

MARCO GIGLIO

CURRICULUM VITAE



PERSONAL INFORMATION

Prof. Marco Giglio

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EDUCATION AND EMPLOYMENT

- 1988: Laurea summa cum laude in Mechanical Engineering, Politecnico di Milano
- 1989-1990: Research Associate, Department of Mechanical Engineering, Politecnico di Milano
- 1990-2002: Assistant Professor, Department of Mechanical Engineering, Politecnico di Milano
- 2002-2014: Associate Professor, Department of Mechanical Engineering, Politecnico di Milano
- 2014-today: Full Professor, Department of Mechanical Engineering, Politecnico di Milano

RESEARCH AND PROFESSIONAL ACTIVITIES

My scientific and research work has been developed in several research areas, and carried out with both experimental and analytical/numerical approaches relating to the structural integrity assessment of mechanical components and systems with applications in the field of aerospace, energy production and mechanical behaviour of metallic materials. My research has been developed within Italian and European research project programmes and in cooperation between public and private companies with universities in addressing original scientific and innovative research with particular focus on the technology transfer of the results obtained.

Interests and areas of expertise:

1. Assessment of ballistic impact damage on components and structures, in mechanical and aeronautical fields

Aerospace structures, in specific operating conditions, must be able to tolerate damage resulting from impacts at high velocity (ballistic tolerance). A reliable modelling technique of the impact conditions and the accumulated damage can allow evaluation, with appropriate criteria, of the residual strength of the structure limiting the experimental effort and uncertainties. Starting from these premises, scientific activities have been carried out exploiting applicative tasks. The ballistic damage on a transmission shaft of the tail rotor transmission of a helicopter has been evaluated, both by means of an experimental approach (including residual strength determination) and modelling methodologies. This study has also led to the original elaboration of a methodology for the automatic re-meshing in Finite Element models aimed at efficiently simulating the behaviour of growing cracks. Investigation into the behaviour of metallic and composite ballistic protections has been also carried out, with special regarding the damage behaviour of the materials involved. This research led to the development of a research project in collaboration with the Italian Ministry of Defence (Development of a predictive model for the ballistic impact - SUMO), concluded recently, as well as the productive international collaboration described below (Structural impact Laboratory SimLab, Norway). On February 2017, a new project in collaboration with the Italian Ministry of Defence (Development of an analytical, numerical and experimental methodology for design of ballistic multilayer protections – SUMO 2) started to continue the previous research. An analytical/numerical model has recently been developed for low speed impacts and validated experimentally, the model enables the evaluation of damage occurring on an aircraft fuselage sandwich panel due to an external impact, with a focus on the mechanical behaviour of sandwich components.

2. Structural integrity evaluation on aircraft and mechanical structures with the use of Structural Health Monitoring methodologies.

In recent years I have developed a research line related to the monitoring and prognosis of damage within the fuselage of aeronautical structures, in particular helicopters. The most innovative element introduced into the research regards the use of numerical models of the damaged structure for training and activation of the monitoring and prognostic algorithms, based on advanced models of neural networks (Virtual Neural Networks). The first result of this research was the activation in 2009 of a European research project within the European Defence Agency framework, of which I was the coordinator. The aim of the project was to evaluate the structural integrity of a helicopter fuselage through an optimized sensor network (Helicopter fuselage crack monitoring and prognosis through on-board sensor network - HECTOR), the project was concluded in 2011.

After the HECTOR project, which was completed with very positive feedback and evaluations, a new European follow-on project of which I was the coordinator was launched, (Aircraft fuselage crack monitoring system and prognosis through expert on-board sensor network - ASTYANAX), aimed at the application of the diagnostic/prognostic tool on a helicopter to assess the damage coming from impact (harsh landing) and from the operating loads (fatigue spectrum loads). The Kick Off meeting of the project took place on December 13, 2012 in Brussels (Belgium).

A further EDA collaboration project called SAMAS is currently being to start (SHM application to Unmanned Aircraft Systems). SAMAS aims at the application of SHM methodologies on flying

unmanned systems with composite material structure, with the purpose of monitoring the applied loads and to evaluate the damage from external impacts.

This research topic activated the considerable number of ongoing international collaborations described below.

3. Calibration of constitutive laws for metallic materials.

An experimental/numerical approach has been carried out in order to investigate the constitutive laws of metallic materials: special attention has been devoted to the description of the plastic behaviour and ductile failure criteria. The application of failure criteria for ductile metals with both phenomenological approach and CDM (Continuum Damage Mechanics) has been specifically investigated. Starting from methods existing in literature, an experimental approach, based on multiaxial testing supported by high fidelity numerical models, has been developed and this novel methodology has been applied to advanced multiphase alloys such as Ti6Al4V alloy. This method has then been used (along with classical approaches of multiaxial fatigue and fracture computational mechanics) to simulate the failure of complex components with interesting results in the application field of aerospace components. The work is continuing with a productive collaboration with the Massachusetts Institute of Technology MIT, USA, Prof. Tom Wierzbicki, author of one of the most widely used models of ductile failure of metals.

4. Expected fatigue life and crack propagation behaviour on aircraft structures and components.

The structural components used in helicopter systems are frequently subjected to multiaxial stress states with variable amplitude, due to the effect of the applied external load spectra. The areas of possible fatigue failure are often close to joints and connections (rivets, expansion bushings, welding). Within this line of research, a deep analysis has been performed to investigate the fatigue crack propagation on the folding beams of a middle class helicopter, using the numerical values obtained from the Finite Element analysis with particular focus on the simulation of the joints involved, and the results obtained have been compared with the available experimental data with a good agreement. Certain aspects related to the multiaxial fatigue criteria strength were analysed in the research, leading to a critical comparison between the different methods available in literature, and developing a novel methodology to evaluate the effect of medium stress on a multiaxial variable state of stress. In addition, a comparative study between the data obtained by the TSA method (thermoelastic stress analysis) and the FE method, with regard to a hub of a helicopter subjected to multiaxial state of stress, was carried out.

5. Fatigue design with defects.

The presence of microstructural or accidental defects on mechanical components requires an approach aimed at assessing the behaviour of the structure in the presence of “short cracks” useful to evaluate the condition of microcracks nucleation and their propagation under load spectra. The proposed approach has been applied to helicopter components made in aluminium alloy, also developing a new testing methodology for the determination of the fatigue limit of the material in the presence of defects. The approach identified allowed us to increase the reliability on the prediction of life expectancy, specifically on aeronautical and mechanical components. Recent advances in the method are under development, considering also the effect of residual stresses coming from shot peening treatments.

Publications:

Author and co-author of 67 publications in peer reviewed international journals and book chapters and more than 100 publications in international and national conference proceedings.

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:

- Structural Impact Laboratory (SimLab), NTNU, Trondheim, Norway (Prof. Tore Borvik, Professor Magnus Langseth) - Study of the residual strength of submarine pipelines subjected to impacts and optimization of multilayer ballistic protection.

Between 18th August 2008 – 11th February 2009, in view of the activities of the research group working under my supervision, Ph.D. Andrea Manes was a visiting scientist at the SimLab where he conducted research mainly based on the investigation of the mechanical behaviour of metallic materials for subsea pipelines (oil & gas): hardening, ductile failure, anisotropy.

We subsequently activated a joint activity of collaborative research on the criteria for optimization of multilayer ballistic protection. The program includes the study of numerical and experimental evaluation of ballistic multilayer protection Aluminium-Steel, with an innovative approach for the optimization of protection.

- Massachusetts Institute of Technology (MIT), Impact and Crashworthiness Lab, Boston, Massachusetts, USA (Prof. Tom Wierzbicki) - Study on the application of complex mechanical components of advanced phenomenological failure criteria for ductile metals.

Research currently is under development with the extensive application of advanced failure criteria also including the effects of the third invariant of the stress tensor (Lode angle) in the calculation model for the evaluation of damage in metals. Within this collaboration, we were invited for a presentation at MIT Workshop On Experimental And Computational Fracture Mechanics, MIT, 6-7 October 2011, Boston, USA (A. Manes and M. Giglio, " Prediction of 3 -D Fracture on the example of the Helicopter Rotor Hub"), as well as sending Ph.D. A. Gilioli in quality of Visiting Student to join the project Rocca (exchange students/researchers POLIMI-MIT), from September 2012 to March 2013.

- Sheffield University, Mechanical Engineering Dept., Dynamic Research Group (Prof. K. Worden, Prof. G. Manson) - Model-based signal processing for damage diagnosis through Lamb wave sensor networks.

This collaboration, which is still in progress, is aimed at the use of piezoelectric sensors for monitoring damage on aircraft panels, with the definition of numerical models useful for the training and the virtual simulation of the damage. As part of the collaboration Ph.D. Dr. C. Sbarufatti was invited as visiting student during the period 22 April 2012 – 22 August 2012.

- Stiftelsen SINTEF, Dept. For Optical Measurement Systems and Data Analysis, Trondheim, Norway (Dr. Mats Carlin) - Definition of sensing networks for monitoring and prognostics of helicopter components (HECTOR).

In the framework of the European research project HECTOR, new approaches have been developed in collaboration with SINTEF for the optimization of wireless sensor networks based on fibre optics, aimed at the development of new methodologies for Structural Health Monitoring. The collaboration took place from 2009-2011, we are now working together to submit a new European project

considering the extension of the algorithm to take composite materials into account (embedded sensors).

- AGH University of Science and Technology, Department of Telecommunications, Krakow, Poland (Prof. Andrzej Pach) - Identification of communication systems between sensor networks and maintenance operating systems (HECTOR).

In the framework of the European research project HECTOR, new methodologies for data transmission have been developed on the basis of the sensor network used for structural health monitoring, with the development of algorithms based on neural networks for signal processing.

The collaboration took place from 2009-2011, and this relationship is in progress incorporated in the new European project ASTYANAX, which the participation of AGH as a partner.

Research funding and technology transfer

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:

- European project EDA A- 0779 -RT -GC HECTOR "Helicopter Fuselage Crack Monitoring and prognosis through on-board sensor", coordinator prof. M. Giglio, 2009-2011, full project budget Euro 2,226,675;
- European Project EDA No. B 1288 GP ESM2 ASTYANAX "Aircraft fuselage crack Monitoring System and Prognosis through eXpert on-board sensor networks", coordinator prof. M. Giglio, 2012-2015, full project budget Euro 4,894,091;
- European Project EDA No. B 1190 GP ESM2 ISSA "Integrated Simulation of Non-Linear Aero-Structural Phenomena Arising On Combat Aircraft In Transonic Flight", head of research unit prof. Giglio, 2013-2016, full project budget Euro 2,600,000;
- Project Lombardy Region, Italy, Ministry of Education, University and Research "DE -LIGHT DE- Icing System for LIGHT -Intermediate Class Helicopters", responsible for project units prof. M. Giglio, 2012-2014, full project budget EUR 988,344;
- Project of the Italian Ministry of Defence in the National Plan of Military Research "SUMO Development of a predictive model for the ballistic impact", project leader prof. M. Giglio, 2011-2012, full project budget EUR 874,910.
- Project of the Italian Ministry of Defence in the National Plan of Military Research "SUMO Development of an analytical, numerical and experimental methodology for design of multilayer ballistic protections", project leader prof. M. Giglio, 2017-2018, full project budget EUR 1,175,189.

In addition to the collaborative projects previously listed, the technology transfer activities permitted to activate various research contracts with companies operating in different sectors of technology (total amount of POLIMI budget involved in the last nine years about 5,000,000 Euro).

Scientific committees:

- AIAS (Italian Association for Stress Analysis), from 1988 to date
- IGF (Italian Group of Fracture), from 1994 to 2007
- Member of Ph.D Scientific Committee in Mechanical Engineering (from 2008 to date) and Rotary Wing Aircraft (from 2009 to 2011), Politecnico di Milano

- Member of ACARE Italy (Advisory Council for Aviation Research and Innovation in Europe) designed by CRUI (Conference of Italian University Rectors), from 2010 to date
- Member of American Helicopter Society, from 2015

Reviewer for the following international journals:

- International Journal of Fatigue
- Wear
- International Journal of Impact Engineering
- Acta Mechanica
- Fatigue & Fracture of Engineering Materials & Structures
- Ocean Engineering
- International Journal of Computer Applications in Technology
- Engineering Computations
- International Journal of Structural Integrity
- Meccanica

Scientific projects reviewer:

- Reviewer of regional and national projects for the Ministry of Education, University and Research (MIUR) in Aerospace and Mechanical Engineering (PRIN calls 2010-2011 and FIRB 2012, Promotion in the Convergence Regions new High Technology Districts and / or new combinations Public -Private (PON "R & C" 2007-2013)
- Expert inserted in the Register of the Ministry of Education, University and Research (MIUR) - DD n. 79/2010/Ric), defined after international public selection in the year 2011

Scientific Awards:

Best Paper Award of the PHM Society, assigned during the 3rd European Conference of the Prognostics and Health Management Society, Bilbao, Spain, 7 July 2016, for the paper "Optimal tuning of particle filtering random noise for monotonic degradation processes", Matteo Corbetta, Claudio Sbarufatti, Marco Giglio

Nomination for best paper award at ESREL 2013 conference with paper "Fatigue Crack Growth under random spectrum loading: Markov Chain Monte Carlo methods for parameter identification", Matteo Corbetta, Claudio Sbarufatti, Andrea Manes, Marco Giglio, (paper ended as the third one).

Research group direction:

Team leader of the SIGMALab research group (Structure Impact Monitoring prognosis Material LABoratory, Homepage: <http://people.mecc.polimi.it/giglio/>), composed by academic people, graduate students and temporary researchers, involved in scientific activity in different research areas, by means of international collaborations and projects.

Teaching activities:

My teaching activities, from the beginning to date, has been focused on courses of the scientific area of Machine Design and Strength of Materials, held at the School of Industrial and Information

Engineering of Politecnico di Milano, in the Degree programmes of Aeronautical and Mechanical Engineering, some of them in English language.

Over the past five academic years my teaching has been developed at Politecnico di Milano as following described:

Bachelor and master degree:

- Academic year 2012/2013: Machine Design 1 (10 credits, 170 students), Machine Design for Aerospace (6 credits, 45 students).
- Academic year 2013/2014: Machine Design 1 (10 credits, 177 students), Machine Design for Aerospace (6 credits, 50 students), Design of Metallic Structures (6 credits, 6 students).
- Academic year 2014/2015: Machine Design 1 (10 credits, 170 students), Machine Design for Aerospace (6 credits, 70 students).
- Academic year 2015/2016: Machine Design 2 (10 credits, 150 students), Machine Design for Aerospace (6 credits, 50 students).
- Academic year 2016/2017: Machine Design 2 (10 credits, 180 students), Machine Design for Aerospace (6 credits, 40 students).

PhD programme:

- Academic year 2009/2010: Fatigue Design of Helicopters (5 credits)
- Academic year 2010/2011: Advanced Fatigue Design (5 credits)
- Academic year 2011/2012: Fatigue Design of Helicopters (5 credits)

Postgraduate courses:

- Lessons in Postgraduate Course in Rotary Wing Technologies, from 2010 to 2015

Continuum Learning and Education Courses:

- Director and teacher in the course "Structural analysis of pressure vessel systems", held annually from 1999 to 2009 at Politecnico di Milano;
- Director and teacher in the course "Analysis and risk assessment of elevators", held annually from 2001 to 2009 years at Politecnico di Milano;
- Teacher in the course "Methods for the assessment of the fatigue strength mechanical components", held annually from 1994 to 2014 years at Politecnico di Milano.

Supervisor of PhD students:

- Matteo Corbetta, Politecnico di Milano, thesis title "Probabilistic modelling of airframe crack dynamics for life-time prediction", 2016
- Sina Amiri, Politecnico di Milano, thesis title "Indentation: Mechanics and Applications", 2015
- Giorgio Vallone, Politecnico di Milano, thesis title "Development of methodologies for structural health monitoring for aeronautical structures: application and benefit assessment", 2014
- Nima Allahverdizadeh Sheikhlou, Politecnico di Milano, thesis title "Application of the Continuum Damage Mechanics models in the ductile damage", 2014
- Andrea Gilioli, Politecnico di Milano, thesis title "Investigation on material mechanical behaviour finalized to improve numerical analyses of impacts on aircraft structures", 2014.
- Massimo Fossati, Politecnico di Milano, thesis title "Ballistic damage evaluation on helicopter components", 2013.
- Claudio Sbarufatti, thesis title "Fatigue crack Propagation of helicopter fuselages and life evaluation through sensor network", 2012

- Andrea Manes, Politecnico di Milano, thesis title “Structural reliability of sandwich panels for helicopter fuselage”, 2007.
- Marco Lodi, Politecnico di Milano, thesis title “Analysis and optimization of a cold working process”, 2007.
- Daniele Colombo, Politecnico di Milano, thesis title “Design of helicopter components with defects or cracks”, 2005.

Department and School committees:

- Deputy Director of Department of Mechanical Engineering, Politecnico di Milano (100 academic, 200 people), from 2017 to date
- Head of the Mechanical Design and Vehicle Group at Department of Mechanical Engineering, Politecnico di Milano (21 academic, 50 people), from 2013 to 2016
- Member of the Scientific Committee, Department of Mechanical Engineering, Politecnico di Milano, from 2013 to date
- Deputy of Degree Commission of School of Industrial and Information Engineering, Politecnico di Milano, from 2009 to date

MAIN PUBLICATIONS

1. M. Salvetti, C. Sbarufatti, A. Gilioli, M. Dziendzikowski, K. Dragan, A. Manes, M. Giglio, “On the mechanical response of CFRP composite with embedded optical fibre when subjected to low velocity impact and CAI tests”, *Composite Structures*, 179:21-34, 2017
2. C. Sbarufatti, A. Beligni, A. Gilioli, M. Ferrario, M. Mattarei, M. Martinelli, M. Giglio, “Strain wave acquisition by a fiber optic coherent sensor for impact monitoring”, *Materials*, 10:7, 2017
3. C. Sbarufatti, M. Corbetta, M. Giglio, F. Cadini, “Adaptive prognosis of Lithium-Ion batteries based on the combination of particle filters and radial basis function neural networks”, Accepted for publication by *Journal of Power Sources*, 2017.
4. F. Cadini, C. Sbarufatti, M. Corbetta, M. Giglio, “A particle filter-based model selection algorithm for fatigue damage identification on aeronautical structures”, Accepted for publication by *Structural Control and Health Monitoring*, 2017.
5. M. Corbetta, A. Saxena, M. Giglio, K. Goebel, “An investigation of strain energy release rate models for real-time prognosis of fiber-reinforced laminates”, *Composite Structures*, 165:99-114, 2017
6. A. Gianneo, M. Carboni, M. Giglio, “Feasibility study of a multi-parameter probability of detection formulation for a Lamb waves-based structural health monitoring approach to light alloy aeronautical plates”, *Structural Health Monitoring*, 16-2:225-249, 2017
7. C. Sbarufatti, G. Vallone, M. Giglio, M. Stefaniuk, A. Leski, W. Zielinski, “Experimental validation of a computational hybrid methodology to estimate fuselage damage due to harsh landing”, *Journal of the American Helicopter Society*, 61, 2016
8. L.M. Bresciani, A. Manes, A. Ruggiero, G. Iannitti, M. Giglio, “Experimental tests and numerical modelling of ballistic impacts against Kevlar 29 plain-woven fabrics with an epoxy matrix: Macro-homogeneous and Meso-heterogeneous approaches”, *Composites Part B: Engineering*, 88:114-130, 2016

9. S. Amiri, X. Chen, A. Manes, M. Giglio., "Investigation of the mechanical behaviour of lithium-ion batteries by an indentation technique", *International Journal of Mechanical Sciences*, 105:1-10, 2016
10. L.M. Bresciani, A. Manes, T.A. Romano, P. Iavarone, M. Giglio, "Numerical modelling to reproduce fragmentation of a tungsten heavy alloy projectile impacting a ceramic tile: Adaptive solid mesh to the SPH technique and the cohesive law", *International Journal of Impact Engineering*, 87:3-13, 2016
11. M. Corbetta, C. Sbarufatti, A. Manes, M. Giglio, "Real-time prognosis of random loaded structures via Bayesian filtering: A preliminary discussion", *Engineering Fracture Mechanics*, 145:143-160, 2015
12. M. Corbetta, C. Sbarufatti, A. Manes, M. Giglio, "Real-time prognosis of crack growth evolution using sequential Monte Carlo methods and statistical model parameters", *IEEE Transactions on Reliability*, 64:736-753, 2015
13. C. Sbarufatti, M. Corbetta, A. Manes, M. Giglio, "Sequential Monte-Carlo sampling based on a committee of artificial neural networks for posterior state estimation and residual lifetime prediction", *International Journal of Fatigue*, 83:10-23, 2015
14. N. Allahverdizadeh, A. Gilioli, A. Manes, M. Giglio, "An experimental and numerical study for the damage characterization of a Ti-6AL-4V titanium alloy", *International Journal of Mechanical Sciences*, 93:32-47, 2015
15. M. Carboni, A. Gianneo, M. Giglio, "A Lamb waves based statistical approach to structural health monitoring of carbon fibre reinforced polymer composites", *Ultrasonics*, 60:51-64, 2015
16. A. Gilioli, A. Manes, M. Giglio, T. Wierzbicki, "Predicting ballistic impact failure of aluminium 6061-T6 with the rate-independent Bao-Wierzbicki fracture model", *International Journal of Impact Engineering*, 76:207-220, 2015
17. L.M. Bresciani, A. Manes, M. Giglio, "An analytical model for ballistic impacts against plain-woven fabrics with a polymeric matrix", *International Journal of Impact Engineering*, 78:138-149, 2015
18. S. Amiri, N. Lecis, A. Manes, M. Giglio, "A study of a micro-indentation technique for estimating the fracture toughness of Al6061-T6", *Mechanics Research Communications*, 58:10-16, 2014
19. A. Gilioli, A. Manes, M. Giglio, "Numerical simulation of a fracture toughness test of an Al6061-T6 aluminium alloy using a ductile criterion", *Mechanics Research Communications*, 58:2-9, 2014
20. C. Sbarufatti, A. Manes, M. Giglio, "Application of Sensor Technologies for Local and Distributed Structural Health Monitoring", *Structural Control and Health Monitoring*, 21:1057-1083, 2014
21. A. Manes, M. Pagani, M. Saponara, D. Mombelli, C. Mapelli, M. Giglio, "Metallographic characterisation of Al6061-T6 aluminium plates subjected to ballistic impact", *Materials Science and Engineering A*, 608:207-220, 2014
22. A. Manes, F. Serpellini, M. Pagani, M. Saponara, M. Giglio, "Perforation and penetration of aluminium target plates by armour piercing bullets", *Int. Journal of Impact Engineering*, 69:39-54, 2014
23. M. Corbetta, C. Sbarufatti, A. Manes, M. Giglio, "On Dynamic State-Space Models for Fatigue-Induced Structural Degradation", *Int. Journal of Fatigue*, 61:202-219, 2014

24. M. Giglio, A. Gilioli, A. Manes, “Mechanical behaviour of Al 6061-T6 aluminium alloy under large strain and failure”, in *Numerical Modeling of Materials Under Extreme Conditions*, Springer, Editors: N. Bonora and E. Brown, ISBN 978-3-642-54257-2, 2014
25. G. Vallone, A. Manes, C. Sbarufatti, M. Giglio, “Helicopter Harsh Landing Events: a Computational Hybrid Methodology to estimate Fuselage Damage”, *Journal of Aircraft*, 50:1896-1907, 2013
26. M. Giglio, A. Manes, Mapelli, D. Mombelli, "Relation between ductile fracture locus and deformation of phases in Ti-6Al-4V alloy", *ISIJ International*, 53:2250–2258, 2013
27. C. Sbarufatti, A. Manes, M. Giglio, "Performance optimization of a diagnostic system based upon a simulated strain field for fatigue damage characterization", *Mechanical Systems and Signal Processing*, 40:667–690, 2013
28. M. Giglio, M. Fossati, D. Lumassi, A. Manes, “Use of numerical simulations in damage assessment due to high velocity impacts”, *Int. J. Materials and Structural Integrity*, 7:215-230, 2013
29. A. Manes, D. Lumassi, L. Giudici, M. Giglio, "An experimental-numerical investigation on aluminium tubes subjected to ballistic impact with soft core 7.62 ball projectiles", *Thin-Walled Structures*, 73:68-80, 2013
30. A. Manes, A. Gilioli, C. Sbarufatti, M. Giglio, "Experimental and numerical investigations of low velocity impact on sandwich panels", *Composite Structures*, 99:8-18, 2013
31. C. Mapelli, A. Manes, M. Giglio, D. Mombelli, " Structural Effect of ballistic impact on a shaft by means of crystallographic investigation", *SDHM Structural Durability and Health Monitoring*, 9:181-199, 2013
32. M. Giglio, A. Manes, C. Sbarufatti, "MEMS for structural health monitoring in aircrafts" in *MEMS for automotive and aerospace applications*, Woodhead publishing, Editors: M.Kraft and N. M. White, ISBN: 9780857091185, 2013
33. L. Collini, M. Giglio, R. Garziera, “Thermomechanical stress analysis of dissimilar welded joints in pipe supports: Structural assessment and design optimization”, *Engineering Failure Analysis*, 26:31-49, 2012
34. N. Allahverdizadeh, A. Manes, M. Giglio, “Identification of damage parameters for Ti-6Al-4V titanium alloy using continuum damage mechanics”, *Materialwissenschaft und Werkstofftechnik*, 43:435-440, 2012
35. M. Giglio, A. Gilioli, A. Manes, “Numerical Investigation Of A Three Point Bending Test On Sandwich Panels With Aluminum Skins And Nomextm Honeycomb Core”, *Computational Materials Science*, 56:69–78, 2012
36. M. Giglio, A. Manes, F. Viganò, "Numerical simulation of the slant fracture of a helicopter's rotor hub with ductile damage failure criteria”, *Fatigue and Fracture of Engineering Materials and Structures*, 35:317–327, 2012
37. C. Mapelli, A. Manes, M. Giglio, D. Mombelli, L. Giudici, C. Baldizzone, A. Gruttadauria, “Survey about the effects of shot peening technique on the fatigue performances of Ti-6Al-4V mechanical specimens featured by different cross-section geometries”, *Materials Science and Technology*, 28:543-548, 2012
38. M. Giglio, A. Manes, A. Gilioli, "Investigations on sandwich core properties through an experimental–numerical approach", *Composites Part B: Engineering*, 43:361–374, 2012

39. M. Giglio, A. Manes, F. Viganò, "Ductile fracture locus of Ti-6Al-4V titanium alloy", *Int. Journal of Mechanical Science*, 54:121–135, 2012
40. M. Giglio, M. Gobbi, S. Miccoli, M. Sangirardi, *Costruzione di Macchine*, McGraw-Hill, ISBN: 9788838665080, 2011
41. A. Manes, M. Giglio, F. Viganò, "Effect of riveting process parameters on the local stress field of a T-joint", *Int. Journal of Mechanical Sciences*, 53:1039-1049, 2011
42. M. Giglio, A. Manes, "Terminal ballistic effect on the crack growth assessment of a helicopter rotor drive", *Engineering Fracture Mechanics*, 78:1542-1554, 2011
43. M. Fossati, D. Colombo, A. Manes, M. Giglio, "Numerical modelling of crack growth profiles in integral skin-stringer panels", *Engineering Fracture Mechanics*, 78:1341-1352, 2011
44. F. Viganò, A. Manes, M. Giglio, U. Mariani, "Failure analysis of a composite main rotor helicopter hub", *Engineering Failure Analysis*, 18:97-109, 2011
45. F. Viganò, A. Manes, M. Giglio, "Investigation on the Fatigue Life of an Al 8090 Helicopter Riveted T-Joint", *Journal of Aircraft*, 48:315-323, 2011
46. M. Giglio, A. Manes, M. Fossati, U. Mariani, C. Giani, "Comparison of Fatigue Crack Propagation Behavior of Al 2024 and Al-Li 8090 Helicopter Fuselage Panels", *Journal of Testing and Evaluation*, 38:73-82, 2010
47. T. Pulecchi, A. Manes, M. Lisignoli, M. Giglio, "Digital filtering of acceleration data acquired during the intervention of a lift safety gears", *Measurement*, 43:455-468, 2010
48. M. Giglio, S. Beretta, D. Colombo, U. Mariani, G. Ratti, "Defect Tolerance Assessment of a Helicopter Component Subjected to Multiaxial Load", *Engineering Fracture Mechanics*, 77:2479-2490, 2010
49. M. Giglio, A. Manes " Effect of Flight Spectrum Loads on the Damage Tolerance Evaluation of a Helicopter Frame", in *Materials with Complex Behaviour Advanced Structured Materials*, Vol.3, Part 3, 311-329, Springer, ISBN:9783642126666, 2010
50. M. Giglio, M. Lodi, "Optimization of a cold-working process for increasing fatigue life", *Int. Journal of Fatigue*, 31:1978-1995, 2009
51. M. Giglio, A. Manes, "Crack propagation on helicopter panel: Experimental test and analysis", *Engineering Fracture Mechanics*, 75:866-879, 2008
52. M. Giglio, A. Manes "Experimental and numerical damage evaluation of a lift safety gear" *Int. Journal of Material and Structural Integrity*, 2:291-317, 2008.
53. D. Colombo, S. Desiderati, M. Giglio, A. Salerno, "TSA/FEM comparative analysis of a helicopter component under multiaxial load", *Strain*, 43:311-318, 2007
54. D. Colombo, M. Giglio, A. Manes, "3D fatigue crack propagation analysis of a helicopter component", *Int. Journal of Materials and Product Technology*, 30:107-123, 2007
55. M. Giglio, M. Lodi, "Residual stress analysis in cold-worked holes with interference bushing", *Int. Journal of Materials and Product Technology*, 30:67-89, 2007.
56. D. Colombo, M. Giglio, "Numerical analysis of thin-walled shaft perforation by projectile", *Computers and Structures*, 85:1264-1280, 2007
57. D. Colombo, M. Giglio, "Determination of the fatigue life of a helicopter tail rotor transmission subjected to ballistic damage", *Engineering Fracture Mechanics*, 74:481-499, 2007
58. A. Bernasconi, M. Filippini, M. Giglio, A. Lo Conte, G. Petrone, M. Sangirardi, *Fondamenti di Costruzione di Macchine*, Mc Graw-Hill, ISBN: 9788838663444, 2006

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