

Group Report 2011
R&D group of Prof. Paulo M.S. Tavares de Castro
 January 10, 2012

Main contributors in the period

- Carlos M.C. Albuquerque
- Daniel Braga
- Daniel F.C. Peixoto
- Miguel A.V. de Figueiredo
- Paulo M.S.T. de Castro
- Pedro M.G.P. Moreira
- Sérgio M.O. Tavares
- Valentin Richter-Trummer

Projects¹

Current

- ‘Railways - rolling contact fatigue’, **FCT** – Fundação para a Ciência e Tecnologia, projecto PTDC/EME-PME/100204/2008, March 2010 – ...
- ‘LighTRAIN Concepção e desenvolvimento de um estrado inovador em alumínio para carruagens de passageiros’, **QREN**; Coord. INEGI: P.M.G.P. Moreira

Concluded in 2011

- ‘Metodologias avançadas de avaliação do comportamento dinâmico de pontes em linhas de alta velocidade’, **FCT** – Fundação para a Ciência e Tecnologia, projecto PTDC/ECM/69697/2006 - FCOMP-01-0124-FEDER-007195; Coord.: Rui Calçada, DEC FEUP, 2008-2011

Project proposals

- SODECIA Centro Tecnológico, Maia, Portugal, proposal **QREN**; partner FEUP coord.: P.M.S.T. de Castro
- NEOPUL, proposal **QREN** ‘CATCOMP – Optimização de componentes de catenária’; Coord. INEGI: P.M.S.T. de Castro
- ‘Interoperable monitoring, diagnosis and maintenance strategies for axle bearings – MAXBE’, **EU FP7**; work programme topic: SST.2012.2.5-1. Rail system interoperability, call identifier: FP7-SST-2012-RTD-1; partner FEUP coord.: Cecília Vale, Dep. Civil Engng., FEUP, Porto, Portugal.

PhD Theses concluded

- Sérgio M. O. Tavares, ‘Design and advanced manufacturing of aircraft structures using friction stir welding’, PhD thesis, Universidade do Porto, Oct. 2011; supervisor: P.M.S.T. de Castro; co-supervisors: J.F. dos Santos, HZG (ex-GKSS) Germany, P. Vilaça (IST).
 Juri: Mário Almeida Santos (OGMA), José Miguel Silva (UBI), Arlindo Silva (IST), Pedro Vilaça (IST), A.T. Marques (FEUP, Presid.)

¹ three other FCT projects are coordinated by P.M.G.P. Moreira

PhD theses current

- Daniel F.C. Peixoto; supervisor: P.M.S.T. de Castro, co-supervisor: L.A. Ferreira
- Carlos Albuquerque; supervisor: Rui Calçada (Dep. Civil Engng., FEUP); co-supervisor: P.M.S.T. de Castro
- Valentin Richter-Trummer, supervisor: P.M.S.T. de Castro, co-supervisors: Jorge F. dos Santos (HZG, Germany), Pedro Vilaça (IST, Lisbon, Portugal)

MSc Theses concluded²

- João Marcos Fonseca Santos, 'Finite elements analysis in structural node on long range centre section', Master of Science in Mechanical Engineering, FEUP (double degree with INSA Toulouse); work performed under the supervision of Ing. J. Le Fanic at AIRBUS (Toulouse); co-supervisors: J.-C. Passieux (INSA Toulouse), P.M.S.T. de Castro (FEUP)

MSc theses current

- Christoph Thies, ERASMUS exchange student, FEUP supervisor: P.M.S.T. de Castro; supervisors at the Bauhaus-Universität Weimar, Fakultät Bauingenieurwesen: Erstprüfer: Prof. Dr.-Ing. habil. C.Könke, Zweitprüfer: Dr.-Ing. Dagmar Hintze
- Daniel Braga, supervisors: V. Richter-Trummer, P.M.S.T. de Castro
- Mariana Bartolomeu, EFACEC supervisor: Dan Ulmamei; FEUP supervisors: L.A. Ferreira, P.M.S.T. de Castro

Books

- P.M.G.P. Moreira, L.F.M. da Silva, P.M.S.T. de Castro, eds., 'Structural connections for lightweight metallic structures', in press

Book chapters

- P.M.G.P. Moreira, V. Richter-Trummer, P.M.S.T. de Castro, 'Lightweight stiffened panels fabricated using emerging fabrication technologies: fatigue behaviour', in: P.M.G.P. Moreira, L.F.M. da Silva, P.M.S.T. de Castro, eds., 'Structural Connections for Lightweight Metallic Structures', in press
- S.M.O. Tavares, Welded aeronautical structures: cost and weight considerations, in: P.M.G.P. Moreira, L.F.M. da Silva, P.M.S.T. de Castro, eds., 'Structural Connections for Lightweight Metallic Structures', in press
- S.M.O. Tavares, P. P. Camanho, P.M.S.T. de Castro, 'Materials selection for airframes: assessment based on the specific fatigue behavior', in: P.M.G.P. Moreira, L.F.M. da Silva, P.M.S.T. de Castro, eds., 'Structural Connections for Lightweight Metallic Structures', in press

² Further to the listed in the main text: dissertation developed at the Department of Aeronautics of Imperial College London under the supervision of Dr. Lorenzo Iannucci: José Augusto Tavares de Melo, "High Velocity Impacts" (exchange student responsible at FEUP: P.M.S.T. de Castro).

- V. Richter-Trummer, P.M.G.P. Moreira, P.M.S.T. de Castro, 'Damage tolerance of aircraft panels taking into account residual stress', in: P.M.G.P. Moreira, L. F. M. da Silva, P.M.S.T. de Castro, eds., 'Structural Connections for Lightweight Metallic Structures', in press

Journal papers

- A. Lanciotti, L. Lazzeri, C. Polese, C. Rodopoulos, P. Moreira, A. Brot, G. Wang, L. Velterop, G. Biallas, J. Klement, "Fatigue crack growth in stiffened panels, integrally machined or welded (LBW or FSW): the DaToN project common testing program", ***SDHM: Structural Durability & Health Monitoring***, vol.7, (3), pp.211-229, 2011
- S.M. Haeusler, P. Baiz, S.M.O. Tavares, A. Brot, P. Horst, M.H. Aliabadi, P.M.S.T. de Castro, Y. Peleg-Wolfen, 'Crack growth simulation in integrally stiffened structures including residual stress effects from manufacturing. Part I: model overview', ***SDHM: Structural Durability & Health Monitoring***, vol.7, (3), pp.163-190, 2011
- S.M.O. Tavares, P.M.S.T. de Castro, "Stress intensity factor calibration for a longitudinal crack in a fuselage barrel and the bulging effect influence", ***Engineering Fracture Mechanics***, vol.78, pp.2907-2918, 2011
- S.M.O. Tavares, S.M. Haeusler, P.M. Baiz, P.M.S.T. de Castro, P. Horst, M.H. Aliabadi, 'Crack growth simulation in integrally stiffened structures including residual stress effects from manufacturing. Part II: modelling and experiments comparison', ***SDHM: Structural Durability & Health Monitoring***, vol.7, (3), pp.191-209, 2011
- V. Richter-Trummer, E.A. Marques, F.J.P. Chaves, J.M.R.S. Tavares, L.F.M. da Silva, P.M.S.T. de Castro, "Analysis of crack growth behavior in a double cantilever beam adhesive fracture test by different digital image processing techniques", ***Mat.-wiss. u.Werkstofftech.***, 2011, vol.42, (5), pp.452-459
- V. Richter-Trummer, P M S T de Castro, 'The through-the-thickness measurement of residual stress in a thick welded steel compact tension specimen by the contour method', ***The Journal of Strain Analysis for Engineering Design***, 2011, vol.46, pp.315-322

Conference papers

- S.M.O.Tavares, P.M.S.T. de Castro, 'Technology assessment in the design of aeronautical structures', AERODAYS 2011 - 6th European Aeronautics Days, March 30-April 1, 2011, Palacio Municipal de Congresos de Madrid, **Madrid, Spain** (poster presentation, student participation programme)
- D.F.C. Peixoto, L.A.A. Ferreira, P.M.S.T. de Castro, 'The Dang Van criterion for fatigue dimensioning', VI International Materials Symposium MATERIAIS 2011 and XV meeting of SPM - Sociedade Portuguesa de Materiais, **Guimarães, Portugal**, April 18-20, 2011
- P.M.G.P Moreira, M.A.V. de Figueiredo, P.M.S.T. de Castro, "A contribution to the mechanical characterization of Cu ETP used in the electric motors industry", VI International Materials Symposium MATERIAIS 2011 and XV meeting of SPM - Sociedade Portuguesa de Materiais, **Guimarães, Portugal**, April 18-20, 2011
- R.M.C. Miranda, C. Albuquerque, V. Richter-Trummer, M.A.V. de Figueiredo, R. Calçada, P.M.S.T. de Castro, 'Fatigue crack propagation behavior of the welded steel of a railway bridge', VI International Materials Symposium MATERIAIS 2011 and XV meeting of SPM - Sociedade Portuguesa de Materiais, **Guimarães, Portugal**, April 18-20, 2011
- S.M.O. Tavares, P. Camanho, P.M.S.T. de Castro, 'Assessment of materials for fuselage panels considering fatigue behavior', VI International Materials Symposium MATERIAIS

- 2011 and XV meeting of SPM - Sociedade Portuguesa de Materiais, **Guimarães, Portugal**, April 18-20, 2011
- V. Richter-Trummer, R.M.C.Miranda, C. Albuquerque, P.M.S.T. de Castro, 'Fatigue crack striation spacing for welded and base material ct steel specimens', VI International Materials Symposium MATERIAIS 2011 and XV meeting of SPM - Sociedade Portuguesa de Materiais, **Guimarães, Portugal**, April 18-20, 2011
 - Gerben Sinnema, Michael Windisch, Janine Schneider, Paulo T. de Castro, Pedro M.G.P. Moreira, 'Damage tolerance characterization of AA2195 and its FSW joints', Advanced Aerospace Materials and Processes Conference and Exposition - AeroMat 2011, **Long Beach, CA, USA**, May 23, 2011
 - V. Richter-Trummer, P. Irving, X. Zhang, M. Pacchione, M. Beltrão, J. dos Santos, 'Biaxial fatigue tests on FSW', 5th FSW Workshop, **Timmendorfer Strand, Germany**, April 4-6, 2011
 - Pedro B. Ribeiro, Tiago B. Faro, A. Alves, Abel D. Santos, Paulo M.S.T. de Castro, "Estudo de conceitos inovadores para o projecto de quinadoras", Congresso de Métodos Numéricos em Engenharia 2011, **Coimbra, Portugal**, June 14-17, 2011
 - A.A.L. Rego, D.F.C. Peixoto, L.A.A. Ferreira, 'Rolling contact fatigue tests in a twin disc machine', VI Congreso Ibérico de Tribología IBERTRIB 2011, Escuela Superior de Ciencias Experimentales y Tecnología, Universidad Rey Juan Carlos, **Móstoles-Madrid, Spain**, June 16-17, 2011³
 - M. Papadopoulos, S.M.O. Tavares, M. Pacchione, S. Pantelakis, 'Mechanical behaviour of AA 2024 friction stir overlap welds', 2nd International Conference of Engineering Against Fracture, 22-24 June 2011, **Mykonos, Greece**
 - C. Albuquerque, V. Richter-Trummer, R.M.C. Miranda, M.A.V. de Figueiredo, R. Calçada, P.M.S.T. de Castro, 'Characterization of the fatigue crack growth behaviour of 32mm thick welded steel CT specimens', 5th International Conference on Advanced Computational Engineering and Experimenting ACE-X 2011, **Vilamoura, Portugal**, July 3-6, 2011
 - P.M.G.P. Moreira, M.A.V. de Figueiredo, P.M.S.T. de Castro, 'Mechanical characterization of Cu ETP used in electric motors rotor bars', 5th International Conference on Advanced Computational Engineering and Experimenting ACE-X 2011, **Vilamoura, Portugal**, July 3-6, 2011
 - P.M.G.P. Moreira, P.M.S.T. de Castro, 'Fatigue crack growth on FSW AA2024-T3 aluminum joints', ICSAAM 2011, the 4th International Conference on Structural Analysis of Advanced Materials, Sept. 7-11, 2011, **Sinaia, Romania**, (abstract in proceedings, p.196)
 - P.M.G.P. Moreira, R.A.M. da Silva, P.M.S.T. de Castro, 'Estudo da velocidade de propagação de fendas em juntas FSW de alumínio 2024-T3', 10º Congresso Iberoamericano de Engenharia Mecânica CIBEM, **Porto, Portugal**, September 4-7, 2011
 - V. Richter-Trummer, C.M.C. Albuquerque, R.M.C. Miranda, M.A.V. de Figueiredo, R. Calçada, P.M.S.T. de Castro, 'Propagação de fendas de fadiga em ligações soldadas de aço', 10º Congresso Iberoamericano de Engenharia Mecânica CIBEM, **Porto, Portugal**, September 4-7, 2011
 - S.M.O.Tavares, 'Advanced non-destructive techniques for friction stir welding defects detection in aeronautical structures', 2ª Conferência Nacional em Ensaio Não Destrutivos "Aplicação de END em Sectores Chave da Indústria: Energia e Transportes / Application of NDT in Key Sectors of Industry: Energy and Transport", Faculdade de Engenharia da Universidade do Porto, **Porto, Portugal**, Dec. 16, 2011

³ Presented by J. Seabra on behalf of the authors.

Other publications

- S.M.O.Tavares (Univ. Porto), M. Papadopoulos (Univ. Patras), M. Pacchione (AIRBUS), 'Friction stir welding – overlap joints performance review', in: Claudio Dalle Donne, Katja Schmidtke, eds., Review of Aeronautical Fatigue Investigations in Germany During the Period 2009 to 2011, EADS Innovation Works, ICAF 2011, pp.27-29
- V. Richter-Trummer (Univ. Porto, HZG), P.E. Irving and X. Zhang (Univ. Cranfield), M. Pacchione (AIRBUS), M. Beltrão and J. dos Santos (HZG), 'Biaxial fatigue tests on friction stir welded aluminium lithium', in: Claudio Dalle Donne, Katja Schmidtke, eds., Review of Aeronautical Fatigue Investigations in Germany During the Period 2009 to 2011, EADS Innovation Works, ICAF 2011, pp.30-32

Refereeing

P.M.S.T. de Castro

- *Composite Structures*
- *International Journal of Fatigue*
- *Materials Science and Engineering - A*
- *Structural Engineering and Mechanics*

Conference committees

- 2nd International Conference of Engineering Against Fracture ICEAF II, June 22-24, 2011, **Mykonos, Greece**; P.M.S.T. de Castro, member of international scientific committee
- 13th Portuguese Conference on Fracture - PCF2012, Department of Mechanical Engineering, Faculty of Science and Technology, University of Coimbra, Feb. 2-3, **Coimbra, Portugal**; P.M.S.T. de Castro, member of scientific committee
- 1st International Conference of the Int. Journal of Structural Integrity IJSI-2012, FEUP, **Porto, Portugal**, June 25-28, 2012, under the sponsorship of EASN – European Aeronautics Science Network, SPM – Sociedade Portuguesa de Materiais *et al.*; organizing team: Chris Rodopoulos (Monash Univ.), Fernanda Fonseca, Lucas F.M. da Silva, Paulo M.S.T. de Castro (chair), Pedro M.G.P. Moreira, Sérgio M.O. Tavares, Valentin Richter-Trummer
- 15th International Conference on Experimental Mechanics – ICEM15, FEUP, **Porto, Portugal**, July 22-27, 2011; P.M.G.P. Moreira, P.M.S.T. de Castro, members of international scientific committee
- ACE-X2012 Athens, Greece, 1-4 July 2012; relocated to **Istanbul, Turkey**; P.M.G.P. Moreira, P.M.S.T. de Castro, members of scientific committee

Presentations

Paulo M.S.T. de Castro

- P.M.S.T. de Castro, 'Aeronáutica e espaço: cogitações', EDAM (Engineering Design and Advanced Manufacturing) lunch talk, MIT-Portugal programme, FEUP, **Porto, Portugal**, June 15, 2011
- C. Albuquerque, V. Richter-Trummer, R.M.C. Miranda, M.A.V. de Figueiredo, R. Calçada, P.M.S.T. de Castro, 'Characterization of the fatigue crack growth behaviour of 32mm thick welded steel CT specimens', 5th International Conference on Advanced Computational Engineering and Experimenting ACE-X 2011, Hilton Vilamoura, **Vilamoura, Portugal**, July 3-6, 2011

Pedro M.G.P. Moreira

- P.M.G.P. Moreira, M.A.V. de Figueiredo, P.M.S.T. de Castro, 'Mechanical characterization of Cu ETP used in electric motors rotor bars', 5th International Conference on Advanced Computational Engineering and Experimenting ACE-X 2011, Hilton Vilamoura, **Vilamoura, Portugal**, July 3-6, 2011
- P.M.G.P. Moreira, P.M.S.T. de Castro, 'Fatigue crack growth on FSW AA2024-T3 aluminum joints', ICSAAM 2011, the 4th International Conference on Structural Analysis of Advanced Materials, Sept. 7-11, 2011, **Sinaia, Romania**

Sérgio M.O. Tavares

- S.M.O. Tavares, 'New design concepts for aeronautical products welded by friction stir', lunch talk, EDAM (Engineering Design and Advanced Manufacturing) MIT-Portugal programme, FEUP, Porto, Portugal, January 5, 2011
- S.M.O. Tavares, P.M.S.T. de Castro, 'Technology assessment in the design of aeronautical structures', AERODAYS 2011 - 6th European Aeronautics Days, March 30-April 1, 2011, Palacio Municipal de Congresos de Madrid, **Madrid, Spain** (poster presentation, student participation programme)
- S.M.O. Tavares, 'Design of aircraft structures considering new manufacturing processes', June 30, 2011, presentation at E3 Education Employment Entrepreneurship Forum, organized by MIT-Portugal students, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, **Caparica, Portugal**
- AIRBUS PhD Day, **Toulouse, France**, Oct. 17, 2011, poster: 'Design and advanced manufacturing of aircraft structures using friction stir welding'

Valentin Richter-Trummer

- AIRBUS PhD Day, **Toulouse, France**, Oct. 17, 2011, poster: 'Residual stress effects and damage tolerance behavior of integral lightweight structures manufactured by FSW and HSM'

Other interventions and coverage

- A.S. Carvalho, A.T. Marques, P.M.S.T. de Castro, 'Ensino vs. investigação, na FEUP', Congresso FEUP 2011, Porto, Portugal, October 3-4, 2011
- P.M.S.T. de Castro, 'Os doutoramentos na FEUP e seu enquadramento', Congresso FEUP 2011, Porto, Portugal, October 3-4, 2011; published as: 'Os doutoramentos', **Newsletter SPEE (Sociedade Portuguesa para a Educação em Engenharia)**, ISSN 2182-0945, Nº 4, Nov. 2011, p.13
- 'Student Profile: Sérgio Tavares, Engineering Design and Advanced Manufacturing (EDAM)' e-News MIT-Portugal, Nov. 2011
<http://www.mitportugal.org/profiles/student-profile-sergio-tavares-engineering-design-and-advanced-manufacturing-edam.html>
- 'Mechanical Engineering Doctoral Programme: Work in Progress 2010 – a Sample', P.M.S.T. de Castro, ed., FEUP, 62 pages, 2011

Missions

Daniel F.C. Peixoto

- Nov. 30, 2011, Maison de la Mécanique, **Paris, France**, meeting on twin disc machines for tribological testing, with representatives of LaMCoS (INSA Lyon, France), Supmca, (Paris, France), PSA (Belchamp, France), NTN-SNR (Annecy, France), CETIM (Senlis, France),

Ascometal CREAS (France), and University of Porto, Portugal represented by Daniel F. C. Peixoto

Paulo M.S.T. de Castro

- AIRBUS PhD Day, **Toulouse, France**, Oct. 17, 2011

Sérgio M.O. Tavares

- 49e Salon International de l'Aéronautique et de l'Espace, **le Bourget, Paris, France**, June 23-24, 2011

Valentin Richter-Trummer

- stay at AIRBUS Hamburg, under the local supervision of Marco Pacchione, in the context of the FCT PhD scholarship SFRH/BD/41061/2007, **Hamburg, Germany**, Feb.-August 2011

others

- Cecília Vale (Dep. Civil Engng., FEUP), presentation at the railways session of the FP7 Transport Information Days 2011 - 18-19 July 2011, **Brussels, Belgium**, including slides of projs. FCT Railways and QREN LighTrain

Meetings

- P.M.S.T. de Castro, V. Richter-Trummer, meeting for discussion of possible projects, **Lisbon, Portugal**, Nov. 7, 2011, with Fernando Fernandez (EMBRAER), João Taborda (EMBRAER), Pedro Vilaça (IST)
- P.M.S.T. de Castro, kick-off project QREN LighTRAIN, ALSTOM Portugal, **Lisbon, Portugal**, Nov. 10, 2011
- P.M.S.T. de Castro, P.M.G.P. Moreira, technical workshop with ALSTOM Transport, Dec. 21, 2011, ALSTOM Portugal, **Lisbon, Portugal**, (project QREN LighTRAIN)

Project reports

- Pedro M.G.P. Moreira, Rui A.M. da Silva, Miguel A.V. de Figueiredo, Paulo M.S. T. de Castro, 'Relatório de ensaio de resistência da ligação da estrutura/tejadilho de autocarro CAETANOBUS, S.A', INEGI, Porto, Feb. 11, 2011
- Pedro M.G.P. Moreira, Lucas F.M. da Silva, Nuno Ramos, 'SAMECA, Adhesive tapes tests according to PSTC101 and PSTC6', INEGI, Porto, May 2011
- Daniel F. C. Peixoto (IDMEC-FEUP), Bin Li (IST), A. Castanhola Batista (FCTUC), *rapporteurs*, 1º Relatório de progresso, correspondente ao primeiro ano; projecto da Fundação para a Ciência e Tecnologia PTDC/EME-PME/100204/2008 'Railways', Março de 2011
- P.M.S.T. de Castro, P.M.G.P. Moreira, powerpoint presentation – contribution to state of the art, project QREN LighTRAIN - technical workshop with ALSTOM Transport, ALSTOM Portugal, Lisbon, Dec. 21, 2011

Evaluations

- ERASMUS MUNDUS Call EACEA/41/10, **Brussels, Belgium**, June 7-11, 2011, P.M.S.T. de Castro
- FCT, final RD projects reports, Mechanical Engng. area, P.M.S.T. de Castro, 2011

Academic panels, juri

- P.M.S.T. de Castro, member of juri, selection of an associate professor, Universidade da Beira Interior, **Covilhã, Portugal**, Jan. 11, and March 10, 2011
- P.M.S.T. de Castro, member of juri, *Agregação* of Filipe Samuel Silva, Universidade de Coimbra, **Coimbra, Portugal**, April 13-14, 2011
- P.M.S.T. de Castro, member of juri, Technische Universität Braunschweig, doctoral thesis of Sascha Haeusler, **Braunschweig, Germany**, April 18, 2011
- P.M.S.T. de Castro, member of juri, *Agregação* of Marcelo F.S.F. de Moura, Universidade do Porto, **Porto, Portugal**, April 28-29, 2011
- P.M.S.T. de Castro, member of juri, *Agregação* of Amílcar L. Ramalho, Universidade de Coimbra, **Coimbra, Portugal**, May 9-10, 2011
- P.M.S.T. de Castro, member of juri, selection of an assistant professor (*professor auxiliar*), IST, Technical University of Lisbon, **Lisbon, Portugal**, Sept. 9, and Sept. 28, 2011
- P.M.S.T. de Castro, member of juri, *Agregação* of Lucas F.M. da Silva, Universidade do Porto, **Porto, Portugal**, Sept. 15-16, 2011
- P.M.S.T. de Castro, member of juri, selection of a full professor (professor catedrático), Faculdade de Ciências e Tecnologia da Universidade de Coimbra, **Coimbra, Portugal**, Dec. 9, 2011

Societies' service

- P.M.G.P. Moreira, vice-coordinator, *divisão 'Fractura'* (fracture division) of SPM - Sociedade Portuguesa de Materiais
- P.M.S.T. de Castro, coordinator, *divisão 'Fractura'* (fracture division) of SPM - Sociedade Portuguesa de Materiais⁴

Visitors

Among others

- Ana Correia, MRA, **Portugal**, Nov. 3, 2011
- Jorge F. dos Santos, HZG, **Germany**, Oct. 9-11, 2011
- José Antonio Fernández, ALAVA, **Spain**, Nov. 3, 2011
- Julien Le Fanic, AIRBUS Fatigue & Damage Tolerance, LR Centre Fuselage, Structural & Computational Mechanics, Toulouse, **France**, July 21, 2011
- Mário Almeida Santos, OGMA, Alverca, **Portugal**, Oct. 10, 2011
- Nuno Rebelo, General Manager and Technical Director, SIMULIA West, **USA**, June 2, 2011
- Quê Vu Do, **France**, May 20, 2011
- Stefan Dan Pastrama, Department of Strength of Materials, University Politehnica of Bucharest, **Romania**, Feb. 21-March 6, 2011

⁴ Outcome in 2011: signature of Memorandum of Understanding between The International Congress on Fracture/The World Academy of Structural Integrity, located at Tohoku University, Sendai, Japan, and Sociedade Portuguesa de Materiais located at Campus do Lumiar, Lisboa, Portugal, to establish a programme of exchange and collaboration in areas of interest and benefit to both organisations; signed on behalf of ICF-WASI by Alberto Carpinteri (Politecnico di Torino, Italy) and David Taplin (Plymouth, UK), and on behalf of SPM by J. Bordado (IST, Lisbon), P.M.S.T. de Castro (FEUP) and P.M.G.P. Moreira (INEGI).

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- Augusto Rego, FEUP doctoral candidate, PRODEM FEUP
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- Calouste Gulbenkian Foundation (PhD scholarship of Daniel F.C. Peixoto)
- CATIM - Metrologia Dimensional 3D (Jorge Barbosa, Fernando Ferreira)
- ERASMUS programme (visit to FEUP Porto of Stefan D. Pastrama; Msc thesis at FEUP Porto of Christoph Thies; MSc thesis of J.T.A. de Melo at the Depart of Aeronautical Engng. of Imperial College London)
- FCT (projects and PhD scholarships of Sérgio M.O. Tavares and Valentin Richter-Trummer)
- Jorge Seabra, FEUP professor, Dep. Mech. Engng.
- Lucas F.M. da Silva, FEUP professor, Dep. Mech. Engng.
- Luís A. Ferreira, FEUP professor, Dep. Mech. Engng.
- Pedro P. Camanho, FEUP professor, Dep. Mech. Engng.
- QREN
- Rui Calçada, FEUP professor, Dep. Civil Engng.
- Workshops of INEGI-DEMec FEUP (José F.R. Almeida *et al.*)