

2017
FEUP Group Report
Paulo M S T de Castro

Contributors

among others:

- António F. Tenreiro (currently 5th year FEUP student)
- Carlos Manuel Pinto Castro (master thesis)
- Daniel Fernando Rocha Amaral (master thesis)
- José Carlos Enes Baganha Rodrigues Marques (master thesis)
- Lucas Gicquel ¹
- Marco André Carvalho Ferreira (master thesis)
- Mariana Oliveira (master thesis)
- Paulo M.S.T. de Castro
- Pedro José de Freitas Abreu (currently 5th year student)
- Sébastien Goarnisson ²
- Sérgio João Monteiro de Barros Moreira (master thesis)
- Sérgio M.O. Tavares ³
- Vasco Duarte Raposo (master thesis)

Courses taught

P.M.S.T. de Castro:

at Faculty of Engineering of the Universidade do Porto – FEUP:

- Design of Machine Elements I
- Design of Machine Elements II
- Fatigue and Fracture Mechanics

Sérgio M.O. Tavares⁴:

at Faculty of Engineering of the Universidade do Porto – FEUP:

- Design of Machine Elements I
- Fatigue and Fracture Mechanics

at ISQ, Grijó, Portugal: *Pós-Graduação em Engenharia da Soldadura (Qualificação EWF/IIW)*:

- Introduction to Fracture Mechanics

¹ internship at FEUP; from Polytech Lille, France.

² internship at FEUP; from Polytech Lille, France.

³ invited auxiliary professor FEUP; also: FEUP post-doc. researcher Oct. 2016 – Aug. 2017.

⁴ also teaching several courses at Escola Superior de Design, Gestão e Tecnologias da Produção de Aveiro - Norte (ESAN), Universidade de Aveiro.

Awards 2017

P.M.S.T. de Castro,

- Publons Peer Review Awards 2017, Engineering
- Publons Peer Review Awards 2017, Materials Science
- ‘Reviewer Certificate’ *Fatigue & Fracture of Engineering Materials & Structures*, 2016 (Youshi Hong, Chief Editor, 22 June 2017)
- Certificate for highly cited research in *Theoretical and Applied Fracture Mechanics*⁵, Dec. 20, 2016
- *Prémio de reconhecimento pedagógico*, January 13, 2017, (Dia da FEUP)

S.M.O. Tavares

- Certificate for highly cited research in *Theoretical and Applied Fracture Mechanics*⁵, Dec. 20, 2016

Theses

FEUP Mech. Eng. Master theses:

- Carlos Manuel Pinto Castro, ‘Printed circuit boards experimental and numerical characterization: mechanical, thermal and vibration analysis’, Mech. Engng. master thesis, FEUP, 6 July 2017, (supervisor at Bosch Ovar: Pedro Bastardo; supervisor at FEUP: Sérgio M.O. Tavares; co-supervisor at FEUP: P.M.S.T. de Castro)
- Daniel Fernando Rocha Amaral, ‘Sistema automático de identificação e transporte de amostras de compostos de borracha’, Mech. Engng. master thesis, FEUP, 4 July 2017, (supervisor at Continental Mabor: José Bruno Pinto Nunes; supervisor at FEUP: J.L. Esteves; co-supervisor at FEUP: P.M.S.T. de Castro)
- Marco André Carvalho Ferreira, ‘Mixed mode crack propagation: numerical and experimental study’, Mech. Engng. master thesis, FEUP, 10 July 2017, (supervisor: Sérgio M.O. Tavares; co-supervisor: P.M.S.T. de Castro)
- Mariana Oliveira, ‘Mecanismos e sistemas logísticos para armazenamento utilizando paletes’, Mech. Engng. master thesis, FEUP, 4 July 2017, (supervisor at Continental Mabor: Manuel Sampaio; supervisor at FEUP: J.L. Esteves; co-supervisor at FEUP: P.M.S.T. de Castro)
- Vasco D. Raposo, ‘SSFSW T-joints in different configurations: influence of rotational and welding speed’, Mech. Engng. master thesis, FEUP, 29 March 2017; (supervisor at HZG, Germany: Alessandro Barbini; co-supervisor at FEUP: P.M.S.T. de Castro)

⁵ S.M.O.Tavares, J.F.dos Santos, P.M.S.T.de Castro, ‘Friction stir welded joints of Al-Li Alloys for aeronautical applications: Butt-joints and tailor welded blanks’, *Theoretical and Applied Fracture Mechanics*, vol.65, pp.8-13, 2013.

Papers

S.J. Moreira, S.M. O. Tavares, P.M.S.T. de Castro, ‘Morphing structures and fatigue: the case of an UAV wing leading edge’, *Fatigue & Fracture of Engineering Materials & Structures*, vol.40, pp.1601–1611, 2017, DOI 10.1111/ffe.12664

S.M.O. Tavares, P.M.S.T. de Castro, ‘An overview of fatigue in aircraft structures’, *Fatigue & Fracture of Engineering Materials & Structures*, vol.40, pp.1510–1529, 2017, DOI 10.1111/ffe.12631

M. Tiago von Hafe Pérez F. da Silva, P.P. Camanho, A.T. Marques, P.M.S.T. de Castro, ‘3D-reinforcement techniques for co-bonded CFRP/CFRP and CFRP/metal joints: a brief review’, *Ciência & Tecnologia dos Materiais*, vol.29, (1), 2017, pp. e102-e107

S.M.O. Tavares, P.M.S.T. de Castro, ‘A comparison of methodologies for fatigue analysis of shafts: DIN 743 vs. approaches based on Soderberg criterion’, *Ciência & Tecnologia dos Materiais*, vol.29, (1), 2017, pp. e76-e81

T.R. Lima, S.M.O. Tavares, P.M.S.T. de Castro, ‘Residual stress field and distortions resulting from welding processes: numerical modelling using Sysweld’, *Ciência & Tecnologia dos Materiais*, vol.29, (1), 2017, pp. e56-e61

D.F.C. Peixoto, P.M.S.T. de Castro, ‘Fatigue crack growth of a railway wheel’, *Engineering Failure Analysis*, vol. 82, 2017, pp.420-434 DOI 10.1016/j.engfailanal.2017.07.036

P. Freitas, A. F. Tenreiro, P. T. de Castro, ‘Comparison between the AFNOR method and the imposition of balanced maximum specific sliding in the imposed centre distance problem’, *U.Porto Journal of Engineering*, ISSN 2183-6493, vol.3, (3), 2017, pp.17-26 , DOI: 10.24840/2183-6493_003.003.0002, published: 24 November, 2017

N. Rosa, M. Marta, M. Vaz, S.M.O. Tavares, R. Simoes, F.D. Magalhães, A.T. Marques, ‘Recent developments on intramedullary nailing: a biomechanical perspective’ *Annals of the New York Academy of Sciences*, vol. 1408, 2017, pp. 20-31 DOI 10.1111/nyas.13524

Editorial:

F. Caputo, C. Navarro, P.T. de Castro, ‘Failure mechanisms and damage modelling for advanced materials’, special issue of *Advances in Materials Science and Engineering*, 2017, <https://doi.org/10.1155/2017/6910685>

Letter to the editor:

S. Pantelakis, P. de Castro, M. Guagliano, F. Berto, ‘Letter to the editor Special issue: Fatigue of aeronautical materials and structures’, *Fatigue & Fracture of Engineering Materials & Structures*, vol.40, p.1509, 2017, DOI 10.1111/ffe.12691

Submitted:

H.M.E. Ramos, S.M.O. Tavares, P.M.S.T. de Castro, ‘Numerical modelling of welded T-joint configurations using Sysweld’, submitted July 30, 2017 to *Ciência e Tecnologia dos Materiais*

Projects

- on-going, ‘DalMat - Damage tolerant structures under mixed mode loading’; LAETA, coordinator S.M.O. Tavares; with UBI and IST

Project proposal:

- ‘Enhanced mechanical proprieties in additive manufactured components – AddStrength’, proposal submitted to FCT ⁶; principal investigator: Sérgio M. O. Tavares, May 2017
- ‘Advanced beam intercepting materials and components: mechanical behavior characterization and enhancement’, proposal CERN/FIS-TEC/0031/2017 ⁷, principal investigator: Sérgio M. O. Tavares, July 27, 2017; (poster presented at FCT on Nov.16, 2017 ⁸)

Presentations at conferences

P.C. Neves, J.-F. Vittori, P. Wilson, M. Huisman, P.M.S.T. de Castro, R. Natal, A.A. Fernandes, ‘Fatigue design of thermoplastic matrix composites components: a simplified approach’, poster presented at: EEVC-2017, European Battery, Hybrid & Fuel Cell Electric Vehicle Congress, Geneva, Switzerland, 14-16 March 2017, in the framework of the Geneva Int. Motor Show

H.M.E. Ramos, S. M.O. Tavares, P.M.S.T. de Castro, ‘Numerical modelling of welded T-joint configurations using Sysweld’, Materiais 2017: XVIII Congresso da Sociedade Portuguesa dos Materiais / VIII International Symposium on Materials, Aveiro, Portugal, 9-12 April 2017

S.M.O. Tavares, P.M.S.T. de Castro, ‘Assessment of standardized methodologies for fatigue design of shafts: DIN 743, FKM and AGMA 6001’, Materiais 2017: XVIII Congresso da Sociedade Portuguesa dos Materiais / VIII International Symposium on Materials, Aveiro, Portugal, 9-12 April 2017

M.A.C. Ferreira, S.M.O. Tavares, J. Belinha, P.M.S.T. de Castro, ‘Mixed mode crack propagation: numerical and experimental study’, 7th International Conference on Mechanics and Materials in Design, Albufeira, Portugal, 11-15 June 2017, communication ref.: 7047

S.M.O. Tavares, S.J. Moreira, P.M.S.T. de Castro, P.V. Gamboa, ‘Morphing aeronautical structures: A review focused on UAVs and durability assessment’, submitted for possible presentation at 4th Int. Conf. Actual Problems of Unmanned

⁶ SAICT, Projetos de investigação científica e desenvolvimento tecnológico (IC&DT), AVISO Nº 02/SAICT/2017.

⁷ Aviso para apresentação de candidaturas - projetos de investigação científica e desenvolvimento tecnológico no âmbito do acordo de cooperação entre Portugal e o European Laboratory for Particle Physics (CERN) – 2017 / Call for SR&TD projects under the cooperation agreement between Portugal and the European Laboratory for Particle Physics (CERN) – 2017.

⁸ Apresentação Pública das candidaturas do Concurso CERN 2017, 16/11/2017, FCT, Lisbon.

Aerial Vehicles Development (APUAVD-2017), October 17-19, 2017, National Aviation University, Kyiv, Ukraine

P. Gamboa, S.M.O.Tavares, L. Reis, P.M.S.T. de Castro, 'Damage tolerant structures under mixed mode loading', 4º Encontro de Jovens Investigadores do LAETA - 4EJIL, 9-10 Nov. 2017, Covilhã, Portugal

Interventions

P.M.S.T. de Castro, 'Engineering in the future: engineering the future', talk at SAKTHI Maia, Portugal, June 14, 2017

P.M.S.T. de Castro, 'Engineering in the future: engineering the future', talk at BEST⁹ Event on Education, FEUP, Porto, Portugal, August 24, 2017

P.M.S.T. de Castro, '*As máquinas na transição para o século XX*', talk on Nov. 8, 2017 part of the commemorations of 180 years of Academia Politécnica, at FEUP; (part of the series of talks entitled 'Materialidades da Politécnica')

Evaluations

P.M.S.T. de Castro:

- Evaluation of Applicants to Fulbright Grants for Students.
- *Comissão Científica para a Seleção de Candidaturas ERASMUS Mundus*¹⁰, appointed by the Director of DEMec-FEUP Prof. J. Seabra on Feb. 22, 2016.
- Programa doutoral Irail (FEUP, UMinho, Univ S. Paulo), selecção de candidaturas, June 26, 2017
- VQR 2011-2014 launched by ANVUR, CINECA 2017 ¹¹

S.M.O. Tavares:

- Evaluation of Marie Skłodowska-Curie Actions Applications - Innovative Training Networks (H2020-MSCA-ITN) - EU Framework Programme for Research and Innovation
- Evaluation of Eurostars applications - EUREKA and the European Commission.
- Evaluation of Marie Skłodowska-Curie Actions Applications - Individual Fellowships (H2020-MSCA-IF) - EU Framework Programme for Research and Innovation

⁹ BEST - Board of European Students of Technology.

¹⁰ projects ALFABET, SMARTLINK, ...

¹¹ ANVUR - Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca;

VQR - Valutazione della Qualità della Ricerca.

CINECA - Consorzio Interuniversitario senza scopo di lucro formato da 70 università italiane, 8 Enti di Ricerca Nazionali e il MIUR - Ministero dell'Istruzione, dell'Università e della Ricerca.

- Evaluation of applications for the Portuguese National Innovation Agency (ANI) – “Sistema de Incentivos à Investigação e Desenvolvimento Tecnológico” - SI I&DT: “Projetos Demonstradores Individuais” (05/SI/2017) and “Projetos em Copromoção” (03/SI/2017)

Editorship

published special issues:

- ***Advances in Materials Science and Engineering***, special issue ‘Failure mechanisms and damage modelling for advanced materials’; lead guest-editor: Francesco Caputo (Seconda Università degli Studi di Napoli); co-guest editors: Carlos Navarro Pintado (Universidad de Sevilla) and P.M.S.T. de Castro (FEUP), 2017
- ***Fatigue & Fracture of Engineering Materials & Structures***, special issue: ‘Fatigue of aeronautical materials and structures’; guest-editors: S. Pantelakis, P. de Castro, M. Guagliano, F. Berto, vol.40, (10), October 2017

in preparation:

- ***International Journal of Aerospace Engineering***, special issue ‘Modelling and optimizing structural behavior of advanced materials for aerospace’; lead guest editor: Roberto Citarella, (Università di Salerno, Italy), co guest-editors: Filippo Berto, Università degli Studi di Padova Italy, and Norwegian University of Science and Technology, Norway; P.M.S.T. de Castro (FEUP)

Refereeing (2017)

P.M.S.T. de Castro¹²

<i>Composite Structures</i>	1
<i>Composites Science and Technology</i>	1
<i>Engineering Failure Analysis</i>	2
<i>Engineering Fracture Mechanics</i>	3
<i>Experimental Techniques</i>	1
<i>Fatigue & Fracture of Engineering Materials & Structures</i>	6
<i>International Journal of Fatigue</i>	2
<i>International Journal of Structural Integrity</i>	2
<i>Journal of Constructional Steel Research</i>	4
<i>Materials Research</i>	1
<i>Materials Science & Engineering A</i>	1
<i>Proceedings of the IMechE, Part L: Journal of Materials: Design and Applications</i>	9
<i>Theoretical and Applied Fracture Mechanics</i>	4

¹² <https://publons.com/author/1237048/paulo-tavares-de-castro#profile>

S.M.O. Tavares¹³

<i>Advances in Materials Science and Engineering</i>	1
<i>Engineering Fracture Mechanics</i>	1
<i>Fatigue & Fracture of Engineering Materials & Structures</i>	2
<i>Journal of Materials Processing Technology</i>	3
<i>Metals</i>	5
<i>Proceedings of the IMechE, Part L: Journal of Materials: Design and Applications</i>	9

Workshop and seminar organization

- 'A integração de rolamentos em projectos mecânicos', seminar by Eng. João Rego (Schaeffler), March 22, 2017¹⁴
- 'Simulation of fracture of graphene', seminar by Professor Nimal Rajapakse, School of Engineering Science, Simon Fraser University, Canada, at the Depart. of Mechanical Engineering, FEUP, June 16, 2017
- 'Rolamentos/chumaceiras: tipos, dimensionamento e inovações', workshop presented by Eng. Jose A. Elices (TIMKEN) and promoted by DUNBELT, on Nov.16, 2017

Membership of scientific committees of conferences

P.M.S.T. de Castro:

- scientific committee, 2º Congresso Doutoral de Engenharia / Doctoral Congress in Engineering – DCE 2017 <http://fe.up.pt/dce17> June 8-9, 2017
- scientific committee of Conference on Materials Design and Applications 2018, Porto, 5-6 July 2018
- international advisory and scientific committees, 9th International Colloquium on Mechanical Fatigue of Metals ICMFM XIX, Faculty of Engineering of the University of Porto, Portugal, September 5-7, 2018

S.M.O.Tavares:

- international scientific committees, 9th International Colloquium on Mechanical Fatigue of Metals ICMFM XIX, Faculty of Engineering of the University of Porto, Portugal, September 5-7, 2018

Other

João Marafona, MIEM-FEUP, summer 2016 internship at Amorim & Irmãos, Champcork, Santa Maria de Lamas, Portugal; supervisor: Eng.º Alexandre Mil-Homens; co-supervisor at FEUP: P.M.S.T. de Castro; Outcome: João Marafona, 'Estágio Extracurricular Programa Estágios de Verão FEUP (PEV-FEUP)'

¹³ <https://publons.com/author/1284808/sergio-mo-tavares#profile>

¹⁴ in the frame of the JUNCOR-FEUP MoU (protocolo de cooperação) signed at FEUP on Dec. 14, 2015.

Service

P.M.S.T. de Castro

- Elected member (director) of the Executive Committee - ExCo of the International Congress on Fracture ICF, at ICF Council Meeting during ICF14, June 20, 2017, Rhodes. (ExCo: President: R McMeeking, Treasurer; 3 V-Ps, Secretary-general, and 10 Directors)

Missions, meetings

P.M.S.T. de Castro

- Continental Mabor, Lousado, Portugal, with Prof. J.L. Esteves, January 10, 2017
- Continental Mabor, Lousado, Portugal, with Prof. J.L. Esteves, January 17, 2017
- Fulbright Commission, Lisbon, Portugal, March 27, 2017
- COTEC, Lisbon, Portugal, May 12, 2017, jury meeting, prize 'Portugal, País de Excelência em Engenharia'
- 14.º Encontro Nacional de Inovação COTEC, May 16, at CEIIA, Matosinhos, Portugal
- Amorim & Irmãos, Champcork, Santa Maria de Lamas, Portugal, visit during internship of João Marafona, August 4, 2017
- Continental Mabor, Lousado, Portugal, with Prof. J.L. Esteves, 'Dia do Estagiário Continental 2017', September 18, 2017
- Ukraine Railway Speed Company, branch of Ukrainian Railway, Kyiv, Ukraine, October 18, 2017
- Ach. Brito, Vila do Conde, Portugal, Nov. 3, 2017
- Vestas Wind Systems A/S, visit to Design Centre, Porto, Portugal, Nov. 22, 2017

S.M.O. Tavares

- International Workshop on Innovating, Massachusetts Institute of Technology, Cambridge, MA, USA, June 12-16, 2017
- Amorim & Irmãos, Champcork, Santa Maria de Lamas, Portugal, visit during internship of João Marafona, August 4, 2017
- Ukraine Railway Speed Company, branch of Ukrainian Railway, Kyiv, Ukraine, October 18, 2017
- Apresentação Pública das candidaturas do Concurso CERN 2017, poster on proposal CERN/FIS-TEC/0031/2017 presented at FCT, Lisbon, on Nov.16, 2017

S.J. Moreira

- Rolls-Royce, Derby, UK, trainee selection process, February 14-15, 2017

Vasco D. Raposo

- HZG, Geesthacht, Germany, Sept. 2016-February 2017, preparation of master thesis under supervision at HZG of Alessandro Barbini; co-supervisor at FEUP: P.M.S.T. de Castro

Juries

Academic degrees

P.M.S.T. de Castro:

- Paula Alexandra Veiga Gonçalves, Mechanical Engng doctoral thesis, FEUP, January 4, 2017
- Pedro Miguel Teixeira Marques, Mechanical Engng doctoral thesis, FEUP, January 20, 2017

- Vasco D. Raposo, Mechanical Engng master thesis, FEUP, March 29, 2017
- Tiago Filipe Santos Ribeiro, Mechanical Engng master thesis, ISEP, Porto, 'Projeto de um elevador automatizado para transporte de limalha', Nov. 24, 2017
- Marcelo Costa, Mechanical Engng doctorate, FEUP, Dec. 19, 2017

S.M.O. Tavares

- Daniel Filipe Oliveira da Silva, Mechanical Engng master thesis, ISEP, Porto, 'Utilização do método direto de obtenção de leis coesivas para previsão de resistência de juntas com chanfro interior', Nov. 21, 2017.

Juries for faculty positions

P.M.S.T. de Castro:

- Universidade de Coimbra, concurso para 1 posto de trabalho de Professor Catedrático FCTUC - DEM | P053-14-457, alegações, reunião 5 de Janeiro de 2017
- Universidade da Beira Interior, concurso documental para um Professor Associado, edital nº420/2017, *Diário da República*, 2.^a série, nº114, 14 de Junho de 2017
- Universidade do Porto, concurso documental para um Professor Associado para a área disciplinar de Engenharia Física da FEUP, edital n.º489/2017, *Diário da República*, 2.^a série, nº134, 13 de Julho de 2017
- Universidade do Porto, concurso documental para uma vaga de Professor Catedrático da área disciplinar de Engenharia Mecânica da FEUP, edital n.º367/2017, *Diário da República*, 2.^a série, nº107, 2 de Junho de 2017

Other juries

P.M.S.T. de Castro

- COTEC, Lisbon, May 12, 2017, jury of COTEC prize 'Portugal, País de Excelência em Engenharia'

Visitors

- André Mota, Equiditec, Queluz, April 19, 2017
- Daniel F.C. Peixoto, BorgWarner, April 17, 2017
- Eduardo Guimarães Marques, DUNBELT, Nov. 16, 2017
- Francisco Gomes da Silva, ISEP, March 29, 2017
- Joan Portero Sobrino, SEM Barcelona, March 2, 2017
- João Rego, Schaeffler, March 22, 2017
- Jose A Elices, TIMKEN Madrid, Nov.16, 2017
- Lorenzo Martines, TIMKEN Madrid, Nov. 16, 2017
- Lucas Gicquel, Polytech'Lille, May-July 2017
- Mário Lopes, DUNBELT, Nov. 16, 2017
- Nimal Rajapakse, Simon Fraser University, Canada, June 16, 2017
- Pedro Bastardo, Bosch, Ovar, March 1, 2017
- Pedro Cavaleiro, ABER, April 24, 2017
- Ricardo Alves de Sousa Castro, ESA, April 12, 2017
- Sébastien Goarnisson, Polytech'Lille, May-July 2017
- Sérgio Moreira, Rolls-Royce, Dec. 29, 2017
- Teresa Morgado, UNL, May 5, 2017

Acknowledgments

FEUP, individuals and organizations that contributed to making possible the work mentioned.

List of acronyms

AGMA	American Gear Manufacturers Association
ANI	Agência Nacional de Inovação
ANVUR	Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca
BEST	Board of European Students of Technology
CERN	European Laboratory for Particle Physics
COTEC	Associação Empresarial para a Inovação
DIN	Deutsches Institut für Normung
DOI	digital object identifier
ESAN	Escola Superior de Design, Gestão e Tecnologias da Produção de Aveiro - Norte
EFW	European Federation for Welding, Joining and Cutting
FCT	Fundação para a Ciência e Tecnologia
FCTUC	Faculdade de Ciências e Tecnologia da Universidade de Coimbra
FEUP	Faculdade de Engenharia da Universidade do Porto
FKM	Research Committee on Mechanical Engineering
HZG	Helmholtz-Zentrum Geesthacht - Zentrum Für Material - Und Küstenforschung
ICF	International Congress on Fracture
IIW	International Institute of Welding
ISEP	Instituto Superior de Engenharia do Porto
ISQ	Instituto de Soldadura e Qualidade
IST	Instituto Superior Técnico
LAETA	Laboratório Associado de Energia, Transportes e Aeronáutica
MIEM	Mestrado integrado em Engenharia Mecânica
MIUR	Ministero dell'Istruzione, dell'Università e della Ricerca
SSFWSW	stationary shoulder friction stir welding
UAV	unmanned aerial vehicle
UBI	Universidade da Beira Interior
VQR	Valutazione della Qualità della Ricerca