Milano

2005-2010 Assistant Professor of Metallurgy at Department of Mechanical Engineering, Politecnico di Milano

2001- 2003: Lecturer at the University of Brescia for the seminary "Materials and composites with metal matrix for advanced applications" for the Master Sc. Mech. Eng. course “Mechanical Metallurgy”

1999 - 2004: Lecturer at Politecnico di Milano for the course "Experimental Metallurgy, tools and methods" for M.Sc. Material Engineering

1999 - 2004: Research Assistant at Metallurgy Team of Department of Mechanical Engineering, Politecnico di Milano

Invited speaker

2015: Key-note speaker al 72nd Annual World Magnesium Conference May 17 – 19, 2015 Vancouver, BC, Canada

2010 - 2012: Politecnico di Milano – Invited speaker at "Failure Analysis and Forensic Engineering” executive course, edition 2012 e 2010.

2011: *Key-note speaker* al *140th TMS Annual Exhibition-Magnesium Technology Symposium* San Diego, CA (USA).

2008: University of Oviedo (Spain) – Lecturer for " *Thixomolding magnesium alloys for strategic product innovation* " seminary of the course “*Seleccion de Materiales en Diseno Mecanico*” for the bachelor in Mechanical Engineering (Escuela Tecnica de Ingegneria Industrial de Gjion).

Teaching activity: Politecnico di Milano

2010- to date: Chair of the “Applied Metallurgy” course for the M.Sc. in Mechanical Engineering.

Chair of the *“Metallurgy and Non Metallic Materials”* course for the B.Sc. in Mechanical Engineering.

2010: Chair of the *“Metallic materials and Product Innovation”* course taught in English for the M.Sc. in Materials Engineering.

Chair of the *“Applied Metallurgy”* course for the M.Sc. In Mechanical Engineering.

Co-chair for the *“Surface treating for engineering mechanical application”* course for the M.Sc. in Materials Engineering.

2008/2010: Chair of the “*Engineering applications of Metallurgy”* course for the B.Sc. in Materials Engineering.

2007/2008: Chair of the “*Metallurgy and Non Metallic Materials”* course for the B.Sc. in Mechanical Engineering.

2006/2008: Chair of the *”Fundamentals of Metallurgy and Mechanical Technologies”* course for the B.Sc. Eng in Mechanical Engineering.

2002/2003: Chair of the "*Experimental Metallurgy"* course for B.Sc. in Materials Engineering.

Didactic evaluation form Students' courses:

Courses	2022/23	2021/22	2020/21	2019/20
095838 - APPLIED METALLURGY	3,6/4	3,5 / 4	3,3 / 4	3,4/4
081377 - METALLURGIA E MATERIALI NON METALLICI	-	3,7/4	3,6 / 4	3,6/ 4

Patents:

- National Patent N. 0001375863: Monolithic node for joining bicycle frame elements (2006).
- National Patent N. 102019000021372: "Processo metallurgico per la preparazione di leghe di Magnesio semisolide in stato quasi-liquido" (2021)
- European Patent EP 3 831 509 A1: "Apparatus and metallurgical process for the preparation and feeding of semi-solid magnesium alloys in a quasi-liquid state for casting injection machines" (2022)

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International Committee and Boards

2012-2017: Board member of *"Case Studies in Engineering Failure Analysis" j*ournal, published by Elsevier.

2011-2017: Member of the Technical Committee "Magnesium Technology", part of the Light Metals Division of the American TMS, Minerals, Metals & Materials Society.

2021-to date Member of the European Board of the International Magnesium Association (IMA)

Recent publications:

- F.D'Errico et all. *INDUSTRIAL SEMISOLID CASTING PROCESS FOR SECONDARY ALUMINIUM ALLOYS FOR DECARBONISING LIGHTWEIGHT PARTS IN AUTOMOTIVE SECTOR*, MATEC Web of Conferences, 2020 | conference-paper, DOI: 10.1051/matecconf/202032606007Part of ISSN: 2261-236X
- F.D'Errico et all. *A NOVEL FLEXIBLE SSM AND HPDC EQUIPMENT TO PROCESS SECONDARY ALUMINIUM ALLOYS FOR DECARBONISING LIGHTWEIGHT PARTS IN AUTOMOTIVE SECTO*r, Light Metals 2019, 2019 | conference-paper, DOI: 10.1007/978-3-030-05864-7_185Part of ISBN: 9783030058630Part of ISBN: 9783030058647Part of ISSN: 2367-1181Part of ISSN: 2367-1696
- F.D'Errico, *BIMODAL CASTING PROCESS OF ECO-MG SERIES ALLOYS BY VERTICAL HIGH-SPEED PRESS MACHINE*, The Minerals, Metals & Materials Series, 2019 | conference-paper, DOI: 10.1007/978-3-030-05789-3_5Part of ISBN: 9783030057886Part of ISBN: 9783030057893Part of ISSN: 2367-1181Part of ISSN: 2367-1696
- F.D'Errico, *MATERIAL-ORIENTED PRODUCT DEVELOPMENT BY QFD4MAT MATERIAL SELECTION STRATEGY APPROACH*, REWAS 2019, 2019 | conference-paper, DOI: 10.1007/978-3-030-10386-6_8Part of ISBN: 9783030103859Part of ISBN: 9783030103866Part of ISSN: 2367-1181Part of ISSN: 2367-1696

- F.D'Errico et all. *SECONDARY ALUMINUM ALLOYS PROCESSED BY SEMISOLID PROCESS FOR AUTOMOTIVE APPLICATION, Light Metals 2017, 2017 | conference-paper, DOI: 10.1007/978-3-319-51541-0_31Part of ISBN: 9783319515403Part of ISBN: 9783319515410Part of ISSN: 2367-1181Part of ISSN: 2367-1696*
- F. D'Errico, M. Dalla Casa, *THE SEQUENCE OF EVENT ANALYSIS IN CRIMINAL TRIALS, SPRINGER BERLIN HEIDELBERG, 2016 | book, DOI: 10.1007/978-3-662-47898-1ISBN: 9783662478974ISBN: 9783662478981*
- F.D'Errico et all*., COMPARATIVE ENVIRONMENTAL BENEFITS OF LIGHTWEIGHT DESIGN IN THE AUTOMOTIVE SECTOR: THE CASE STUDY OF RECYCLED MAGNESIUM AGAINST CFRP AND STEEL***,** Magnesium Technology 2015, 2015-02 | DOI: 10.1002/9781119093428.ch16
- F.D'Errico, *MATERIAL SELECTIONS BY A HYBRID MULTI-CRITERIA APPROACH, SPRINGERBRIEFS IN MATERIALS, 2015 | BOOK, DOI: 10.1007/978-3-319-13030-9*
- F.D'Errico et all.*THE INGRID PROJECT: DEVELOPMENT OF SOLUTIONS FOR SUSTAINABLE AND HIGHLY INTERCONNECTED GRIDS,* Engineering Solutions for Sustainability, 2015 | conference-paper, DOI: 10.1007/978-3-319-48138-8_25Part of ISBN: 9783319486130Part of ISBN: 9783319481388
- F.D'Errico et all. *HIGH-CAPACITY HYDROGEN-BASED GREEN-ENERGY STORAGE SOLUTIONS FOR THE GRID BALANCING,* Essential Readings in Magnesium Technology, 2014-02-01 | DOI: 10.1002/9781118859803.ch11
- F.D'Errico et all. *LIFE CYCLE ASSESSMENT OF ECO-MAGNESIUM ® ALLOY PRODUCED BY GREEN METALLURGY EU PROJECT PROCESS ROUTE,* Magnesium Technology 2014, 2014-02-01 | DOI: 10.1002/9781118888179.ch3
- F.D'Errico et all. *FINAL ASSESSMENT OF PREINDUSTRIAL SOLID-STATE ROUTE FOR HIGH-PERFORMANCE MG-SYSTEM ALLOYS PRODUCTION: CONCLUDING THE EU GREEN METALLURGY PROJECT*, JOM, 2013-08-06 | journal-article DOI: 10.1007/s11837-013-0705-1
- F.D'Errico et all. *A GREEN URBAN MOBILITY SYSTEM SOLUTION FROM THE EU INGRID PROJECT,* REWAS 2013, | conf. paper: DOI: 10.1002/9781118679401.ch20
- *AN ICT-BASED ENERGY MANAGEMENT SYSTEM TO INTEGRATE RENEWABLE ENERGY AND STORAGE FOR GRID BALANCING,* Proceedings of the the fourth international conference on Future energy systems - e-Energy '13 2013 | conference-paper DOI: 10.1145/2487166.2487196
- F.D'Errico et all. *MECHANICAL PROPERTIES OF AZ31 ALLOY PROCESSED BY A GREEN METALLURGY ROUTE | PROPIEDADES MECÁNICAS DE LA ALEACIÓN AZ31 PROCESADA POR UNA RUTA ECO-SOSTENIBLE*2013 | journal-article, DOI: 10.3989/revmetalm.1315EID: 2-s2.0-84894516666
- F.D'Errico et all. High Performance Mg-System Alloys for Weight Saving Applications: First Year Results from the GREEN METALLURGY EU Project, Magnesium Technology 2012 | Conference paper, DOI: 10.1002/9781118359228.ch83
- F.D'Errico et all. *HIGH-CAPACITY HYDROGEN-BASED GREEN-ENERGY STORAGE SOLUTIONS FOR THE GRID BALANCING,* Magnesium Technology 2012, 2012-03 | other DOI: 10.1002/9781118359228.ch88 (Awarded Best World paper 2012 in Magnesium Technology Application)

January*, 2023*

Fabrizio D'Errico

Curriculum Vitae (Limited to Forensic Engineering Matter)

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Senior Material Researcher

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A) Studies on Engineering Failure Analysis Methods applied to Forensic Engineering. Failures during operations are commonly evaluated through engineering failure analysis methods, of which metal failure analysis is a branch. The goal is to identify mechanisms of failure and seek out mitigating solutions to prevent similar failures from occurring again. Reconstructing a failure event goes beyond the identification of pure metal failure mechanisms; root causes of failures and the relative contribution of hexogen (e.g. load, surface condition, environment, etc.) and endogen (e.g. microstructure and its relationship with product mechanical response) factors are investigated in order to provide guidelines in re-design and in the optimization of industrial products. Root cause failure analysis (RCFA) has been coupled with most common engineering methods for safe-design and risk-management such as FMEA (Failure Mode and Effect Analysis) and causal diagrams (most widely known, the Ishikawa Diagram). Through this analysis specific expertise has been acquired in the forensic field, specifically in the reconstruction of complex accidents, primarily in the transportation sector. The need of scientific methods to precisely reconstruct failure events in the forensic field - primarily those related to criminal cases that involve complex organizations – led to a research theory of accidents, as well as the sequence of events that happen before and during an accident in relationship to the models of accident causation (J.T.Reason, 1997). The final outcome has been a general methodology researcher applies by using causality principles, the general relationship among police evidence and universal laws, employing a framework which allows non-technical personnel to understand if all the events have been accurately reconstructed on the basis of the evidence.

A.1) Participation in editorial committees of international journals in Forensic Engineering and failure Analysis Engineering:

- 2016-2017: Member of Scientific Committee Member of Journal **Case Studies in Engineering Failure Analysis (ISSN: 2213-2902)**, Elsevier.

A.2) Participation to international conferences on Forensic Engineering:

- 2012, San Diego, USA: Invited speaker for special training in Advanced Accident Reconstruction Seminars organized by American National Academy of Forensic Engineers (NAFE)

- 2013, Minneapolis, USA: Invited speaker for special training in Advanced Accident Reconstruction Seminars organized by American National Academy of Forensic Engineers (NAFE)

- 2016, Tampa, USA: Invited speaker for special training in Advanced Accident Reconstruction Seminars organized by American National Academy of Forensic Engineers (NAFE)

A.3) Monographies published on Forensic Engineering issues:

- F.D'Errico, M.Dalla Casa, Oltre il ragionevole dubbio. Prove scientifiche per il tracciamento delle responsabilità nei disastri e sinistri industriali, ETS, 2012 (ITALY)

- F.D'Errico, M.Dalla Casa, The Sequence of Event Analysis in Criminal Trials: Scientific Proofs for Tracking Criminal Liabilities in Complex Accidents and Disasters, Springer, 2015 (GERMANY-USA)

B) Past experience on Forensic Engineering for high complexity accident reconstruction, mainly railway accidents:

1. **(2012) Technical Expert for the Prosecutor Office of Bolzano Court, Proc. Pen. 3781/2012 R.G.N.R.,** Freigth train derailment in Bressanone station;

2. **(2014) Technical Expert for the Prosecutor Office of Bergamo Court, Proc. Pen. 17689/13 R.G.N.R. mod.21,** Train crash mortal collision;

3. **(2016) Technical Expert for the Prosecutor Office of Lecce Court, Procedimento n° 3531/15 R.G. mod.44**, Passenger train failure;

4. **(2016) Technical Expert for the Prosecutor Office of Trani Court, Proc. Pen. n. 4270/16**, Train crash mortal collision in Andria province;

5. **(2016) Technical Expert for Prosecutor Office of Milano Court, Proc. Pen. 3537/16 Mod.21 -** Person mortally injured by subway train investment;

6. **(2017) Technical Expert for Prosecutor Office of Lucca Court, Proc. Pen. 4374/17 –** Crain crash with mortally injured workers**.**

7. **(2017) Technical Expert for Prosecutor Office of Florence Court, Proc. Pen. 19279/17 Mod 44 - H**igh speed train derailment;

8. **(2018) Technical Expert for Prosecutor Office of Milano Court, Proc. Pen. 3651/18** – Train disaster cause by derailment of passenger train in Pioltello Limito;

9. **(2018) Technical Expert for Prosecutor Office of Genova Court, Proc. Pen. 40358/18 R.G.P.M. -** Passenger train derailment;

10. **(2018) Technical Expert for Prosecutor Office of Paola Court, Proc. Pen. 2201/18 R.G.P.M. –** Railway track rupture;

11. **(2018) Technical Expert for Prosecutor Office of Florence Court, Proc. Pen. 23872/18 R.G.P.M. –** Train investment of workers in construction site; mortally injured workers in Pellegrino's tunnel in Florence;

12. **(2018) Technical Expert for Prosecutor Office of Ferrara Court, Proc. Pen. 2423-2018 –** Freight train derailment;

13. **(2019) Technical Expert for G.U.P at Court of Ravenna, Proc. Pen. 7022-17RGNR_2223_18 RGGIP** – Mortal accident of workers caused by abnormal crane failure

14. **(2019) Technical Expert for Prosecutor Office of Milano Court, Proc. Pen. p.p. 2019/14520** – Abnormal breaking events in Metropolitana Milano MM1 and MM2 line;

15. **(2019) Technical Expert for Prosecutor Office of Napoli Court, Proc. Pen. p.p. 2020/1750** – Metropolitan Train Crash

16. **(2020) Technical Expert for Prosecutor Office of Lodi Court, Proc. Pen. p.p. 535/2020 M. 21**– High Speed Train Crash

17. **(2020) Technical Expert for Prosecutor Office of Monza Court, Proc. Pen. p.p. 7884/2020 M. 21**– Regional train derailment

18. **(2020) Technical Expert for Prosecutor Office of Cremona Court, Proc. Pen. p.p. 1488/2020 M. 21**– Railway track failure

March, 2022

Fabrizio D'Errico