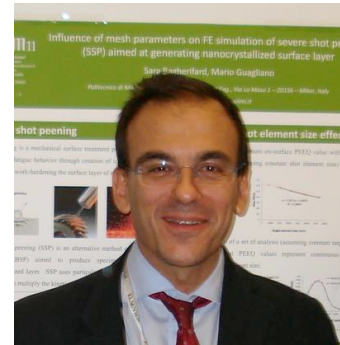


MARIO GUAGLIANO

CURRICULUM VITAE



PERSONAL INFORMATION

Prof. Mario Guagliano

Place of Birth: Pavia (Italy)

Date of Birth: October 18th, 1963

Position: Full Professor of Machine Design and Strength of Materials

Organization: Politecnico di Milano, Department of Mechanical Engineering

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EDUCATION AND EMPLOYMENT

- 1988: Laurea (MSc) in Mechanical Engineering, Politecnico di Milano
- 1989-1991: Research Associate, Department of Mechanical Engineering, Politecnico di Milano
- 1991-1993: Technical Assistant, Department of Mechanical Engineering, Politecnico di Milano
- 1993-2001: Assistant Professor, Department of Mechanical Engineering, Politecnico di Milano
- 2001-2016: Associate Professor, Department of Mechanical Engineering, Politecnico di Milano
- 2016-today: Full Professor, Department of Mechanical Engineering, Politecnico di Milano

HONORS

- 2017: Doctor Honoris Causa, University of Zilina, SK.

ACADEMIC APPOINTMENTS

- 2017-today, Rector's Delegate for International Relations with Middle East countries.
- 2016-today, Delegate for Double Degree Programs for Mechanical Engineering at the School of Industrial and Information Engineering, Politecnico di Milano.
- 2012-today, Member of the PhD Faculty in Mechanical Engineering, Politecnico di Milano
- 2006-2016, Delegate for International Relationships and Student Exchange Mobility Programs for Mechanical Engineering at the School of Industrial and Information Engineering, Politecnico di Milano.
- 2006-today Responsible of the study plan "Advanced Mechanical Design", MSc degree in Mechanical Engineering.

RESEARCH AND PROFESSIONAL ACTIVITIES

My scientific and research activity has been developed in several research areas, and carried out both with experimental and analytical/numerical approaches. The main focus is on surface modification techniques aimed at obtaining superior properties, on the development of experimental and numerical methodologies for determining the fracture and damage parameters and, more recently, on the application of the acoustic emission technique for damage assessment and monitoring of composite materials.

My research has been developed within Italian and International research project programmes and in cooperation with public and private companies and with universities, with a special focus on the research of solutions suitable for implementation in practical applications.

Interests and areas of expertise:

1. Surface treatments to improve the mechanical properties of materials and mechanical elements

My interest for surface treatments aimed at improving the mechanical behaviour of machine and structural elements dates back to my thesis, where I developed one of the first numerical model (validated by experimental measurements) for the assessment of the residual stresses induced by deep rolling in low-alloyed steels.

Then I moved to shot peening, a much more general and common treatment, very complex from a physical point of view, since it involves different sources of non-linearities that make difficult the development of a model for assessing the relation between the treatment parameters and the effect on the treated surface, in terms of residual stresses, surface work hardening and possible improvement of the fatigue behaviour.

In particular, I developed the first numerical approach to relate the Almen Intensity to the residual stress field: this paper remains one of the most important in the field with more than 100 citations according to the database Scopus. Besides, I studied how to relate the residual stress field and the surface work hardening with the resulting fatigue strength, even by considering previous heat treatments: the results were included in papers published in peer reviewed ISI journals and have got a considerable number of citations.

The attention was also focused on other treatments, especially deep rolling and nitriding, and numerical models have been developed to assess the evolution of the surface state and the microstructure due to these treatments.

More recently the research in this field has been steered toward the development of shot peening-based treatments able to induce severe plastic deformation, with the aim to get not only residual stress and work hardening, but also grain refinement down to a size of about 100nm. The parameters of such a treatment strongly differ from usual shot peening as well as the final effects are quite different. This is the reason why a new name was defined for this treatment, that is severe shot peening, SSP. After a first period where the aim of the investigations were to characterize the characteristics of the treated layer of material, in a second step the research was oriented to the development of a hybrid (numerical/theoretical) model able to relate the treatment parameters to the microstructure characteristics of the treated surface (dimension of grains, residual stresses, roughness): the comparison with experimental results allowed to validate the model, at least for the materials investigated.

The subsequent fatigue tests carried out on SSPed smooth and notched specimens confirmed the ability of the treatment to get superior mechanical properties.

Recently a research activity aimed at understanding the effect of SSP on the biological properties (cell and bacterial adhesion) of the treated surfaces of bio-med materials (stainless steel AISI 316 and Ti so far): the results confirmed an modified activity also in field, especially as regards the ability to reduce the bacterial adhesion and the associated risk of infections.

The activities related to this research line were developed within public research grants (TEPS, by Regione Lombardia and Fondazione Cariplo) and also with contractual research with private companies (especially with PeenService Srl, SME sited in Bologna (Italy) and Winoa Group (France)).

The activity in this area has been done (and is continuing) also in cooperation with the University of Cambridge (UK), Prof. Atina Markaki, with the Massachusetts Institute of Technology MIT, USA, Prof. Chris Schuh, and with the North-Eastern University, Boston, MA (USA), Prof. Thomas Webster.

References of the results obtained are visible on the following papers in the list on the next pages (Peer-Reviewed Journals): [1, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 18, 21, 23, 25, 26, 27, 30, 31, 32, 37, 38, 42, 44, 45, 47, 48, 50, 52, 59, 65, 67, 71, 72, 73, 75, 76, 77].

2. Gas dynamic cold spray process with emphasis on modelling and on characterization of the cold sprayed surfaces.

Since 2009 I started a research line on cold Gas Dynamic Spray, or simply Cold Spray (CS), a surface modification technology aimed at obtaining surface coating by dynamic deposition. That is to say that the coating is obtained by shooting a flow of powder against a metallic substrate with a supersonic speed, superior to a minimum value (generally called critical velocity) and minor of an upper value (called erosion velocity). This velocity range depends on the involved materials (powder and substrate) and on the process conditions (temperature, pressure). With respect of traditional thermal coating process, in CS the energy to get the adhesion of the powder is dynamic and not thermal: this has a series of advantages (reduced energy demand, possible application to temperature sensitive materials, thick layers,..) that makes CS a very promising technology in many industrial fields.

In this research area my interest has been initially focussed in defining a simple model able to assess the critical velocity of a wide range of materials and at studying the properties of the cold sprayed coatings.

In the first case a FE based model was developed, in cooperation with the Dept. of Mathematics of Politecnico di Milano, able to post-process the FE results of an analysis simulating the impact of one or more particles on a substrate to detect the condition of adiabatic shear instability and, thus, the critical velocity. The model was later simplified and made easier to use for a general use. The analyses, once compared with experimental data, resulted in much more accurate results with respect of the other existing models.

As regards the characterization of the cold sprayed coatings, the attention was focussed on microstructure, residual stresses and on fatigue: the papers published on these subject were among the first one in the international context.

In particular, the residual stress analyses were oriented on Ti and Al alloys and permitted to accurately evaluate the expected residual stresses due to cold spray, while the fatigue tests allowed to evidence the importance of the interface strength on the fatigue behaviour of the coated parts and, at the same time, the potential highly beneficial effects of cold spray on fatigue.

Another aspect that was investigated is effect of surface pre or post treatments on the properties of cold spray coatings: in particular, it was found that shot peening as pre-treatment has an highly beneficial effect on the coating adhesion and on fatigue strength.

At present the activity in this research area is concentrated in cold spray as possible repair technique in aeronautic: this activity is done within the EC FP7 funded project CORSAIR (2013-2106), with 13 academic and industrial partners.

The activity on cold spray has been done in cooperation with Veneto NanoTech (Italy), University of Ottawa (Canada), prof. Bert Jodoin, University of Waterloo (Canada), prof. Amid Jahed, Technical University of Brno (CZ), prof. Jan Cizek.

References of the results obtained are visible on the following papers in the list on the next pages (Peer-Reviewed Journals): [9, 16, 17, 24, 24, 29, 35, 36, 39, 43].

3. Experimental and numerical methodologies for determining the fracture and damage parameters of materials and the failure condition of mechanical elements

A part of my research activity has been dedicated, from the beginning and sometime with intersections with the previously described activities, to the development of experimental and numerical methods for determining the damage and fracture mechanics parameters.

As regards the experimental activity a great effort has been devoted to the photoelastic technique, with original and internationally recognized approaches to calculate the stress intensity factors (K_I , K_{II} and K_{III}) of internal cracks in Hertz-contact problems. The results have been used for defining a method for assessing the critical conditions of cracked railway wheels.

At the same time a hybrid approach based on the analytical calculation of the displacements in the uncracked body in the zone surrounding the crack (but far enough to be not influenced by the presence of the crack); these displacements are used as boundary condition of a FE model of small portion of the wheel including the crack. The model was then generalized on collaboration with the University of Cagliari (Italy), prof. Massimiliano Pau, for not Hertzian pressure distributions obtained by experimental ultrasonic measurements. Another generalization of the model regards its application to gear tooth.

This research has been supported with the project “Methods for the assessment of structural integrity of railway wheels (2004-2006), funded in the “Research Projects of National Interest” program, by the Italian Minister for Scientific and Technological Research and Education (MIUR), which I was National Coordinator of.

In the same research line also the importance of the T-stress term of the elastic stress field in a cracked part loaded in mixed mode conditions has been investigated.

As regards the numerical fracture mechanics studies, it is underlined the development of an original method to design appropriate 3D mesh for calculating very accurately (much more than the usual meshing techniques) the stress intensity factors under mixed mode conditions of elliptical cracks, even with axes ratio quite high.

Also composite materials were part of the research line related to fracture and damage mechanics; in particular, in cooperation with the University of Parma, prof. Enrica Riva, one of the first meso-scale damage models of woven carbon fibre composites was developed.

Finally, also some failure analysis of mechanical components funded in the framework of contractual research with companies were part of the activity related to the failure analysis of mechanical components, like crankshafts, shafts, ball valves.

At present an activity aimed at modelling the damage occurring in the cold spray coatings under static and cyclic loads and based on the technique of the cohesive elements is on course even if no results have been published so far.

References of the results obtained are visible on the following papers in the list on the next pages (Peer-Reviewed Journals): [22, 33, 34, 40, 41, 49, 51, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 66, 68, 69, 70, 74, 78, 79].

4. Detection of damage in composite materials by the Acoustic Emission technique

Composite materials are more and more used in many applications, first of all in aeronautics, where the new generation airplanes use composites in a more and more relevant percentage.

Even if composite materials have many advantages with respect of more traditional metal alloys, first of all the favourable ratio weight/strength, they present also some possible problems that must be correctly addressed. In particular, the definition of a traditional fail-safe strategy for composites is hard to be introduced, due to the peculiarity of the damage mechanisms in this kind of materials. This makes more interesting the possibility to develop experimental techniques able to continuing monitoring the state of the material and alarm in a dangerous situation. My research activity in this field was focussed on acoustic emission and its ability to conveniently detect damage in composites under static and fatigue loading. In particular the main results from this activity are the development of an original approach based neural-network based classification of AE signals from tensile tests. A self-organizing map is trained with AE data from one specimen; then the map is clustered with the k-means algorithm.

The results shows that the classifier built from a smooth specimen was able to correctly classify other specimens with the same and with a different material layup, and is capable of recognizing signals from notched specimens, thus providing interesting and encouraging indications in view of the application on real structures.

This research has been conducted within the project “Analysis and monitoring of damage in composite materials” (AMDACOMP) (2007-2009), funded in the “Research Projects of National Interest” program, by the Italian Minister for Scientific and Technological Research and Education (MIUR), thanks to the company ETS Sistemi Industriali srl, which funded both a PhD scholarship and a contractual research grant (2010-2013), and in cooperation with the University of Cardiff (UK).

References of the results obtained are visible on the following papers in the list on the next pages (Peer-Reviewed Journals): [2, 5, 19, 28, 46].

Publications:

Co-Author of 2 books, Co-Editor of 1 book, author/co-author of 79 papers published in peer-reviewed journals with Impact Factor, co-author of 5 book chapters, co-editor of one book, co-author of 125 papers published in international and national conference proceedings, co-author of 1 patent.

Bibliometric data (SCOPUS Database, 21/07/2018)

Citations: 2337 in 1437 documents (1800 without self-citations)

h-index: 29 (25 without self-citations)

International collaborations:

Regarding the international collaborations for research activities, below are listed the main collaborations developed in the last 5 years and/or in progress. All these cooperation were developed by means of common funds (see also the paragraph *Coordination of research projects, research funding and technology transfer*) and/or by supervising visiting PhD students or Professors in the respective Universities (see also the paragraph *Host for visitors from foreign Institutions*). The subjects have been described in detail in the paragraph *Interests and areas of expertise* of this CV:

- Department of Materials Science and Engineering, MIT, Boston, MA (USA), Professor Christopher A Schuh – Characterization of nanocrystalline surfaces obtained by severe shot peening. (2014-2016)
- Department of Materials Science and Engineering, MIT, Boston, MA (USA), Professor Ming Dao – Bioactive Coating for Accelerated Bone Regeneration: A Pathway to Enhance Implant Fixation (2013-2015)
- Department of Mechanical Engineering, MIT, Boston, MA (USA), Professor Ken Kamrin – Exploring and Modelling Interacting Cracks: Toward a Crack Network Model. (2013-2016)
- University of Cardiff (UK), Professor Rhys Pullin – Detection of damage in composite materials by the Acoustic Emission Technique (2013-2015)
- Technical University of Brno (CZ) – Professor Libot Pantelajev – Analysis and characterization of ultrafine Mg alloys obtained by Equi Channel Angular Process (ECAP). (2014-2016)
- Department of Material Science, University of Zilina (SK), Professor Otakar Bokuvka – Effect of shot peening and severe shot peening on the fatigue properties of metals and welded joints.(2008-today)
- Department of Materials and Metallurgical Engineering, University of Oviedo (Spain), Professor Inés Fernandez Pariente – Effect of Shot Peening on the mechanical properties of Severely Shot Peened Materials. (2007-today)

Coordination of research projects and research funding

The research activities described above have led to the development of several European, National and Regional projects, of which I am a project manager/coordinator and/or head of research units, listed below:

- Local responsible for the Mechanical Engineering Department of the project “Sistema di alimentazione elettrica supplementare per veicoli elettrici” (Supplementary Energy Supply System for Electric Vehicles) (SATELLITI), funded by Regione Lombardia (2017-2019).
- Coordinator of the research project “Cold Spray Radical Solutions for Aeronautic Improved Repairs” (CORSAIR, www.corsair-project.eu), funded in the EU FP7 program (call FP7-AAT-2013-RTD-1), contract number n. 605207 (2013-2016).
- Responsible of the Politecnico di Milano Unit of the Research Project “Bioactive Coating for Accelerated Bone Regeneration: A Pathway to Enhance Implant Fixation Nonlinear Piezoelectric Energy Harvesting” funded in the MIT-POLIMI Progetto Rocca Project, Seed Funds, Coordinators: MIT: Ming Dao - Polimi: Mario Guagliano, 2015-2016.
- Responsible of the Politecnico di Milano Unit of the Research Project “Exploring and Modelling Interacting Cracks: Toward a Crack Network Model,” funded in the MIT-POLIMI Progetto Rocca Project, Seed Funds, Coordinators: MIT: Ken Kamrin - Polimi: Mario Guagliano, 2015-2016.
- Local responsible for the Mechanical Engineering Department of the project “Twin Engine Pack System” (TEPS), funded by Regione Lombardia and Fondazione Cariplo (2014-2016).

- Responsible of the Research Unit Politecnico di Milano of the research project “Innovative materials for eco friendly floors”, funded in the program MD 2008 Regione Lombardia (n.6735, 05/03/2008) (2008-2010).
- Coordinator of the Local Research Unit at Politecnico di Milano for the project “Analysis and monitoring of damage in composite materials” (AMDACOMP) (2007-2009), funded in the “Research Projects of National Interest” program (PRIN), by the Italian Minister for Scientific and Technological Research and Education (MIUR).
- National coordinator and responsible of the Local Research Unit at Politecnico di Milano for the project “Methods for the assessment of structural integrity of railway wheels (2004-2006), funded in the “Research Projects of National Interest” program (PRIN), by the Italian Minister for Scientific and Technological Research and Education (MIUR).
- Responsible of many research projects granted by private and public companies (2010-today), among them: Brembo, CAMERON VALVES Italy, CIR Ambiente, ENI, ETS Sistemi Industriali, Ferrari Automotive, Metal Improvement Italy, Patrini sas, Peenservice Srl, Sicam BOSCH, SPX Seital, Tenaris Dalmine, Trasfor ABB, Wheelabrazor Allevard, WINOA.

Invited Plenary Talks

- “Fatigue strength of cold sprayed coated materials” *XVIII International Colloquium on Mechanical Fatigue of Metals, Gijon, September 5-7, 2016.*
- “Characterization of nanocrystalline surfaces obtained by severe impact treatment” *XIV Congreso Nacional de Materiales, Gijon (Spain), June 8-10 2016.*
- “Metal surfaces obtained by severe Characterization and applications of nanocrystalline impact treatment” *NANOSMAT ASLA 2015, Meliksab University, Kayseri (Turkey), March 24th-26th, 2015*
- “Cold spray for new repair solutions”, *European Cold Spray Symposium (EUROSS), Paris (France), 26 May 2014 at MINES ParisTech.*
- “Surface coating by cold spray: properties, problems and future applications”, *International Conference on Experimental Solid Mechanics and Dynamics (X-Mech 2014), Iran University of Science and Technology (IUST), Teheran (Iran), 18-19 Feb 2014.*
- “Nanostructured surfaces obtained by severe impact treatments: properties, problems and applications”, *3rd International Conference on Engineering Against Failure”(ICEAF 3), Kos (Greece), 27-29 June 2013.*
- “Fatigue behaviour improvement by surface treatments: some recent experiences and critical assessment of the results." *International Conference on Experimental Solid Mechanics and Dynamics" (X-Mech 2012), Iran University of Science and Technology (IUST), Teheran (Iran), 6-8 March 2012.*
- “Recent experiences, perspectives and problems in shot peening, a mechanical treatment to improve the fatigue behavior of structural parts”, *XXVIII Encuentro del Grupo Español de Fractura (GEF), Gijon (Spain) , 6-8 April 2011.*

Positions held in foreign institution

- Cycle of lectures on “Mechanical properties and fracture behavior of materials”, Master “Materials Science and Technology”, University of Oviedo (Spain) – 2010.
- Cycle of lectures at the Summer School of Fatigue of Materials at the University of Zilina (SK), area “Increasing fatigue lifetime by deformation strengthening the surface layer”- 2010.

- Cycle of lectures on “Mechanical properties and fracture behavior of materials”, Master “Materials Science and Technology”, University of Oviedo (Spain) – 2009.
- Cycle of lectures at the Summer School of Fatigue of Materials at the University of Zilina (SK), area “Increasing fatigue lifetime by deformation strengthening the surface layer”- 2008.
- Cycle of lectures at the Summer School of Fatigue of Materials at the University of Zilina (SK), area “Increasing fatigue lifetime by deformation strengthening the surface layer”- 2004.
- Cycle of lectures at the Summer School of Fatigue of Materials at the University of Zilina (SK), area “Increasing fatigue lifetime by deformation strengthening the surface layer”- 2002.

Editorial Boards

- International Journal of Structural Integrity (Emerald Group Publishing Limited – ISSN: 1757-9864) (2017-present).
- Acta Materialia Turcica (2017-present)
- Journal of Multiscale Modelling (World Scientific – ISSN: 1756-9737) (2016-present).
- Structural Damage and Health Monitoring (Tech Science Press – ISSN: 1930-2983) (2005-present).
- Materials Engineering (Materialove Inzinierstvo – ISSN: 1335-0803 (2011-present).
- Il Progettista Industriale (Tecniche Nuove, in Italian, ISSN 0392-4823), Editor-in-chief (2008-present).
- Frattura e Integrità Strutturale (Fracture and Structural Integrity) (Gruppo Italiano Frattura – ISSN: 1971-8993 (2008-2014).
- Guest Editor of special issues of the journals: *Engineering Fracture Mechanics*, *Surface and Coatings Technology*, *International Journal of Fatigue*, *International Journal of Structural Integrity*.

Organization of Conferences

- Chairman of the 30th International Conference on Surface Modification Technologies (SMT30), Milan, June 29-July 1, 2016.
- Co-Chairman of the 17th International Colloquium on Mechanical Fatigue of Metals, Verbania (Italy), 25-27 June 2014.
- Chairman of the 11th International Conference on the Mechanical Behaviour of Materials (ICM11), Como, 5-9 June 2011.
- Co-Chairman of the 2th International Conference on Fracture and Damage Mechanics, Milano, 18-20 September 2001.

Other organizational activities

- Director of the Continuing Education course “Fatigue Design of Machine and Structural elements”, Politecnico di Milano (2004-present, on annual base).
- Member of the Organizing Committee of the XIX National IGF Conference (Italian Group of Fracture), Milano, 2-4 July 2007.
- Member of the Organizing Committee of the XXXIV National AIAS Conference (Italian Association of Stress Analysis), Milano, 14-17 September 2005.

Scientific committees:

- Member of the International Scientific Committee For Shot Peening (ISCSP) (2017-today).
- Member of the International Scientific Committee of the Danubia Adria Symposium, DAS, (2015-today).

- Vice-president of the International Conference on the Mechanical Behavior of Materials (ICM), (2011-2015).
- Member of the Advisory Board of the project Promo-Air, co-funded by the European Commission Research area: AAT.2013.7-3. FP7-AAT-2013-RTD-1 (2012-2015).
- Member of the Board of Directors of the European Aeronautic Science Network (EASN) association as Treasurer (2010-present)
- Member of the International Scientific Committee of the Conference: Fracture and Damage of Materials (FDM) (1999-present)
- Member of the International Scientific Committee of the 16th Colloquium on the Mechanical Fatigue of Metals (ICMFM16) (2012)
- Member of the International Scientific Committee on Experimental Solid Mechanics and Dynamics (X-Mech 2012 and XMech 2014) (2012-2014).
- Member of the International Scientific Committee of the 10th International Conference on the Mechanical Behaviour of Materials (ICM10), (2007).
- Member of the International Scientific Committee of the 3rd International Conference on Engineering Against Failure (ICEAF3), (2013, 2015).
- Member of the Scientific Committee of the Italian Group of Fracture (IGF), (2007-2009).

Reviewer for the following international journals:

- International Journal of Fatigue
- Wear
- Acta Materialia
- Fatigue & Fracture of Engineering Materials & Structures
- International Journal of Structural Integrity
- International Journal of Fatigue
- Surface and Coatings Technology
- Applied Surface Science
- Engineering Fracture Mechanics
- Structural Health and Damage Monitoring
- International Journal of Structural Integrity
- Measurements
- Composite Structures
- Theoretical and Applied Fracture Mechanics
- Measurements
- Materialove Inzinierstvo
- Materials and Design
- Frattura e Integrità Strutturale
- Scripta Materialia
- Composite, Part B
- Materials & Engineering
- Advances in Engineering Software
- Composite Structures
- Engineering Failure Analysis
- Mechanics Research Communications
- Materials Science & Engineering A
- Journal of Materials Processing Technology
- Tribology International

- Materials Characterization

Scientific evaluator and projects reviewer:

- Reviewer of the European Council Research, Call 2016 – Advanced Grants. (2016).
- Member of the Committee for Evaluation of the Research and Professional Activities of the Institutes of the Czech Academy of Sciences (CAS) for 2010-2014. (2015).
- Reviewer of the European Council Research, Call 2015 – Consolidator Grants. (2015).
- Reviewer of proposal presented in the “Research Projects of National Interest” program (PRIN), Italian Ministry of Education, University and Research (MIUR) – 2007-2010.

Professional appointments

- Appointed Technical Consultant for the Courts of Milano, Piacenza and Pavia in different legal actions.
- Appointed Technical Consultant for the Chamber of Commerce of Milano in different legal civil actions.

TEACHING AND SUPERVISING ACTIVITIES

Teaching

My teaching activities, from the beginning to date, has been focused on courses of the scientific area of Machine Design, Finite Elements Method and Strength of Materials, held at the School of Industrial and Information Engineering and at the School of Industrial Design of Politecnico di Milano, in the Degree programmes of Mechanical Engineering and Design & Engineering, some of them in English language.

My teaching has been developed at Politecnico di Milano since 2001, when I have got the Associate Professor position, as described here:

Bachelor and master degree:

- Politecnico di Milano: Final Lab for development of Industrial Products (MSc in Design & Engineering) (2013-present)
- Politecnico di Milano: Il Metodo degli elementi finiti per lo sviluppo dei prodotti industriali (FEM for developing industrial products) (MSc in Design & Engineering) (2011-present)
- Politecnico di Milano: FEM Lab (BSc in Mechanical Engineering) (teacher, 2010-2013)
- Politecnico di Milano: Lab for development of Industrial Products (MSc in Design & Engineering) (2007-2010)
- Politecnico di Milano: Fondamenti di Progettazione Meccanica (Fundamentals of Mechanical Design) (MSc in Design & Engineering) (2008-2010)
- Politecnico di Milano: Progettazione: Metodi, strumenti e applicazioni (Mechanical Design: Methods, Tools and Applications) (MSc in Mechanical Engineering) (2004-present).
- University of Pavia: Costruzione di Macchine (Machine Design) (BSc in Mechanical Engineering) (2003—2008, 2010-2013)
- Politecnico di Milano: Progettazione di Sistemi Meccanici (Design of Mechanical Systems) (BSc in Mechanical Engineering) (1997-2006).
- Politecnico di Milano: Costruzione di Macchine (Machine Design) (BSc in Mechanical Engineering) (1997-2008)

- Politecnico di Milano: Costruzione di Macchine (Machine Design) (MSc in Mechanical Engineering) (teaching assistant 1990-2001)

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PhD programme:

- Academic year 2015/2016: Finite Elements in Engineering Design (5 credits)
- Academic year 2013/2014: Finite Elements in engineering Design (5 credits)
- Academic year 2012/2013: Finite Elements in Engineering Design (5 credits)

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Continuum Learning and Education Courses:

- Director and teacher in the course "Fatigue design of mechanical and structural elements", held annually from 1999 to 2017 years at Politecnico di Milano.
- Teacher in the course "Fatigue Design of Welded Structures", held annually from 2001 to 2011 at Politecnico di Milano;
- Teacher in the course "Structural analysis of pressure vessel systems", held annually from 1999 to 2009 at Politecnico di Milano;

Supervisor of PhD students:

- Stefano Monti, 2016-2018 thesis title “
- Marco Rossoni, 2016-2018
- Klara Petrackova, 2015-2017 thesis title “Development of damage models for cold sprayed coatings”.
- Giorgia Galimberti, 2014-2017 thesis title “From metallic powder to the object: how manufacturing production can be modified”.
- Atieh Moridi, 2012-2014 thesis title “Cold spray coating: process evaluation and combination with other surface treatments
- Davide Crivelli, 2011-2013 thesis title “Structural health monitoring with acoustic emission and neural networks”
- Mostafa Hassani , 2011-2013 thesis title “Surface nanocrystallization by severe shot peening; from concept to application”
- Ramin Ghelichi, 2009-2011, thesis title “A new compound surface treatment aimed to obtain nano-structured coating”
- Sara Bagherifard, 2008-2010, thesis title “Severe shot peening to obtain nanostructured surfaces: process development and mechanical characterization of materials “

Supervisor of MSc students:

- Supervisor of more than 100 MSc theses.

Host supervisor for visitors from foreign Institutions

- Michal Jambor (PhD Student, topic: surface treatments), University of Zilina, Slovakia, 2017.
- Daniel Kajánek (PhD Student, topic: surface treatments), University of Zilina, Slovakia, 2017.
- Yu Liu (Associate Professor, topic: severe shot peening), Jilin University, China, 2016.
- Xiaohui Zhao (Associate Professor, topic: severe shot peening), Jilin University, China, 2016.
- Asghar Heydari (PhD student, topic: severe shot peening) Tarbiat Modarres University, Iran, 2016.

- Lebbal Habib (PhD student, topic: severe shot peening), Université des Sciences et de la Technologie Mohamed Boudiaf Oran, Algerie, 2015
- Mohammad Chaib (PhD student, topic: severe shot peening), University of Sidi Bel Abbes, Algerie, 2015.
- Jan Lago (PhD student, topic: severe shot peening). Univeristy of Zilina, Slovakia, 2015, 2016.
- Libor Pantelejev (Associate Professor, topic: ECAP and Mg alloys), Technical University of Brno, Czech Republic, 2014.
- Roman Stepanek, (PhD, topic: severe plastic deformation), Technical University of Brno, Czech Republic, 2014.
- Pavel Pokorny (PhD student, topic: cold spray coating), University of Brno, Czech Republic, 2014.
- Denisa Zavodska (MSc student, topic: fatigue behaviour of shot peened and polished low alloy steels). Univeristy of Zilina, Slovakia, 2014, 2015, 2016, 2017.
- Shaker Meguid (Full Professor, topic: FE and multiscale simulations), University of Toronto, 2013.
- Bohuslav Masa (PhD student, topic: cold spray coating), University of Brno, Czech Republic, 2013.
- Libor Trsko (PhD student, topic: severe shot peening). Univeristy of Zilina, Slovakia, 2013, 2014.
- Katarina Mikova (PhD student, topic: severe shot peening). Univeristy of Zilina, Slovakia, 2012, 2013.
- Victor Llaneza Menéndez (PhD student, topic: residual stress measurements with the X-ray diffraction). Univeristy of Oviedo, Spain, 2010.
- Inés Fernandez Pariente (Associate Professor, topic: shot peening and severe shot peening for improving the fatigue behaviour of metals), Univeristy of Oviedo, Spain, 2007, 2008, 2009.
- Mahnaz Zakeri (PhD student, topic: photoelasticity for fracture mechanics analysis under mixed mode conditions), Iranian University of Science and Technology, Theran, Iran, 2006.

Invited member in Committees for PhD final defences in foreign Institutions

- Elvira Segurado Frutos “Mejora del comportamiento a fatiga del acero AISI 4340 mediante la combinación de tratamientos superficiales” Supervisor: Prof. Javjer Belcunze, University of Oviedo, Gijon, January 12th 2017.
- Davide Verdi “Effect of the temperature on the microstructure and the mechanical properties of pasr cladded Ni-based metal matrix composite coatings” Superviors: Prof. Pedro Poza, Universidad Rey Juan Carlos, Madrid (Spain), December 11th, 2015.
- Libor Trsko “Gigacycle Fatigue Properties of Materials with Nanostructured Surface Obtained by Shot Peening, Supervisor PProf. Otakar Bokuvka, U iveristy of Zilina, Zilina, August 26th, 2014.
- Ana Teresa Vielma Mendoza, “Optimization of shot peening process on a low alloy steel”, Supervisor: Prof. Javjer Belcunze, University of Oviedo, Gijon, October 21st 2013.
- Pedro Perez Sanjurjo "Influencia del proceso de shot peening en el comportamiento a fatiga de un acero inoxidable duplex", Supervisor: M.C. Rodriguez Gonzalez, I. Penuelas Sanchez, University of Oviedo, Gijon, July 21st 2012.
- Hong Yan Miao "Numerical and Theoretical study of shot peening and stress peen forming process", Supervisor Prof. M. Lévesque, Ecole Polytechnique de Montréal, Montréal June 1th, 2010.

- Mahnaz Zakeri "On the presence of T-Stress in mode II crack problems: numerical analysis and experimental investigation", Supervisor Prof. M.R. Ayatollahi, Iranian University of Science and Technology, Teheran August 31st, 2008.

Invited seminars in foreign Institutions

- "Cold Spray, a new technology for innovative coatings", University of Oviedo, Campus Gijon, February 26th, 2015.
- "Cold spray for improved repairs in aeronautics", Technical Univeristy of Brno (Czech Republic), March 13th, 2014.
- "Nanostructured surfaces obtained by severe impact treatments: properties, problems and applications", Tarbiat Modares University, Theran (Iran), February 19th, 2014.
- "Shot peening for obtaining nano structured metal surfaces: a predictive model and experimental results", Ecole Polytechnique Montréal, Montréal (Canada), May 31th 2010.
- "Numerical and Experimental Analysis of Internal Cracks in Railway Wheels", Iranian University of Science and Technology, Teheran (Iran) August 30th, 2008.

Milan, February 15th, 2018

Mario Guagliano

LIST OF PUBLICATIONS

Authored books

1. O. Bokuvka, G. Nicoletto, M. Guagliano, L. Kunz, P. Palcek, F. Novy, M. Chapulova (2014). *Fatigue of Materials at Low and High Frequency Loads*. Published by University of Zilina (SK). ISBN: 9788055408576.
2. P. Davoli, L. Vergani, S. Beretta, M. Guagliano, S. Baragetti (2007). *Costruzione di Macchine 1*. p. 1-280, MILANO:McGraw-Hill, ISBN: 8838663807.

Book Chapters

1. S. Bagherifard, I. Fernandez-Pariente, R. Ghelichi and M. Guagliano (2015) Severe Shot Peening to Obtain Nanostructured Surfaces: Process and Properties of the Treated Surfaces. In: *Handbook of Mechanical Nanostructuring, Vol. 1* (Edited by M. Aliofkhazraei). Wiley & Sons, Inc., ISBN: 9783527335060. Chapter 13, pp. 29-323.
2. C. Morel, M. Guagliano (2015). Surface Nanostructuring through a Technique Derived from Shot-Peening: Recent Advances. In: *Handbook of Mechanical Nanostructuring, Vol. 2* (Edited by M. Aliofkhazraei). Wiley & Sons, Inc., ISBN: 9783527335060. Chapter 30, pp. 701-715.
3. M. Guagliano (2012). Severe shot Peening to obtain nanostructured surfaces: processes, properties and applications. In: *SHOT PEENING - A Dynamic Application and Its Future (3rd Edition)* (Edited by S. Baker). MFN Publishing House. ISBN: 9783033035911, pp. 220-243.
4. M. Guagliano, L. Vergani (2010). Fracture Mechanics approach and Propagation of Cracks. In: N. Bachschmid, P. Pennacchi, E. Tanzi “Cracked Rotors- A Survey on Static and Dynamic Behaviour Including Modelling and Diagnosis”, Springer, Berlin. ISBN: 9783642014840..
5. M. Guagliano (2009). Application of shot peening in the automotive industry.. In: *SHOT PEENING - A Dynamic Application and Its Future (2nd Edition)* (Edited by S. Baker). MFN Publishing House. ISBN: 9783033020269, pp. 220-239.

Edited books

1. M. Guagliano, M.H. Aliabadi (Eds.) (2004) *Fracture and Damage of Composites*. Series: *Advances in Fracture Mechanics*, Vol. 8. WIT Press.

Papers published in Peer-Reviewed Journals

1. S. Bagherifard, D.J. Hickey, S. Fintová, F. Pastorek, I. Fernandez-Pariente, M. Bandini, T.J. Webster, M. Guagliano (2018) Effects of nanofeatures induced by severe shot peening (SSP) on mechanical, corrosion and cytocompatibility properties of magnesium alloy AZ31. *ACTA BIOMATERIALIA*, Vol. 66, pp. 93–108.
2. K. Petráčková, J. Kondás, M. Guagliano (2018) Fixing a hole (with cold spray), *INTERNATIONAL JOURNAL OF FATIGUE*, Vol. 110, pp. 144-152.
3. S. Bagherifard, G. Roscioli, M.V. Zuccoli, J. Kondás, M. Guagliano (2017) Cold Spray Deposition of Freestanding Inconel Samples and Comparative Analysis with Selective Laser Melting. *JOURNAL OF THERMAL SPRAY TECHNOLOGY*, Vol. 26, pp. 517-526. SSN:1059-9630.

4. K. Petráčková, J. Kondás, M. Guagliano (2017) Mechanical Performance of Cold-Sprayed A357 Aluminum Alloy Coatings for Repair and Additive Manufacturing. JOURNAL OF THERMAL SPRAY TECHNOLOGY, in press.
5. J. Lago, M. Guagliano, O. Bokuvka, L. Trško, O. Ridky, F. Novy, D. Závodská, Improvement of fatigue endurance of welded S355 J2 structural steel by severe shot peening. SURFACE ENGINEERING, Vol. 33, pp. 715-720. ISSN: 0267-0844.
6. L. Trško, M. Guagliano, O. Bokuvka, , F. Novy, D. , M. Jambor, Z. Florková (2017). Influence of Severe Shot Peening on the Surface State and Ultra-High-Cycle Fatigue Behavior of an AW 7075 Aluminum Alloy. JOURNAL OF MATERIALS ENGINEERING AND PERFORMANCE. Vol. 26, pp. 2784-2797. ISSN:1059-9495.
7. A. Heydari Astarace, R. Miresmaeili, S. Bagherifard, M. Guagliano, M. Aliofkhazraei “ Incorporating the principles of shot peening for a better understanding of surface mechanical attrition treatment (SMAT) by simulations and experiments. MATERIALS AND DESIGN, Vol. 116, pp.365-373, ISSN: 0264-1275.
8. J. González, S. Bagherifard, M. Guagliano, I. Fernández Pariente (2017) Influence of different shot peening treatments on surface state and fatigue behaviour of Al 6063 alloy. ENGINEERING FRACTURE MECHANICS, in press.
9. A. Ghasemi, S.M. Hassani-Gangaraj, A.H. Mahmoudi, G.H.Farrahi, M. Guagliano (2016). Shot peening coverage effect on residual stress profile by FE random impact analysis. SURFACE ENGINEERING, Vol. 32, pp. 861-870, ISSN: 0267-0844.
10. S. Bagherifard, S. Slawik, I. Fernandez-Pariente, Mucklich, M. Guagliano (2016). Nanoscale surface modification of AISI 316L stainless steel by severe shot peening. MATERIALS AND DESIGN, vol. 102, pp. 68-77. ISSN: 0264-1275.
11. D. Zavadzka, M. Guagliano, O. Bokuvka, L. Trsko (2016). Effect of Shot Peening on the Fatigue Properties of 40NiCrMo7 steel. MANUFACTURING TECHNOLOGY, vol. 16, pp. 295-299. ISSN: 1213-2489.
12. J. Lago, M. Guagliano, F. Novy, O. Bokuvka (2016). Influence of Laser Shock Peening Surface treatment on Fatigue Endurance of Welded Joints from S355 Structural Steel. MANUFACTURING TECHNOLOGY, Vol. 16, pp. 154-159. ISSN: 1213-2489.
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14. A. Moridi, S.M. Hassani-Gangaraj, S. Vezzù, L. Trisko, M. Guagliano (2015). Fatigue behavior of cold spray coatings: The effect of conventional and severe shot peening as pre/post-treatment. SURFACE AND COATINGS TECHNOLOGY, Vol. 283, pp. 247-254. ISSN: 0257-8972.
15. S.M. Hassani-Gangaraj, A. Moridi, M. Guagliano (2015). Critical review of corrosion protection by cold spray coatings”. SURFACE ENGINEERING, Vol. 31, pp. 803-815, ISSN: 0267-0844.
16. S.M. Hassani-Gangaraj, M. Carboni, M. Guagliano (2015). Finite element approach toward an advanced understanding of deep rolling induced residual stresses, and an application to railway axles, MATERIALS & DESIGN, 83, pp. 689-703, ISSN: 0261-3069.
17. D. Crivelli, M. Guagliano, M. Eaton, K. Holford, R. Pullin (2015). Localisation and identification of fatigue matrix cracking and delamination in a carbon fibre panel by acoustic emission, COMPOSITES, Part B: ENGINEERING, 74, pp. 1-12, ISSN: 1359-8368

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22. M. Boniardi, M. Guagliano, A. Casaroli, R. Andreotti, F. Ballerini (2014). Large Forgings: Microstructural Evolution and Residual Stresses Due to Quenching Treatments - A Combined Numerical and Experimental Approach. *MATERIALS PERFORMANCE AND CHARACTERIZATION (ASTM International)*, vol. 3, No. 4, DOI: 10.1520/MPC20140005, ISSN: 2379-1365.
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