

MD 2023

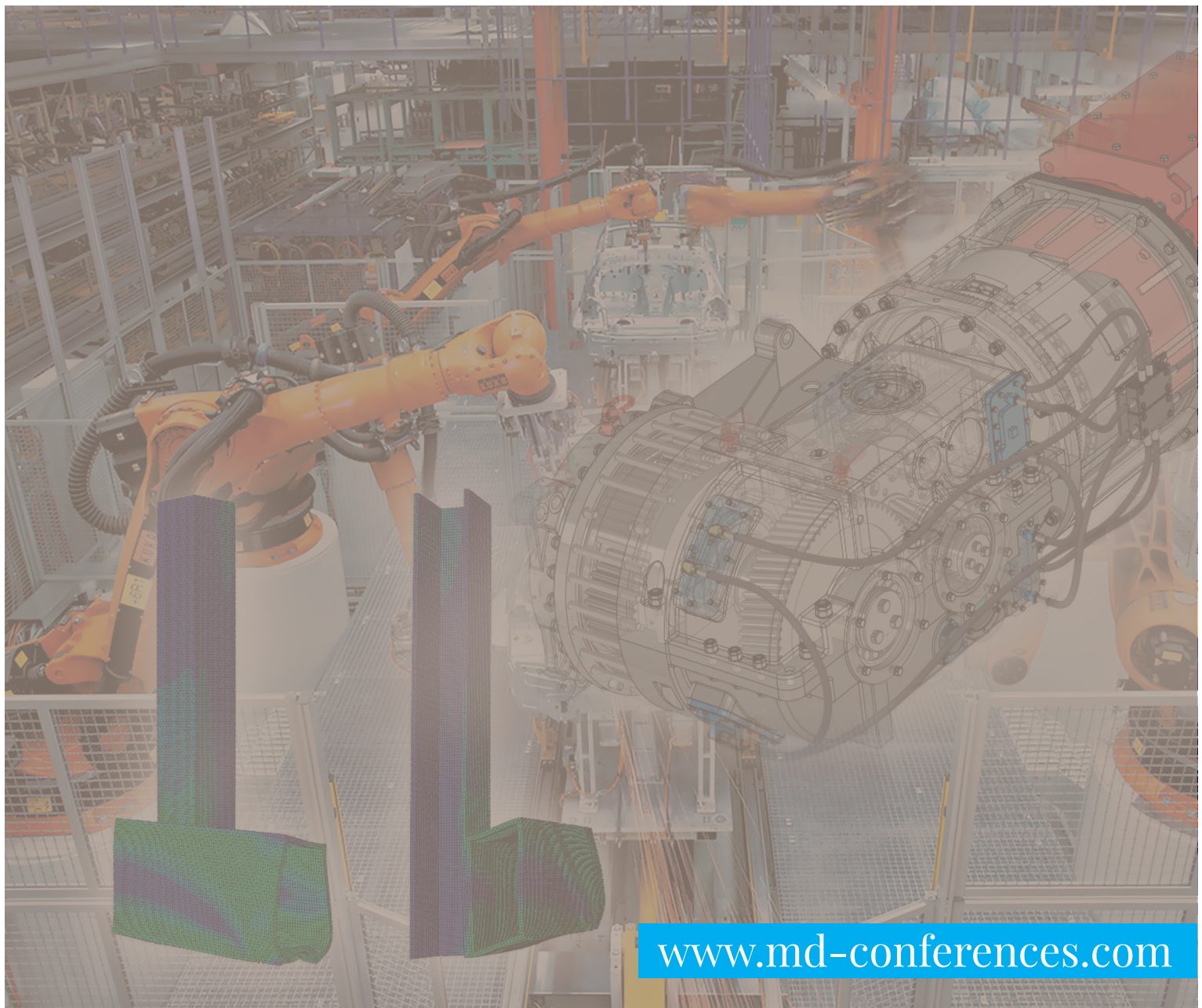
International Conference on Machine Design

Programme

7-8 SEPTEMBER 2023

Faculty of Engineering – University of Porto
Porto, Portugal

U. PORTO
FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO



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Programme

Author name underlined → presenting author

Time Thursday 7 September 2023

08:40 MD2023 Opening (Room B032)

Session 1: Machine Elements & Mechanisms I

(Chair: P. Beneš, Czech Technical University in Prague, Czech Republic; L. F. M. da Silva, University of Porto, Portugal)

Room B032

09:00 **Experimental and numerical evaluation of a granular damping element** MD23_01
S. Avdić, M. Nagode, J. Klemenc, S. Oman (University of Ljubljana, Faculty of Mechanical Engineering, Slovenia)

09:20 **Predicting Friction Torque and Kinematics of Tapered Roller Bearings using a detailed Multibody Simulation Model** MD23_62
P. Wingerts Zahn (RPTU University of Kaiserslautern-Landau, Kaiserslautern, Germany), O. Koch

09:40 **Collocated and non-collocated active spatial absorbers** MD23_26
Z. Šika, J. Gregor, K. Kraus, P. Beneš (Czech Technical University in Prague, Czech Republic), J. Krivošej, T. Vyhliđal

10:00 **Dynamic optimization of the crank system** MD23_30
M. Meléndez (Ikerlan Research Center, Spain), F. Martínez, A. Cenitagoya, M.J. Cabello

10:20 **Design of a slow sound based acoustic metamaterial with sub-wavelength thickness** MD23_22
W. Bova, E. Nijman, M. Polanz, D. Mundo (University of Calabria, Italy)

10:40 COFFEE BREAK (Room under the Auditorium)

Session 2: Machine Automation & Testing I

(Chair: Francisco J. G. Silva, Polytechnic of Porto, Portugal; R. J. C. Carbas, INEGI, Porto, Portugal)

Room B032

11:00 **2D and 3D Wires Formability for Car Seats: A Novel Full-Automatic Equipment Concept towards High Productivity and Flexibility** MD23_44
Manuel Gaspar, Francisco J. G. Silva (Polytechnic of Porto, Portugal), Raul D. S. G. Campilho, André F. V. Pedroso, N. P. V. Sebbe, R.C.M. Sales-Contini

11:20 **Identifying Impacts Caused by a Fault on a Gear Tooth Using Machine Learning for Predictive Maintenance** MD23_36
M. Cavacece (University of Cassino and Southern Lazio, Italy)

11:40 **A novel full-automatic concept to produce Bowden cables first subset improving productivity, flexibility, and safety** MD23_45
Eduardo Eiras, Francisco J. G. Silva (Polytechnic of Porto, Portugal), Raul D. S. G. Campilho, André F. V. Pedroso, N. P. V. Sebbe, R.C.M. Sales-Contini

12:00 **Offline Validation of the Design of Digital Twin Control Modelling for Electro Pneumatic Systems** MD23_07
A.A. Santos (School of Engineering of Porto, Polytechnic of Porto, Portugal), A.F. Silva, F. Pereira, C. Felgueiras, M. Silva

12:20	A low cost, high-resolution strain sensing framework for embedded monitoring of finite stiffness deformations in machine tool structures T. Furness (The University of Huddersfield, Queensgate, Huddersfield, UK), S. Fletcher	MD23_61
12:40	Distribution of the residual tolerable imbalance between correction plans M. Cavacece (University of Cassino and Southern Lazio, Italy)	MD23_37
13:00	LUNCH BREAK (Room under the Auditorium)	
<p>Session 3: Machine Elements & Mechanisms II (Chair: C. M. da Silva, University of Porto, Porto, Portugal; E. Marques, University of Porto, Porto, Portugal)</p>		
Room B032		
14:00	Meshing principle of Archimedean worm drive J. Cui, Y. Zhao (School of Mechanical Engineering and Automation, Northeastern University, China), G. Li	MD23_04
14:20	An efficient analytical method for misaligned planetary gears through a distributed contact force model J. Marco Jordan (Mechanical Engineering Department, KU Leuven, Belgium), B. Blockmans, B. De Smet	MD23_14
14:40	A new model for increasing economic and environmental sustainability in cutting abrasive discs from rectangular shapes V. F. C. Sousa (ISEP, Polytechnic of Porto, Porto, Portugal), Francisco J. G. Silva, Raul D. S. G. Campilho, R.C.M. Sales-Contini, André F. V. Pedroso, N. P. V. Sebbe, J. Moreira	MD23_57
15:00	A Symbolic Approach to Kinematics and Compliance Analysis of Suspension Mechanisms M. Larcher (University of Trento, Italy), D. Stocco, M. Tomasi, F. Biral	MD23_17
15:20	Impact of tooth friction on the instantaneous angular speed of spur gears G. Spaggiari (University of Lyon, France), D. Remond, A. Bourdon, T. Touret, C. Changenet, S. Mayoux	MD23_23
15:40	Assessing the Effects of Interference Fit Assembly on Gear Tooth Surface Deviations A. Fuentes-Aznar (Rochester Institute of Technology, USA), I. Gonzalez-Perez	MD23_53
16:00	COFFEE BREAK (Room under the Auditorium)	
<p>Session 4: Machines I (Chair: A. Fuentes-Aznar, Rochester Institute of Technology, USA; Andrea Piga Carboni, Federal University of Santa Catarina, Joinville, Brazil)</p>		
Room B032		
16:20	Packaging machine vibration reduction by dynamic balancing M. Asensio (IKERLAN Research Centre, SPAIN), F. Martínez, M. Cabello, M. López-Lombardero, A. Cenitagoya, J. Manterola, M. Melendez	MD23_03
16:40	Conception and design of machine elements of a wear test rig for quality assurance of remanufactured ground exploring tools' (GETs') components N. Mswela (Department of Mechanical, Energy, & Industrial Engineering, Botswana International University of Science and Technology, Palapye, Botswana), S. Macha, K. Orapeleng, T. Motimedi, R.V.S. Prasaad, B. Matshediso, E.O. Olakanmi	MD23_59
17:00	Characterisation of surface roughness using additive manufacturing of PEEK for fluid transport D. Šeruga (University of Ljubljana, Faculty of Mechanical Engineering, Slovenia), H. Bouma, M. Wolbers, J. Klemenc, M. Nagode, S. Oman	MD23_43

17:20	Vibration analysis of motorcycle handlebar for riding comfort L. Nogueira Caldas, <u>A. Piga Carboni</u> (Federal University of Santa Catarina, Joinville, Brazil), T. A. Fiorentin	MD23_54
17:40	On the design of unconventional testing machines for adhesive characterization – the case study of Advanced Joining Processes Unit A. F. G. Tenreiro, <u>E. A. S. Marques</u> (Faculdade de Engenharia da Universidade do Porto, Portugal), R. J. C. Carbas, C. M. da Silva, A. M. Lopes, L. F. M. da Silva	MD23_16
18:00	Electric underwater tools for Sun Coral Management Barbara Segal, <u>Andrea Piga Carboni</u> (Federal University of Santa Catarina, Joinville, Brazil), Marcelo Crivellaro, Thais Gainó, Arthur Sena Marques, Luiz Appel	MD23_28
19:00	Poster session and RECEPTION (Room under the Auditorium)	
Poster 1	Estimation of cogging stiffness of a PMSM-driven rod <u>E. Vanbecelaere</u> (Ghent University, Belgium), J. De Viaene, M. Monte, K. Stockman	MD23_31
Poster 2	A Simple and Practical Vibration Control Method for Stacker Cranes Using Dynamic Interaction and Its Experimental Verification <u>M. Iwamura</u> (Fukuoka University, Japan), T. Goto, Y. Shinto, A. Nakatsuru, M. Iwano, T. Shimogawa	MD23_32
Poster 3	Custom Testing Machine for Weak Snowpack Layers <u>I. L. J. Camacho</u> (Faculdade de Engenharia da Universidade do Porto, Portugal), A. M. Lopes, C. M. da Silva, R. J. C. Carbas, E. A. S. Marques, L. F. M. da Silva	MD23_48
Poster 4	Machine Learning-Based Methods for Quantification of Weak Adhesion in Single Lap Joints Using Lamb Waves for Structural Health Monitoring <u>G. Ramalho</u> (Faculdade de Engenharia da Universidade do Porto, Portugal), A.M. Lopes, L.M.F. da Silva	MD23_25
Poster 5	Void detection in bonded joints with computed damage metrics from Electromechanical impedance spectra <u>A.F.G. Tenreiro</u> (Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial, Portugal), A.M. Lopes, L.M.F. da Silva	MD23_10
Poster 6	Application of Machine Learning Methods for Locating Weak Adhesion in Single Lap Joints Using Lamb Waves for Structural Health Monitoring <u>G. Ramalho</u> (Faculdade de Engenharia da Universidade do Porto, Portugal), A.M. Lopes, L.M.F. da Silva	MD23_24
Poster 7	Development and Validation of Dynamic Models on Multiple Scales for Research on Rolling Bearings <u>P. Wingertszahn</u> (RPTU University of Kaiserslautern-Landau, Kaiserslautern, Germany), O. Koch	MD23_63
Poster 8	Development of a unified specimen for adhesive characterisation: Numerical and experimental study on the mode I (mDCB) fracture component <u>D.S. Correia</u> (Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial, Portugal), I.D. Costa, B.D. Simões, E.A.S Marques, R.J.C. Carbas, L.F.M da Silva	MD23_09

Session 5: Optimization

(Chair: D. Šeruga, University of Ljubljana, Faculty of Mechanical Engineering, Slovenia; C. M. da Silva, University of Porto, Porto, Portugal)

Room B032

08:40	Enhanced design parameters of a cylindrical helical compression spring using an optimization algorithm and a non-linear behavior model G. Cadet (Université de Toulouse, France), M. Paredes	MD23_05
09:00	A method to establish a thermal digital twin of a gearbox A. Monot (University of Lyon, France), T. Touret, C. Changenet, F. Ville, T. Grangeorge, F. Fayolle	MD23_12
09:20	Optimization of Cutting Parameters by Measuring Cutting Force in Sawing Machines M.B. Alisinoğlu (Bursa Uludağ Üniversitesi, Turkey), S.E. Hayber	MD23_08
09:40	Economic lot scheduling problem with returns in a remanufacturing system S. Abid (Mohammed V University, Morocco), F. Mhada	MD23_21
10:00	Optimal control of a spatial inverted pendulum using the adjoint method P.W. Maciąg (Warsaw University of Technology, Poland), P.A. Malczyk, J. Frączek	MD23_27
10:20	Optimum design of shaft-bore cooling structure for machine tool spindle S. Wakiya (Kanagawa University Graduate School, Japan), J. Kusuyama, Y. Nakao	MD23_29

10:40 **COFFEE BREAK (Room under the Auditorium)**

Session 6: Machine Automation & Testing II

(Chair: Saša Zelenika, University of Rijeka, Croatia; R.D.S.G. Campilho, School of Engineering, Polytechnic of Porto, Portugal)

Room B032

11:00	Design of a modular soft tool for automatic seed sowing K. Blanco (Centre for Automation and Robotics, Spain), E. Navas, L. Emmi, R. Fernández	MD23_06
11:20	Productivity improvement of control cable manufacturing equipment for the automotive industry P.M.S. Ramalho, R.D.S.G. Campilho (School of Engineering, Polytechnic of Porto, Portugal), F.J.G. Silva, A.F.V. Pedroso, R.C.M. Sales-Contini	MD23_18
11:40	Numerical Design of a Thread-Optimized Gripping Setup for Single Lap Joint Testing in a Split Hopkinson Pressure Bar B. S. Moreira, P. D. P. Nunes, C. M. da Silva, A. F. G. Tenreiro (Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial, Portugal), A. M. Lopes, R. J. C. Carbas, E. A. S. Marques, M. P. L. Parente, L. F. M. da Silva	MD23_15
12:00	Waste heat energy harvesting system for strength monitoring of honeybee colonies P. Gljušćić (University of Rijeka, Croatia), S. Zelenika	MD23_13
12:20	Artificial Intelligence Tool for Pneumatic System Design Control A.A. Santos (School of Engineering of Porto, Polytechnic of Porto, Portugal), A.F. Silva, F. Pereira, C. Felgueiras, M. Silva	MD23_49
12:40	Design of a connector assembly equipment for the automotive industry P.M.P. Curralo, R.D.S.G. Campilho (School of Engineering, Polytechnic of Porto, Portugal), J.A.P. Pereira, F.J.G. Silva, A.F.V. Pedroso, R.C.M. Sales-Contini	MD23_19

13:00 **LUNCH BREAK (Room under the Auditorium)**

Session 7: Machine Automation & Testing III

(Chair: Luciano E. Chiang, Pontificia Universidad Católica de Chile, Chile; R. J. C. Carbas, INEGI, Porto, Portugal)

Room B032

14:00	Hydraulic Control System of a Robotic Arm equipped with a Flying Shear for Cutting Pipes <u>M. Cavacece</u> (University of Cassino and Southern Lazio, Italy), G. Figliolini, C. Lanni	MD23_38
14:20	Influence of Laser Marking Parameters in the DMC Code on the Quality of PBT/Glass Fibre Composite Surface Analysed by SEM <u>R.C.M. Sales-Contini</u> (ISEP, Polytechnic of Porto), João Pedro Costa, F.J.G. Silva, Arnaldo G. Pinto, Isabel Mendes Pinto, R.D.S.G. Campilho	MD23_65
14:40	Design and selection of web processing traction coating <u>J. De Viaene</u> (University Ghent, Belgium), Y. Thielemans, A. K. Mathivanan, J. D. M. De Kooning, K. Stockman	MD23_33
15:00	Novel Robot Arm Concept for Lightweighting High Performance Machinery <u>K. John</u> (University of Huddersfield, UK), S. Fletcher, T. Furness	MD23_34
15:20	Application of packing problem to grasping by a two-finger gripper used in forest harvesting Yesid A. Caicedo, <u>Luciano E. Chiang</u> (Department of Mechanical and Metallurgical Engineering, Pontificia Universidad Católica de Chile, Chile)	MD23_46
15:40	Error Analysis of Inertial Navigation <u>M. Cavacece</u> (University of Cassino and Southern Lazio, Italy)	MD23_35

16:00 COFFEE BREAK (Room under the Auditorium)

Session 8: Machines II

(Chair: A. M. Lopes, University of Porto, Portugal; L. F. M. da Silva, University of Porto, Portugal)

Room B032

16:20	Design and sizing of an automatic wire feeding welding machine D.O. Tavares, <u>V.F.C. Sousa</u> (ISEP – School of Engineering, Polytechnic of Porto, Porto, Portugal), R.D.S.G. Campilho, F.J.G. Silva, A.F.V. Pedroso	MD23_60
16:40	Computer Application for Electric Network Management of an Industrial Company <u>A.F.V. Pedroso</u> (School of Engineering, Polytechnic of Porto, Portugal), F.J.G. Silva, R.D.S.G. Campilho, R.C.M. Sales-Contini, R.R. Moreira	MD23_40
17:00	Design and Development of a High-Speed Twin-Disc Test Rig for Rolling-Sliding Contact Test <u>A.A. Carvalho</u> (Competence Center in Manufacturing, Aeronautics Institute of Technology, Departamento de Ciência e Tecnologia Aeroespacial, Brazil), R.R da Silva, D.L. Xavier, R.R. Rego	MD23_42
17:20	Lifespan increase of electrical terminal crimping tools for the automotive industry H.M.B. Lemos, R.D.S.G. Campilho, F.J.G. Silva, R.P. Martinho, <u>A.F.V. Pedroso</u> (School of Engineering, Polytechnic of Porto, Portugal)	MD23_39
17:40	Die Casting Thermal Diffusion Study Through the Natti Gunter Process <u>R.C.M. Sales-Contini</u> (ISEP, Polytechnic of Porto), Helder Pinto, F.J.G.Silva, R.D.S.G. Campilho	MD23_64
18:00	Dynamic behavior of power losses in a power-circulating rig for gear testing <u>A.A. Carvalho</u> (Competence Center in Manufacturing, Aeronautics Institute of Technology, Departamento de Ciência e Tecnologia Aeroespacial, Brazil), N.M. Andrade, R.R. Rego	MD23_41

20:00 MD2023 BANQUET (Blini restaurant)