

January 3rd, 2018

## Luca Fumagalli

### 1. General info

#### a. Contact details & Nationality, Age, status

Name FUMAGALLI LUCA  
E-mail [luca1.fumagalli@polimi.it](mailto:luca1.fumagalli@polimi.it)  
Nationality Italian

Birth date 06, 06, 1982



#### b. Current position

July 2015 – now Assistant Professor at Politecnico di Milano - DIG (Dipartimento di Ingegneria Gestionale) – Ricercatore t.d. art. 24 c. 3 lett. A Legge 240/10 (t. pieno)

#### c. Short summary

Luca Fumagalli has been collaborating with the Department of Management, Economics and Industrial Engineering of Politecnico di Milano since January 2007. In the period January 2007-December 2009, he attended the PhD program – Scuola Interpolitecnica di Dottorato – PhD program delivered by *Politecnico di Milano, Politecnico di Torino, Politecnico di Bari*, attending courses at the *Department of Management, Economics and Industrial Engineering, Politecnico di Milano*.

He got the PhD title in 2010 and from that year he has worked as research fellow (Assegnista di ricerca) at the *Department of Management, Economics and Industrial Engineering, Politecnico di Milano*, working on different research topics, with a specific concern to maintenance management related topics, ICT for manufacturing, smart manufacturing and Industry 4.0 concepts. During the PhD period and afterwards, Luca Fumagalli has been lecturer and teaching assistant in courses at undergraduate, graduate and post graduate level (in Italy and abroad). He is adjunct professor for the course: Gestione degli Impianti Industriali (10 CFU), bachelor degree of Ingegneria Gestionale at Politecnico di Milano, Campus Cremona. He has collaborated in activities related with national and EU projects mainly concerning industrial engineering issues. He is presently responsible of the research of Osservatorio Tecnologie & Servizi per la Manutenzione (TeSeM, [www.tesem.net](http://www.tesem.net)) and vice-director of Master Megmi (Master Executive in Gestione della Manutenzione Industriale – Executive Master on Industrial Maintenance Management) delivered by MIP – School of Management – Politecnico di Milano and SdM – School of Management Università degli Studi di Bergamo (<http://www.mip.polimi.it/megmi>).

### 2. Education and qualifications

In this section the titles received and the attended university courses are listed; visiting periods abroad in the scope of the attended PhD program are listed and eventually the language skills are provided.

#### a. University Degree

December 2006 POLITECNICO DI MILANO  
Master Degree in Mechanical Engineering at Politecnico di Milano, final score: 103/110, thesis (final project) title: “MODELLAZIONE DELLA LOGISTICA RICAMBI IN UN'INDUSTRIA MULTISITO: IL CASO ITALCEMENTI”  
October 2004 POLITECNICO DI MILANO  
Bachelor degree in Mechanical Engineering at Politecnico di Milano, final score: 108/110.

3-January-2018



## b. PhD

January 2007- POLITECNICO DI MILANO  
December 2009

PhD program – Scuola Interpolitecnica – PhD program delivered by Politecnico di Milano, Politecnico di Torino, Politecnico di Bari. PhD courses attended at: Department of Management, Economics and Industrial Engineering, Politecnico di Milano. Thesis title: Innovation in maintenance management for manufacturing and process industries.

PhD degree (European Doctorate degree) (Dissertation on February 25th 2010). PhD Thesis title: “Innovation in maintenance for manufacturing and process industries” (Tutor: Prof. Marco Garetti; Co-tutor: Prof. Marco Macchi)

This PhD program required to spend at least 9 months abroad, visiting other research institutions. To this end the following visiting periods were carried out:

### Visiting periods

#### FINLAND

March-May 2009. VTT, Technical Research Centre of Finland

September – October 2008. VTT, Technical Research Centre of Finland

#### SPAIN

September – November 2009. University of Sevilla – Escuela Superior de Ingenieros

June – July 2008. University of Sevilla – Escuela Superior de Ingenieros

#### FRANCE

January 2008. Nancy Université

May 2007. Nancy Université

#### CHILE

July - September 2009. Universidad Tecnica Federico Santa Maria (Valparaiso) – within this period two weeks of visiting at the mining company: EL TENIENTE – CODELCO Chile.

## c. Other educational programs/qualifications

### Language Skills

English Reading skills: good, Writing skills: good, Verbal skills: good  
Spanish Reading skills: good, Writing skills: basic, Verbal skills: good

## 3. Research activity

### a. Current and past research positions

In this section the job contracts from 2010 to 2015 are listed:

1 February 2014 – 2 July 2015 (contract according to the Art 22 della L. 240/2010)	Research Fellow at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Development of the architecture of a representation layer for manufacturing system control” - “Sviluppo dell'architettura di interfaccia di un modello di rappresentazione semantica per il controllo di sistemi manifatturieri”.
1 February 2013 – 31 January 2014 (contract according to the Art 22 della L. 240/2010)	Research Fellow at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Definition of a system of performance indicators for industrial services” - “Definizione di un sistema di indicatori di prestazione per servizi industriali”.
1 February 2012 – 31 January 2013 (contract according to the Art 22 della L. 240/2010)	Research Fellow at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Analysis of models for maturity assessment and change management for industrial service development” - “Analisi di modelli di maturità e di gestione del cambiamento nell'ambito dello sviluppo di servizi industriali”.
1 February 2011 – 31 January 2012 (contract	Research Fellow at Politecnico di Milano - DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Metodi e strumenti per la riduzione dei costi di gestione dei Materiali di Manutenzione” (Methods and tools for the reduction

3-January-2018

previous to the Art 22 della L. 240/2010)

of the cost of spare parts management). The research was carried out in the scope of a funded project. The project was funded by Lombardy Region (Regione Lombardia) and ABB (A Maintenance Service Provider) – Research program: Dote Ricerca. In the project a software tool for the support to engineering of spare parts management was developed.

1 February 2010 – 31 January 2011 (contract previous to the Art 22 della L. 240/2010)

Research Fellow at Politecnico di Milano - DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Studio di metodi diagnostici e prognostici innovativi a garanzia di efficienza, sicurezza e sostenibilità” (Study of innovative diagnostic and prognostic methods to guarantee efficiency, safety and sustainability). The research was carried out in the scope of a project funded by Lombardy Region (Regione Lombardia).

## **b. Research areas of interest**

The research activity is divided in areas with a specific focus on the maintenance topics, main research interest of Luca Fumagalli. The followings are the main research areas of interest:

### **b.1 Research area: Spare parts management (2006 – now)**

The first area of interest is related with maintenance management, with a specific focus on spare parts management and the supporting tool that can be developed as an aid for decision making in this context. The following main research activities belong to this research area:

- Master Degree thesis topic: development of a simulation tool to support decision making for spare parts management (April 2006 – December 2006)
- Research collaboration as Research Fellow (Assegno di ricerca) focused on the development of methodologies and tools for spare parts management, that specifically result in the definition of specification for a tool for spare parts management. Title of the research activity: “Metodi e strumenti per la riduzione dei costi di gestione dei Materiali di Manutenzione” (Methods and tools for the reduction of the cost of spare parts management). The research was carried out in the scope of a Funded Project. The project was funded by Lombardy Region (Regione Lombardia) and ABB (A Maintenance Service Provider). In the project a software tool for the support to engineering of spare parts management was developed (February 2010 – January 2011)

### **b.2 Research area: Condition based maintenance (2007 – now)**

This research area is related with topics concerning condition based maintenance (CBM), condition monitoring, diagnostics technique, use and development of new ICT solutions for CBM.

The following main research activities belong to this research area:

- Laboratorio di Gestione della Manutenzione (LGM) – Department of Management, Economics and Industrial Engineering Technical and scientific responsible of the laboratory. In the scope of LGM: Responsible of the development of the tool ProDEST (Prognostics and Diagnostics with Electric Signature Analysis Technique). The tool is developed with the collaboration of National Instruments, that provided the devices to practically implement the tool (Spring 2011 – now).
- Research collaboration as Research Fellow (Assegno di Ricerca) at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: “Studio di metodi diagnostici e prognostici innovativi a garanzia di efficienza, sicurezza e sostenibilità” (Study of innovative diagnostic and prognostic methods to guarantee efficiency, safety and sustainability). The research was carried out in the scope of a project funded by Lombardy Region (Regione Lombardia). The development of a diagnostic tool, based on the Electrical Signature Analysis (ESA), was carried out (February 2011 – January 2012).
- Collaboration in the activity of the “eSONIA” project, ARTEMIS Call2 2009 Programme under Grant Agreement n°100223, correspondent to the project shortly entitled eSONIA Embedded Service Oriented Monitoring, Diagnostics and Control: Towards the Asset-aware and Self-Recovery Factory. The project dealt with the use of web-services as building block for the definition of an architecture that can support asset-aware and self-recovery factory. Specific focus is given to solutions for monitoring and diagnostics, related with the main role of Politecnico di Milano into the project (March 2010 – February 2013).
- Support in the preparation of project proposals:

3-January-2018



- at Italian level: Simplex - Service-Based Integrated Maintenance Platform for Efficiency in SMEs. Proposal submitted by Fumagalli Luca as Principal Investigator for the program "Futuro in Ricerca 2013" (Decreto del 28 dicembre 2012 prot. n. 956/Ric) - LINEA 1 (starting). Proposal positively evaluated at the first step (February 2013) and invited to the second step of submission (June 2013). Proposal not approved at the second step.
- at Italian level: Development of predictive maintenance algorithms and models based on electric signature - Sviluppo di algoritmi e di modelli basati sul metodo della firma elettrica a supporto della manutenzione predittiva. Project proposal submitted for BANDO FIRB - PROGRAMMA "FUTURO IN RICERCA" 2010
- at European level: "eSONIA" project, ARTEMIS Call2 2009 Programme under Grant Agreement n°100223, correspondent to the project shortly entitled eSONIA Embedded Service Oriented Monitoring, Diagnostics and Control: Towards the Asset-aware and Self-Recovery Factory (Successful proposal)

### **b.3 Research area: Industrial services – Maintenance services (2008 – now)**

This research area is related with topics concerning industrial services. Starting from the research experience about spare parts management and condition based maintenance issues, Luca Fumagalli gained experience in the field of Maintenance Management. During the research activities, the importance of considering the maintenance services became higher and higher. To this end, he has investigated topics related with technologies and services for maintenance, both from a technical and an organizational perspective. Attention is paid to tools that can support the adoption of technologies and services for maintenance, namely the analysis of maturity and change management models and tools for supporting decision making.

The following main research activities belong to this research area:

- Responsible of the research of Osservatorio Tecnologie & Servizi per la Manutenzione (TeSeM, [www.tesem.net](http://www.tesem.net))
- Research collaboration as Research Fellow (Assegno di Ricerca) at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: "Analysis of models for maturity assessment and change management for industrial service developemnt" - "Analisi di modelli di maturità e di gestione del cambiamento nell'ambito dello sviluppo di servizi industriali". This collaboration is related with the project "MSEE", FP7, Call:FoF-ICT-2011.7.3: Virtual Factories and enterprises. MSEE - Manufacturing Service Ecosystem.
- Support in the preparation of project proposals:
  - collaboration in the preparation of the "MSEE" project proposal, FP7, Call:FoF-ICT-2011.7.3: Virtual Factories and enterprises. MSEE - Manufacturing Service Ecosystem (Successful proposal).

### **b.4 Research area: Open manufacturing automation (2012 – now)**

This research area is related with topics concerning ICT for manufacturing and automation of shop-floor control, with a specific concern on new approaches for production management at shop floor level, smart manufacturing and Industry 4.0 concepts. The research area is strongly based on new ICT and embedded solutions available at research and industrial level that are paving the way for new architecture of control systems. Such architectures may benefit from an opportune modelling of the manufacturing systems, namely thanks to a meaningful description of the system that is possible mainly thanks to the use of ontologies.

The following main research activities belong to this research area:

- Technical Coordinator for Politecnico di Milano of eScop project research activity (eSCOP is an EU ARTEMIS funded project).
- Research Fellow at Politecnico di Milano DIG (Dipartimento di Ingegneria Gestionale). Title of the research activity: "Development of the architecture of a representation layer for manufacturing system control" - "Sviluppo dell'architettura di interfaccia di un modello di rappresentazione semantica per il controllo di sistemi manifatturieri".

### **c. National and International Research Projects**

In this section the main research projects (8 projects) where Luca Fumagalli has been involved are listed, presenting his role in the project activities. The list is related to research projects funded at different level: by European funding programs, by Regione Lombardia (Lombardy Region), by private companies, by other institutions.

3-January-2018



- 1) February 2014 – February 2016 – Participation to the project eScop (Embedded systems Service-based Control for Open manufacturing and Process automation). eScop is a ARTEMIS funded research project; it aims at to overcome the current drawbacks for the shop floor control level (i.e. MES and deterministic / real-time control). This goal is achieved by introducing an innovative approach based on the combination of 3 different pillars, namely: i) embedded systems, ii) ontology-based knowledge management and iii) service-oriented architecture.
- Within eScop project, Luca Fumagalli keeps the role of Technical Coordinator of Politecnico di Milano.
- 2) February 2013 – January 2014 – Participation to the project Sustainable Value Creation in Manufacturing Networks. Sustain Value is a FP7 funded research project on new industrial models for a sustainable and efficient production.
- 3) February 2012 – January 2014 – Participation to the project “MSEE”, FP7, Call:FoF-ICT-2011.7.3: Virtual Factories and enterprises. MSEE - Manufacturing Service Ecosystem.
- Within the project, Luca Fumagalli was in charge of the leadership of the work package related with the analysis of models for maturity assessment for industrial services and the definition of a change management approach for companies willing to introduce services in their portfolio of “products” (e.g. Original Equipment Manufacturer which propose a maintenance service to their customers).
- 4) December 2010 – Now – Participation to the activity of Osservatorio TeSeM ([www.tesem.net](http://www.tesem.net)) (Observatory TeSeM).
- The Observatory is funded by private funding. The Observatory TeSeM is furthermore a research activity that involves industrial experts but also scientific experts coming from other Italian universities, collaborating to create an industrial and scientific network on maintenance topics (see [www.tesem.net](http://www.tesem.net) for updated information about the large network of Italian universities collaborating to the Observatory).
- Luca Fumagalli is responsible of the research of the observatory: in charge of coordinating the activity related with the delivering of the survey, collecting and analyzing the data coming from companies and carrying out selected business case analysis to understand the impact on maintenance management of the innovation through technologies and services. Moreover he collaborates to the organization of periodical workshops and events in the scope of TeSeM activity.
- 5) March 2010 – February 2013 – Participation to the project “eSONIA”, ARTEMIS Call2 2009 Programme under Grant Agreement n°100223, complete title of the project: eSONIA Embedded Service Oriented Monitoring, Diagnostics and Control: Towards the Asset-aware and Self-Recovery Factory (Successful proposal).
- The consortium was composed by the following institutions and companies: Hermia Ltd, Tampere University of Technology, Prodatec, FluidHouse, Fundacion Tecnalia, Acciona S.A., IntegraSys, Brno University of Technology, Unis a.s., Politecnico di Milano Comau, CRF (Centro Ricerche Fiat), ST Microelectronics.
- In the scope of the project:
- in charge of coordinating the activity with the other national and international partners
  - responsible for Politecnico di Milano of the activity related with the work packages dealing with the development of the Information Model to be used in the eSONIA platform and the activity related with the implementation of tools for maintenance (monitoring and diagnostic tools) into the eSONIA platform, including the testing in the use case developed by COMAU on one of their working station.
  - responsible of the organization of the Consortium Meeting held in Milano in November 2010.

3-January-2018



- 6) July 2009 – December 2011 – Participation to the project: Sviluppo e applicabilità meccatronica della firma elettrica per innovare la diagnostica predittiva a garanzia dell'efficienza e della sicurezza delle macchine (Development and mechatronical applicability of electric signature to innovate predictive diagnostics to guarantee efficiency and safety of the machines) funded by Regione Lombardia (Lombardy Region).
- The consortium was composed by the following institutions and companies: Balance Systems, ZD Mechatronics, Politecnico di Milano (Dipartimento di Elettrotecnica and Dipartimento di Ingegneria Gestionale), University of Bergamo, Kilometro Rosso, Provincia di Bergamo, Confindustria Bergamo
- In the research, in charge of the activity related with the development of a methodology for the analysis of applicability of electric signature analysis on equipment and production systems. During the project in charge for Politecnico di Milano for the activity related with the practical development of the tool for maintenance analysis (diagnostic and prognostic analysis) on the electric signature, collected through sessions on the demo-machine available at Balance Systems premises.
- 7) January 2009 – June 2013 – Scientific Member of Imapla project (PIRSES-GA-2008-230814 – iMaPla). In charge of managing relations with the international partners involved in the project (University of Seville, University of Nancy, Universidad Tecnica Federico Santa Maria, Valparaiso, Chile). From Month 18 of the project, responsible for the preparation of periodic reports and relation with the project Officer. Imapla project was a Marie Curie project, dedicated to fund mobility of researchers. The project concerned research activity about maintenance management.
- 8) September – November 2008, March – May 2009 – Participation to eMari (Mobile Support for e-Maintenance) project during the visiting periods at VTT as visiting PhD student (VTT project, funded at local level). The role in the project was related to a specific task on the development of ontology of diagnosis of machine condition.

#### 4. Involvement in scientific networks

##### a. Honors & Awards

- Best paper award at XIX Summer School "F. Turco 2014:  
Paper: Negri E., Fumagalli L., Garetti M., Tanca L. (2014). A review of semantic languages for the conceptual modelling of the manufacturing domain. In: XIX Summer School "F. Turco" "A Challenge for the future: the role of industrial engineering in a global sustainable economy". Senigallia, Italy, September 09-12, 2014.
- Best Industrial Paper at the IFAC IMS2016 Workshop December 5-7, 2016, Austin, TX, USA:  
Paper: Luca Fumagalli, Marco Macchi, Cristian Colace, Maurizio Rondi, Alessandro Alfieri, "A Smart Maintenance Tool for a Safe Electric Arc Furnace.

##### b. Participation to national and international conferences as invited speaker

- May 12th 2009, VTT premises, Espoo (Finland) – Invited speaker at: "Mini Seminar on Product Life Cycle Management and e-Maintenance"
- 27<sup>th</sup> October 2011 – Politecnico di Milano, Milano (Italy) – 27-28 October 2011: "VIII Convegno Nazionale ASAP forum: Gestire il valore del Servizio con il Lean Thinking". Invited speech to present the research activity carried out in collaboration with ABB about the development of a tool for spare parts management.
- 18<sup>th</sup> November 2011 – ICT Forum, Erba (CO), Italy – ICT Forum November 2011 – event organized by Agomir. Invited speech to present the research activity of Observatory TeSeM

3-January-2018



23<sup>rd</sup> November 2011, GE Oil & Gas premises, Firenze (Italy)

Visit to iCenter – GE Oil & Gas, organized by ASAP SMF. Invited speech to present the research activity of Observatory TeSeM

### c. Editorial and Referee activity for international journals:

- Assistant of the Book Reviews Editor of Production Planning and Control (present editor: Marco Macchi) (2008-2011)
- Reviewer for IMA Journal of Management Mathematics (October 2011 – now)
- Reviewer for European Journal of Industrial Engineering (May 2011 – now)
- Reviewer for the special issue Special Issue on “Product&Service System Engineering: From Theory to Industrial Applications” in Computers in Industry (July 2011 – January 2012)
- Reviewer for International Journal of Production Economics (June 2010 – now)
- Reviewer for Production Planning & Control (March 2008 – now)
- Reviewer for Ingenieria y Gestion de Mantenimiento (Spanish journal) (December 2010 – now)

### d. Other research-related assignments

11th January 2012 Member of the Commission for the evaluation of PhD thesis of Mónica A. López Campos (Miembro titular de tribunal evaluador de la tesis doctoral) in the commission of January 11th, at the University of Seville, Escuela Superior de Ingenieros, Spain.

### e. Scientific network

- From 2015, member of the Ontology Engineering group, Chaired by Prof. Dimitris Kiritsis, EPFL, Lausanne
- Member of the Scientific committee of IBIS Lab - INFORMATION-BASED INDUSTRIAL SERVICES – Università di Firenze, Dipartimento di Energetica (<http://www.ibis.unifi.it>)
- Research collaborator in the group Sistemas Inteligentes de Mantenimiento, University of Seville, Escuela Superior de Ingenieros, Spain (<http://taylor.us.es/sim/index.php>)
- Contact person for Italy for the activities related with PALM – workshop, series of workshops organized on the topic of Product and Asset Lifecycle Management.

## 5. Teaching activities

### a. Current and past teaching assignments

The teaching activity is related to two main scopes where lectures have been delivered: at undergraduated level at Politecnico di Milano (both at bachelor and at master of science level) and at post-graduated level, in the scope of MIP, School of Management of Politecnico di Milano, and in particular within Master Megmi (Master Executive in Gestione della Manutenzione Industriale – Executive Master on Industrial Maintenance Management).

#### 5a.1 Teaching activity at Politecnico di Milano

Academic year 2015/2016 – 2016/2017 – 2017/2018	Lecturer for the course: Gestione degli Impianti Industriali (10 CFU), bachelor degree of Ingegneria Gestionale at Politecnico di Milano, Cremona Campus - Polo di Cremona.
Academic year 2017/2018	Lecturer for the course: Industrial Technologies (10 CFU), Master of Science degree of Management Engineering at Politecnico di Milano, Bovisa Campus.
Academic year 2016/2017	Lecturer for the course: Manufacturing Systems Planning (10 CFU), Master of Science degree of Management Engineering at Politecnico di Milano, Bovisa Campus.
March 2016 – June 2016	Delivering lectures at master degree level for the course Design and Management of Production Systems – Marco Macchi (10 CFU).
October 2015 – January 2016	Delivering lectures at master degree level for the course Manufacturing Systems Planning – Marco Macchi (10 CFU).

3-January-2018



March 2015 – June 2015	Delivering lectures master degree level course in Design and Management of Production Systems – Marco Garetti (10 CFU).
Academic year 2014/2015	Adjunct professor for the course: Gestione degli Impianti Industriali (10 CFU), bachelor degree of Ingegneria Gestionale at Politecnico di Milano, Cremona Campus - Polo di Cremona.
October 2014 – February 2015	Delivering lectures at master degree level course (course of Modelling of production and logistics systems, Modellazione dei sistemi produttivi e logistici – Marco Macchi and Marco Melacini – 10 CFU) about: modelling with: IDEF0, EPC and use of simulation.
March 2014 – June 2014	Delivering lectures at bachelor and master degree level course in two different courses about design and management of production systems: <ul style="list-style-type: none"> <li>- Impianti industriali e gestione della produzione – Marco Macchi (9 CFU + 1 CFU for final evaluation);</li> <li>- Progettazione e gestione degli impianti di produzione – Marco Garetti (10 CFU).</li> </ul>
October 2013 – February 2014	Delivering lectures at master degree level course (course of Modelling of production and logistics systems, Modellazione dei sistemi produttivi e logistici – Marco Macchi and Marco Melacini – 10 CFU) about: modelling with: IDEF0, EPC and use of simulation.
March 2013 – June 2013	Delivering lectures at bachelor and master degree level course in two different courses about design and management of production systems: <ul style="list-style-type: none"> <li>- Impianti industriali e gestione della produzione – Marco Macchi (9 CFU + 1 CFU for final evaluation);</li> <li>- Progettazione e gestione degli impianti di produzione – Marco Garetti (10 CFU).</li> </ul>
October 2012 – February 2013	Delivering lectures at master degree level course (course of Modelling of production and logistics systems, Modellazione dei sistemi produttivi e logistici – Marco Macchi and Marco Melacini – 10 CFU) about: modelling with: IDEF0, EPC and use of simulation.
March 2012 – June 2012	Delivering lectures at bachelor and master level course in two different courses about design and management of production systems: <ul style="list-style-type: none"> <li>- Impianti industriali e gestione della produzione – Marco Macchi (9 CFU + 1 CFU for final evaluation);</li> <li>- Progettazione e gestione degli impianti di produzione – Marco Garetti (10 CFU).</li> </ul>
October 2011 – February 2012	Delivering lectures at master degree level course (course of Modelling of production and logistics systems, Modellazione dei sistemi produttivi e logistici – Marco Macchi and Marco Melacini – 10 CFU) about: modelling with: IDEF0, EPC and use of simulation.
March 2011 – June 2011	Delivering lectures at bachelor and master degree level course (course of Gestione della manutenzione (Asset Lifecycle Management) – Marco Garetti – 10 CFU) about: FMECA analysis, reliability analysis, spare parts management, maintenance KPI  Delivering lectures at master degree level course in three different courses about design and management of production systems: <ul style="list-style-type: none"> <li>- Impianti industriali e gestione della produzione – Marco Macchi (9 CFU + 1 CFU for final evaluation);</li> <li>- Progettazione e gestione degli impianti di produzione – Marco Garetti (10 CFU);</li> <li>- Design and management of production systems (at Lecco campus – course in English language) –Giacomo Tavola (10 CFU).</li> </ul>
March 2010 – June 2010	Delivering lectures at master degree level course (course of Gestione della manutenzione (Asset Lifecycle Management) – Marco Garetti – 10 CFU) about: FMECA analysis, reliability analysis, spare parts management, maintenance KPI.
October 2009 – February 2010	Delivering lectures at master degree level course (course of Modelling of production systems, Modellazione dei sistemi produttivi – Marco Macchi – 10 CFU) about: modelling with: IDEF0, IDEF3, ER, UML and use of simulation.

October 2008 – February 2009	Delivering lectures at master degree level course (course of Modelling of production systems, Modellazione dei sistemi produttivi – Marco Macchi – 10 CFU) about: modelling with: IDEF0, IDEF3, ER, UML and use of simulation.
March 2008 – June 2008	Delivering lectures at master degree level course (course of Gestione della manutenzione (Asset Lifecycle Management) – Marco Garetti – 10 CFU) about: FMECA, reliability analysis.
October 2007 – February 2008	Delivering lectures at master degree level course (course of Modeling of production systems, Modellazione dei sistemi produttivi – Marco Macchi – 10 CFU) about: modeling with: IDEF0, IDEF3, ER, UML and use of simulation.
March 2007 – June 2007	Delivering lectures at master degree level course (course of Gestione della manutenzione (Asset Lifecycle Management) – Marco Garetti – 10 CFU) about: FMECA, reliability analysis.

### 5a.2 Teaching activity related to MIP

October 2017 – December 2017	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools.
April 2015 – June 2015	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools.
December 2013 – now	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools.
September 2013	Lecturer in the course: Advanced Maintenance Management of Industrial Assets, delivered to Chilean maintenance managers at MIP.
October 2012 – February 2013	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools. Evaluation for the lectures given in this course by Luca Fumagalli: mean above 3 (in a scale 1-4, 3=good) for all the detailed sub-fields of evaluation and equal to 4 (in a scale 1-5) as global evaluation.
October 2011 – March 2012	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools. Evaluation for the lectures given in this course by Luca Fumagalli: mean above 2,5 (in a scale 1-4, 2=adequate, 3=good) for all the detailed sub-fields of evaluation and equal to 3,5 (in a scale 1-5) as global evaluation.
November 2010	Delivering lectures at Master MeGMI (master post-graduation level) about: Reliability analysis, Software for reliability analysis, Reliability Block Diagram Modelling.
March – May 2010	Delivering lectures at Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques, Use of software R-MES to approach an industrial test case.
December 2009	Delivering lectures at Master MeGMI (master post-graduation level) about: Reliability analysis, Software for reliability analysis, Reliability Block Diagram Modelling. Evaluation for the lectures given in this course by Luca Fumagalli: mean above 2,7 (in a scale 1-4, 2=sufficient, 3=good) for the detailed sub-fields of evaluation and equal to 3,5 (in a scale 1-5) as global evaluation.

3-January-2018



November 2008	Delivering lectures at Master MeGMI (master post-graduation level) about: Reliability analysis, Software for reliability analysis, Reliability Block Diagram Modelling.
March – May 2008	Delivering lectures at Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques, Use of software R-MES to approach an industrial test case.
March – May 2007	Delivering lectures at Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques, Use of software R-MES to approach an industrial test case.

### 5a.3 Teaching activity with foreign institutions

Lecturer at postgraduate level at “Magister en Ingeniería Industrial Mención en Gestión de Activos y Confiabilidad Operacional (MAM) delivered by Pontificia Universidad Católica de Valparaíso. Lectures about condition based maintenance (delivered in Spanish). Lectures delivered:

- May – June 2013
- August 2015
- August 2016
- August 2017

### b. Involvement in programs design or improvement

(some of the information provided hereafter has been already mentioned in the previous sections)

Academic year 2014/2015 and 2015/2016	Lecturer for the course: Gestione degli Impianti Industriali, bachelor degree of Ingegneria Gestionale at Politecnico di Milano, Polo di Cremona.
2013 - now	Luca Fumagalli is vice-director of Master Megmi (Master Executive in Gestione della Manutenzione Industriale – Executive Master on Industrial Maintenance Management) delivered by MIP – School of Management – Politecnico di Milano and SdM – School of Management Università degli Studi di Bergamo ( <a href="http://www.mip.polimi.it/megmi">http://www.mip.polimi.it/megmi</a> ).
December 2013 – now	Responsible of the “Ingegneria della Manutenzione 2 – IdM2” course at MIP Master MeGMI (master post-graduation level) about: Maintenance Engineering techniques. In this course, lecturer for the lectures about techniques for Condition Based Maintenance, statistical approaches for reliability analysis and simulation tools. Evaluation not yet available for this course.

### c. PhD and Master thesis supervision

Beside the teaching activity other activities have been carried out related mainly with the tutoring of students for different objectives (e.g. PhD, bachelor and master of science thesis, project works). Details are provided later, presenting tutoring and supervising activities carried out for Politecnico di Milano and MIP.

#### 5c.1 Tutoring activity at Politecnico di Milano

Luca Fumagalli supports the research activity of the Politecnico di Milano PhD candidate Elisa Negri on the topic of her PhD thesis: “Ontology-based manufacturing”, related to the research area of Open Manufacturing Automation.

Luca Fumagalli has been supervisor of the students for their thesis projects, with specific concern to topics related with the courses of “Gestione della Manutenzione (Asset Lifecycle Management)”, “Progettazione degli impianti di produzione”, “Modellazione dei sistemi produttivi e logistici”, “Gestione degli Impianti Industriali”. In the scope of this activity he has been tutor or co-tutor of more than 50 students for bachelor and master degree thesis.

#### 5c.2 Tutoring and other activities related to Master MeGMI MIP

September 2010 – Now	Responsible of the Management of Project work for Master MeGMI. In charge of tutoring the student in the choosing of the topic for the development of the Project work required in the scope of Master MeGMI.
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3-January-2018



September 2007 – now	<p>Tutor of project works in the scope of Master MeGMI. Master executive in Gestione della Manutenzione Industriale (Executive Master in Industrial Maintenance Management), delivered by MIP Politecnico di Milano and Università degli Studi di Bergamo. Titles of the Project Works that were supervised:</p> <p>“Definition of a maintenance plan for the UHP furnace in a steelmaking company”  “Analysis of maintenance information system for a steelmaking company”  “Definition of a set of maintenance KPI for cement industry”  “Analysis of failure impact on railway network for planning of spare parts warehouse”  “Applicability study of a diagnostic system on an industrial compressor”  “Reliability analysis on a steel rolling mill”  “Implementation of an intelligent monitoring system to an electric furnace”  “Revision of maintenance plan and standardization of operation procedures in a steel making company”  “Evaluation of reliability parameters and analysis of spare parts management for a railway infrastructure”  “Proposal of a maintenance re-organization for the introduction of maintenance engineering division in a medium-small steel making company”  “Prompt identification of water leakage and control of the process in a steel-making furnace”  “Maintenance processes analysis and re-definition of the lubrication plan in a steel-making company”  “Analysis of the spare parts of a cement production facility”  “RCM (Reliability Centered Maintenance) Methodology applied to a bottling line”</p>
Spring 2010	<p>Tutor of the activity of Fabian Gamboa, student of the Master MAM (Master in Asset Management) – Universidad Tecnica Federico Santa Maria, Valparaiso - Chile, during his visit to Trenitalia repair centre located in Foligno (PG), Italy. This activity is in the scope of the exchange program between MAM and MIP-MeGMI (Master Executive in Gestione della Manutenzione Industriale).</p>
Autumn 2007	<p>Tutor of the activity of Sebastian Yanez, student of the Master MAM (Master in Asset Management) – Universidad Tecnica Federico Santa Maria, Valparaiso - Chile, during his visit to selected Italian companies. This activity is in the scope of the exchange program between MAM and MIP-MeGMI (Master Executive in Gestione della Manutenzione Industriale).</p>
Autumn 2007	<p>Tutor of the project work: “FMECA methodology applied to a fleet of vehicles”. Project supervised in the scope of Master MIP - Bosch – Manutenzione e service impianti industriali e flotte e veicoli.</p>

## 6. Administration tasks

### a. Organizational activity for Politecnico di Milano - DIG

Since 2015	Support to the Politecnico di Milano OPEN DAY activity for Polo di Cremona.
Since 2015	Promoter of the Career Day at Polo di Cremona, coordinating the organization of the event with Career Service staff.
2011 - now	Technical and scientific responsible of the Laboratorio di Gestione della Manutenzione (LGM) – Department of Management, Economics and Industrial Engineering In the scope of LGM. The laboratory has a key role for promoting and developing research activity in the scope of Condition Based Maintenance. The laboratory supports research activity for development of funded projects through the activity of research fellows and create the environment for the development of Master of Science thesis for student from the courses of Management Engineering, Mechanical Engineering, Automation Engineering.
2013-now	Responsible of the research activity called “Maintenance Living Lab” developed in collaboration with MTM-Plamai.com for the diffusion of Maintenance Engineering approach in SMEs.

3-January-2018

2015	Participation to the group that will be in charge of promoting the Bachelor courses of the Cremona Campus among possible new students in the high schools.
31 <sup>st</sup> March 2012	Support to the Politecnico di Milano OPEN DAY desk of Department of Management, Economics and Industrial Engineering.
9th April 2011	Support to the Politecnico di Milano OPEN DAY desk of Department of Management, Economics and Industrial Engineering.
June – December 2010	Support to the activities related with the visiting period of Dr. Christos Emmanouilidis: organization of meetings and research activities between him and personnel of DIG and companies, interesting for his research activity.
December 2010 – February 2011	Support to the activities related with the visiting period of Prof. Danubia Espindola: organization of meetings and research activities between her and personnel of DIG and companies, interesting for her research activity.
June 2010	Support to the activities related with the visiting period of Prof. Vittal Prabhu, visiting the Department of Management, Economics and Industrial Engineering.

### **b. Coordination or direction of training programs**

(the information provided hereafter has been already mentioned in the previous sections)

2013 now	- Luca Fumagalli is vice-director of Master Megmi (Master Executive in Gestione della Manutenzione Industriale – Executive Master on Industrial Maintenance Management) delivered by MIP – School of Management – Politecnico di Milano and SdM – School of Management Università degli Studi di Bergamo ( <a href="http://www.mip.polimi.it/megmi">http://www.mip.polimi.it/megmi</a> ).
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### **c. Organization of Conferences**

#### **6c.1 Organization of national workshops/conferences**

October 26th, 2011 Fiere, Verona (Italy)	Verona	Support in the organization of the Workshop – “Strategie e leve per migliorare il servizio manutenzione tramite il condition monitoring” organized in the scope of MCM (Mostra Convegno Internazionale della Manutenzione Industriale) – Chairman of the Round Table with industrial experts at the end of the workshop.
Spring 2007, 2008, 2009 – Università degli Studi di Bergamo, Dalmine, Italy.		Organization of periodic events of METIM seminar (Metodi e Tecnologie per il miglioramento della competitività aziendale attraverso l’Ingegneria di Manutenzione), organized in the scope of master megmi (MIP).

#### **6c.2 Organization of international workshops/conferences**

The following are the conferences for which a support in the organization have been provided. The support given range from organizational issues to scientific activities related with program definition and paper reviews.

October 2010, Cernobbio (Como), Italy		Collaboration in the organization of APMS 2010 the International conference on Advances in Production Management Systems. Cernobbio, Italy.
October 2009 – Bergamo, Italy		Programme chair of the conference MITIP 2009, Bergamo, Italy, organized by Politecnico di Milano and Università degli Studi di Bergamo.
February 2009 , Aprica (Sondrio), Italy		Collaboration in the organization of Maintenance Session in the PALM Winter Doctoral Workshop
July 2007, Stezzano (Bergamo), Italy		Collaboration in the organization of PLM 07 Conference - 4th edition of the International Conference on Product Lifecycle Management (PLM07)

## **7. Collaboration with industry, institutions and other external bodies**

### **a. Area of expertise**

3-January-2018



The area of expertise concerns the topics of Maintenance Management and ICT for manufacturing as consequences of the research activity previously described in the CV. Main focus of developed and ongoing industrial projects is maintenance management, with specific concern to: spare parts management, maintenance engineering and condition based maintenance.

#### **b. Projects/activities conducted**

(some of the information provided hereafter has been already mentioned in the previous sections)

- Research activity in collaboration with RFI (Rete Ferroviaria Italiana) about the analysis of applicability of reliability analysis approaches to an industrial case related with railway infrastructure through the use of R-MES software (software for maintenance engineering).
- Research activity called “Maintenance Living Lab” developed in collaboration with MTM-Plamai.com and OME Metallurgica Erbesse srl for the implementation of Maintenance Engineering approach and supporting information system in OME Metallurgica Erbesse srl.
- Research activity in collaboration with ABB for the development of the specification for the deployment of a tool for spare parts management. The tool is nowadays called *ISPO (Inventory Spare Parts Optimizazion)*.
- Research activity in collaboration with Tenaris Dalmine Spa and Intellimech Consortium for the development of the specification for the deployment of a tool for Condition Based Maintenance on a UHP furnace.

#### **c. Management, coordination and sales of projects**

Participation to the activity of Osservatorio TeSeM ([www.tesem.net](http://www.tesem.net)) (Observatory TeSeM). The Observatory is funded by private funding. Research activity of TeSeM has been already previously mentioned in the CV. Luca Fumagalli has been involved in the coordination of TeSeM Observatory activity as well as in the meeting dedicated to market and sales the results of TeSeM in order to get funding from companies through their partnership in the observatory activity.

#### **d. Member of Committees, Boards, Advisory Boards or similar in public or private institutions**

(the information provided hereafter has been already mentioned in the previous sections)

- Member of the Scientific committee of IBIS Lab - INFORMATION-BASED INDUSTRIAL SERVICES – Università di Firenze, Dipartimento di Energetica (<http://www.ibis.unifi.it>)
- Research collaborator in the group Sistemas Inteligentes de Mantenimiento, University of Seville, Escuela Superior de Ingenieros, Spain (<http://taylor.us.es/sim/index.php>)
- Contact person for Italy for the activities related with PALM – workshop, series of workshops organized on the topic of Product and Asset Lifecycle Management.

### **8. List of publications**

#### **a. International indexed journals**

- 1) Mohammed, W.M., Ramis Ferrer, B., Iarovyi, S., Negri, E., Fumagalli, L., Lobov, A., Martinez Lastra, J.L., Generic platform for manufacturing execution system functions in knowledge-driven manufacturing systems, (2017) International Journal of Computer Integrated Manufacturing, pp. 1-13. Article in Press. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85034843058&doi=10.1080%2f0951192X.2017.1407874&partnerID=40&md5=683d3d13cec3f9597d8f0b4c95a7a3ff> DOI: 10.1080/0951192X.2017.1407874
- 2) Negri, E., Perotti, S., Fumagalli, L., Marchet, G., Garetti, M., Modelling internal logistics systems through ontologies,(2017) Computers in Industry, 88, pp. 19-34. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85016147678&doi=10.1016%2fj.compind.2017.03.004&partnerID=40&md5=89b56c778623a1bc44314d848d1395f5> DOI: 10.1016/j.compind.2017.03.004
- 3) Negri, E., Fumagalli, L., Garetti, M., Tanca, L., Requirements and languages for the semantic representation of manufacturing systems,(2016) Computers in Industry, 81, pp. 55-66. <https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84973293567&doi=10.1016%2fj.compind.2015.10.009&partnerID=40&md5=cd15c9f9c1d2435a76eed81e6cf05014 DOI: 10.1016/j.compind.2015.10.009

- 4) Negri, E., Fumagalli, L., Garetti, M., Tanca L. (2015) Requirements and languages for the semantic representation of manufacturing systems. Computers in Industry. DOI: 10.1016/j.compind.2015.10.009
- 5) Colace C., Fumagalli L., Pala S., Macchi M., Matarazzo N. R., & Rondi M. (2015). Implementation of a condition monitoring system on an electric arc furnace through a risk-based methodology. Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability, 1748006X15576441.
- 6) Holgado, Maria; Macchi, Marco; Fumagalli, Luca (2015). Maintenance Business Model: a concept for driving performance improvement. DOI:10.1504/IJSEAM.2015.070623. pp.159-176. In International Journal of Strategic Engineering Asset Management - ISSN:1759-9733 vol. 2 (2)
- 7) Macchi, M., Crespo Márquez, A., Holgado, M., Fumagalli, L., Barberá Martínez, L. 2014. Value driven engineering of E-maintenance platforms. Journal of Manufacturing Technology Management. Journal of Manufacturing Technology Management, Volume 25 (4) 2014, art. no.17110941, pp. 568-598. Scopus code: 2-s2.0-84901021572.
- 8) Roda, I., Macchi, M., Fumagalli, L., Viveros, P. 2014. A review of multi-criteria classification of spare parts: From literature analysis to industrial evidences. Journal of Manufacturing Technology Management, Volume 25 (4) 2014, art. no.17110939, pp. 528-549. Scopus code: 2-s2.0-84901060634.
- 9) Macchi M., Fumagalli L. (2013). A maintenance maturity assessment method for the manufacturing industry, Journal of Quality in Maintenance Engineering, 19 (3), art. no.17094789, pp. 295-315. ISSN 1355-2511. Scopus code: 2-s2.0-84883409414.
- 10) Espíndola D., Fumagalli L., Garetti M., Pereira C.E., Botelho S., Ventura Henriques R., A model-based approach for data integration to improve maintenance management by mixed reality, Computers in Industry, Volume 64 (4), 2013, pp. 376-391. Scopus code: 2-s2.0-84876065938. CODICE ISI: WOS:000318465100003.
- 11) Macchi M., Kristjanpoller F., Garetti M., Arata A., Fumagalli L. (2012). Introducing buffer inventories in the RBD analysis of process production systems RELIABILITY ENGINEERING & SYSTEM SAFETY, 104, ISSN:0951-8320, pp. 84- 95. Scopus code: 2-s2.0-84861422630. CODICE ISI: WOS:000306032500008.
- 12) Macchi M., Garetti M., Centrone D., Fumagalli L., Pavirani G.P. (2012). Maintenance management of railway infrastructures based on reliability analysis RELIABILITY ENGINEERING & SYSTEM SAFETY, 104, ISSN:0951-8320, pp. 71- 83. Scopus code: 2-s2.0-84861401376. CODICE ISI: WOS:000306032500007.

#### **b. International books**

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#### **c. Chapters in international books**

- 1) Garetti, M., Negri, E., Fumagalli, L. (2015) "Ontology-Based Modeling of Production and Logistics Systems" in Strzelczak, S., Balda, P., Garetti, M., Lobov, A. (eds.) "Open Knowledge-driven Manufacturing & Logistics - The eScop Approach" ISBN 987-83-7814-440-3
- 2) L. Fumagalli, E. Negri, Maturity Assessment and Change Management for Manufacturing Innovation Ecosystems (2014). Section of the book: Manufacturing Service Ecosystem, Achievements of the European 7th Framework Programme FoF-ICT Project MSEE: Manufacturing Service Ecosystem (Grant No. 284860), Eds.: Stefan Wiesner, Claudia Guglielmina, Sergio Gusmeroli, Guy Doumeingts. ISBN 978-3-95886-003-2.
- 3) M. Macchi, L. Fumagalli, R. Pinto, S. Cavalieri, (2011). A decision making framework for managing maintenance spare parts in case of lumpy demand: an action research in the avionics sector. Chapter of the book: Nezh Altay and Lewis A. Litteral in Service Parts Management: Demand Forecasting and Inventory Control. Springer-Verlag, London, ISBN 9780857290380.
- 4) M. Macchi, L. Fumagalli, B. Iung, Stock management of emergency spare parts for production lines in a multi site context (2011); pag.549-572 in: Maintenance Modelling and Applications, John Andrews, Christophe Berenguer, Lisa Jackson, ISBN 978-82-515-0316-7.

#### **d. Other international journals**

- 1) Garetti, M., Fumagalli, L., Negri, E. (2015). Role of ontologies for CPS implementation in manufacturing. Management and Production Engineering Review 6 (4), December 2015, pp. 26-32

3-January-2018



- 2) E. Jantunen, M. Macchi, L. Fumagalli, F. Di Leone (2010). Financial analysis of e-Maintenance, MAINTWORLD, (pp. 38- 43), Issue 2.

#### e. International conferences

[in brackets is indicated when the paper is indexed by Scopus]

- 1) Negri, E., Fumagalli, L., Macchi, M., A Review of the Roles of Digital Twin in CPS-based Production Systems, (2017) Procedia Manufacturing, 11, pp. 939-948. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029833606&doi=10.1016%2fj.promfg.2017.07.198&partnerID=40&md5=8050bdfad87d2c836e7157bd0070c227> DOI: 10.1016/j.promfg.2017.07.198
- 2) Macchi, M., Roda, I., Fumagalli, L., On the Advancement of Maintenance Management Towards Smart Maintenance in Manufacturing,(2017) IFIP Advances in Information and Communication Technology, 513, pp. 383-390. [https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029367895&doi=10.1007%2f978-3-319-669236\\_45&partnerID=40&md5=7c2a9a3a6e3b383606381a5eddf9d64a](https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029367895&doi=10.1007%2f978-3-319-669236_45&partnerID=40&md5=7c2a9a3a6e3b383606381a5eddf9d64a) DOI: 10.1007/978-3-319-66923-6\_45
- 3) Fumagalli, L., Macchi, M., Roda, I., Giacomini, A., Cross-correlation method for orchestration of preventive maintenance interventions,(2017) IFIP Advances in Information and Communication Technology, 513, pp. 84-91. [https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029357452&doi=10.1007%2f978-3-319-669236\\_10&partnerID=40&md5=ff92c398648d629f6ff7207398d6cb78](https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029357452&doi=10.1007%2f978-3-319-669236_10&partnerID=40&md5=ff92c398648d629f6ff7207398d6cb78) DOI: 10.1007/978-3-319-66923-6\_10
- 4) Fumagalli, L., Macchi, M., An E-maintenance platform based on SOA and smart sensors, (2016) 14th IMEKO TC10 Workshop on Technical Diagnostics 2016: New Perspectives in Measurements, Tools and Techniques for Systems Reliability, Maintainability and Safety, pp. 96-101. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84985916017&partnerID=40&md5=42aace4d68723269a0aade2a8913b99c>
- 5) Turrin, S., Marelli, M., Fumagalli, L., A performance model for medium voltage equipment,(2016) 14th IMEKO TC10 Workshop on Technical Diagnostics 2016: New Perspectives in Measurements, Tools and Techniques for Systems Reliability, Maintainability and Safety, pp. 102-106. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84985947191&partnerID=40&md5=9b8b8ade434667cb971ccc6c27d1c124>
- 6) Holgado, M., Macchi, M., Fumagalli, L., Value-in-use of e-maintenance in service provision: survey analysis and future research agenda,(2016) IFAC-PapersOnLine, 49 (28), pp. 138-143. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85006409723&doi=10.1016%2fj.ifacol.2016.11.024&partnerID=40&md5=c4641ad75d8c68543217f3e283e666ab> DOI: 10.1016/j.ifacol.2016.11.024
- 7) Campos, J., Sharma, P., Jantunen, E., Baglee, D., Fumagalli, L., The Challenges of Cybersecurity Frameworks to Protect Data Required for the Development of Advanced Maintenance,(2016) Procedia CIRP, 47, pp. 222-227. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978782626&doi=10.1016%2fj.procir.2016.03.059&partnerID=40&md5=94928685801949777de6a65882dbabbb> DOI: 10.1016/j.procir.2016.03.059
- 8) Fumagalli, L., Macchi, M., Colace, C., Rondi, M., Alfieri, A., A Smart Maintenance tool for a safe Electric Arc Furnace,(2016) IFAC-PapersOnLine, 49 (31), pp. 19-24. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85012911617&doi=10.1016%2fj.ifacol.2016.12.155&partnerID=40&md5=9445216f90c3de9920308584e99341dd> DOI: 10.1016/j.ifacol.2016.12.155
- 9) Garetti, M., Macchi, M., Pozzetti, A., Fumagalli, L., Negri, E., Synchro-push: A new production control paradigm,(2016) Proceedings of the Summer School Francesco Turco, 13-15-September-2016, pp. 150-155. Cited 2 times. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85005978302&partnerID=40&md5=e143d163702dc0c686501a5370345d2d>
- 10) Fumagalli, L., Macchi, M., Pozzetti, A., Taisch, M., Tavola, G., Terzi, S., New methodology for smart manufacturing research and education: The lab approach,(2016) Proceedings of the Summer School Francesco Turco, 13-15-September-2016, pp. 42-47. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85006043680&partnerID=40&md5=cdf822a3149be33e775b070189bad19d>

- 11) E. Negri, L. Fumagalli, M. Macchi, M. Garetti (2015). Ontology for Service-Based Control of Production Systems. Proceedings of APMS international conference, Tokyo, Japan, 7th-9th September 2015. ISBN 978-3-319-22759-7, pp. 484-492. **[Scopus]**
- 12) E. Negri, L. Fumagalli, M. Garetti (2015). Approach for the use of ontologies for KPI calculation in the manufacturing domain. Proceedings of the XX Summer School Francesco Turco, 2015. Naples, Italy, 16th-18th September 2015. ISBN: 978-88-908649-0-2 ISSN: 2283-8996.
- 13) Fumagalli, L., Roda, I., Scotton, L., Macchi, M., Refosco, G. (2015). Experimental comparison of spare parts inventory models through simulation: The case of a railway line. Proceedings of the Summer School Francesco Turco, (Industrial Systems Engineering), pp. 67- 72.
- 14) Campos Jaime, Jantunen Erkki, Baglee David, Gilabert Eduardo, Fumagalli Luca, Emmanouilidis Christos (2015), The use of mobile technologies and their economic benefits in maintenance. Proceedings of the 10th World Congress on Engineering Asset Management (WCEAM 2015) Koskinen, Kari T., et al., eds. Springer, 2016. Pp. 113 – 119.
- 15) Natalia Trapani, Marco Macchi, Luca Fumagalli, Risk Driven Engineering of Prognostics and Health Management Systems in Manufacturing, in Proceedings of 15th IFAC/IEEE/IFIP/IFORS Symposium Information Control Problems in Manufacturing (INCOM 2015), Ottawa, Canada, 11-13 May 2015.
- 16) Luca Fumagalli, Marco Macchi, Integrating Maintenance within the Production Process through a Flexible E-Maintenance Platform, in Proceedings of 15th IFAC/IEEE/IFIP/IFORS Symposium Information Control Problems in Manufacturing (INCOM 2015), Ottawa, Canada, 11-13 May 2015.
- 17) Negri E., Fumagalli L., Garetti M., Tanca L. (2014). A review of semantic languages for the conceptual modelling of the manufacturing domain. In: XIX Summer School "F. Turco" "A Challenge for the future: the role of industrial engineering in a global sustainable economy". Senigallia, Italy, September 09-12, 2014.
- 18) Macchi, M., Pozzetti, A., Fumagalli, L. (2014), Industrial Implementation of Models for Joint Production and Maintenance Planning. IFIP Advances in Information and Communication Technology, 438 (PART 1), pp. 499-506. APMS conference 2014, September 2014, Ajaccio, France. **[Scopus]**
- 19) Fumagalli, L., Pala, S., Garetti, M., Negri, E. (2014), Ontology-Based Modeling of Manufacturing and Logistics Systems for a New MES Architecture. IFIP Advances in Information and Communication Technology, 438 (PART 1), pp. 192-200. APMS conference 2014, September 2014, Ajaccio, France. **[Scopus]**
- 20) Macchi, M., Pozzetti, A., Fumagalli, L., Exploring the Integration of Maintenance with Production Management in SMEs (2014). IFIP Advances in Information and Communication Technology, 438 (PART 1), pp. 507-514. **[Scopus]**
- 21) Fumagalli, L., Pala, S., Macchi, M. (2014). A web service-based toolbox for machine diagnostics based on statistical analysis. Proceedings of The 3rd International Workshop and Congress on eMaintenance, 17-18 June 2014, Lulea, Sweden.
- 22) Pala, S., Fumagalli, L., Garetti, M., Macchi, M. (2014). Smart Sensors for Condition Based Maintenance: a Test Case in the Manufacturing Industry. EUROPEAN CONFERENCE OF THE PROGNOSTICS AND HEALTH MANAGEMENT SOCIETY 2014, Nantes (France) July 2014.
- 23) Jantunen E., Arnaiz A., Baglee D., Fumagalli L. (2014). Identification of Wear Statistics to Determine the Need for a New Approach to Maintenance. Euromaintenance 2014, 5-8 May 2014, Helsinki, Finland.
- 24) Maria Holgado, Marco Macchi, Luca Fumagalli, Driving performance improvement through the concept of Maintenance Business Model. In proceedings of conference MPMM 2013, Maintenance Performance Measurement and Management, 12th-13th September 2013 Lappeenranta, Finland.
- 25) Colace, C., Fumagalli, L., Pala, S., Macchi, M., Matarazzo, N. R., Rondi, M. (2013). An Intelligent Maintenance System to Improve Safety of Operations of an Electric Furnace in the Steel Making Industry. CHEMICAL ENGINEERING, 33, pp. 397-402. **[Scopus]**
- 26) Garetti M., Fumagalli L., Lobov A., Martinez Lastra J. L. (2013). Open automation of manufacturing systems through integration of ontology and web services. In proceedings of 7th IFAC Conference on Manufacturing Modelling, Management, and Control International Federation of Automatic Control. Saint Petersburg, Russia. June 19-21, 2013. **[Scopus]**
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