NUMISHEET 2016: The 10th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes:

Part A - Benchmark Problems and Results
Part B - General Papers

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Part B: Rui P.R. Cardoso, Eduardo Souza Neto, J.M.A Cesar de Sa and O.B. Adetoro

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PREFACE

The NUMISHEET conference series have been established as a world-class forum through which new intellectual ideas and technologies in the area of sheet metal forming simulation are exchanged. Previous NUMISHEET conferences have given enormous contributions to industry and academia in what regards the development of new methods and ideas for the numerical simulation of sheet metal forming processes. Previous NUMISHEET conferences were held in: Zurich (Switzerland, 1991), Isehara (Japan, 1993), Dearborn (USA, 1996), Besancon (France, 1999), Jeju Island (South Korea, 2002), Detroit (USA, 2005), Interlaken (Switzerland, 2008), Seoul (South Korea, 2011) and Melbourne (Australia, 2014).

The NUMISHEET 2016 conference will be held in Bristol, UK. It features technical, keynote and plenary sessions and mini-symposiums in diverse sheet metal forming areas including the recently introduced incremental sheet forming and electromagnetic forming, as well as new prominent numerical methods such as IsoGeometric Analysis and meshless methods for sheet analysis. NUMISHEET 2016 will have eight academic plenary lectures delivered by worldwide recognised experts in the areas of sheet metal forming, material modelling and numerical methods in general. Also, NUMISHEET 2016 will have three industrial plenary lectures which will be addressed by three different companies with strong businesses in sheet metal forming processes: AutoForm, Crown Technology and Jaguar Land Rover.

One of the most distinguishing features of NUMISHEET conference series is the industrial benchmark sessions, during which numerical simulations of industrial sheet formed parts are compared with experimental results from the industry. The benchmark sessions provide an extraordinary opportunity for networking, for the exchange of technologies related to sheet metal forming and for the numerical validation of sheet metal forming codes/software. Three benchmark studies have been organised in NUMISHEET 2016: BM1) “Benchmark 1 – Failure Prediction after Cup Drawing, Reverse Redrawing and Expansion”, for both an aluminium AA 5352 and steel TH330 alloys, where the major objectives are predicting the earing profile of the cup and the failure point after complex nonlinear strain paths; BM2) “Benchmark 2 – Springback of a Jaguar Land Rover Aluminium Panel”, where it is intended to study the thickness distribution and the springback profiles of a component of a Jaguar car at three particular cross-sections; BM3) “Benchmark 3 – Springback of an Al-Mg alloy in warm forming conditions”, where the main objective is to predict the springback of a Al-Mg alloy after warm forming conditions.

The conference proceedings will include a standard proceedings for regular and keynote papers (Part B) and a separated proceedings for the industrial benchmarks (Part A). Both proceedings will be published by the Institute of Physics (IOP) and will be included in SCOPUS database for a wide scientific dissemination. The benchmarks book proceedings, Part A, will be available through a printed paperback book and an electronic version and the proceedings book for the regular papers, part B, will be available through a USB pen drive. Both
proceedings books will also be available online through the Institute of Physics publishers’ platform.

The NUMISHEET 2016 international conference is organising two special issues in two prestigious peer-reviewed international journals: 1) The International Journal of Solids and Structures; 2) The European Journal of Computational Mechanics. The NUMISHEET 2016 conference delegates are thus invited to submit an extended version of their papers for these two special issues, which will have a peer reviewed process as usual before publication in the journals.

Bristol, United Kingdom, July 15, 2016
NUMISHEET2016 Chairs
Rui P.R. Cardoso, E. Souza Neto, J.M.A. Cesar de Sa, O.B. Adetoro
ACKNOWLEDGEMENT

The NUMISHEET conference has a particular characteristic of joining experts from academia and industry for the discussion of numerical methods around the simulation of 3D sheet metal forming processes. The organising committee would like to express their gratitude to the many distinguished individualities that contributed enormously to the success of this conference. We gratefully acknowledge:

The conference participants that are taking part in this prestigious conference either by presenting scientific papers or by participating with their simulations in the benchmark case studies;

Professors: Ferri Aliabadi (Imperial College London, UK), Rene De Borst (University of Sheffield, UK), Anne-Marie Habraken (University of Liege, Belgium), Akhtar Khan (University of Maryland, USA), Stelios Kyriakides (University of Texas, USA), Eugenio Onate (Technical University of Catalunya, Spain), Rade Vignjevic (Brunel University London, UK) and Jeong Whan Yoon (Deakin University, Australia) for accepting to deliver the plenary lectures and for all their support to this conference;

The Industrial Plenary Speakers: Dr Kevin Ambrose (Crown Technology, UK), Dr Bart Carleer (AutoForm), Dr Neil Small and Mr Matt Stanton (Jaguar Land Rover, UK) for accepting to deliver these important Industrial Plenary sessions, giving more of an industrial flavour to this conference;

The organisers of the mini-symposiums: MS1 - “Forming defects, material and shape instabilities”, P. Manach, J.B. Kim and S. Thuillier”; MS2 - “Challenges in characterization and modelling of Titanium materials”, O. Cazacu and B. Revil-Baudard; MS3 - “Formability in Sheet Metal Forming Processes”, X. Zhu, S. Li and T. B. Stoughton; MS4 - "Meshless Method in Manufacturing", E. Barbieri and P.H. Wen; MS5 - “Isogeometric Analysis of Structures with Applications to Shells and Contact/Impact”, S. Hartmann, Y. Bazilevs and D. Benson; MS6 - ”Material Modelling for Sheet Metal Forming”, F. Barlat, J.W. Yoon; MS7 – "Incremental sheet forming processes", R.J. Alves de Sousa, A. K. Behera and F. A. Lora;

The University of the West of England, Bristol, UK, for hosting this conference and for facilitating administrative resources such as contracting and administrative staff. In particular, we would like to thank Professor Glenn Lyons for his fantastic support to this conference;

The sponsors of this conference: AutoForm (Gold Sponsor), ESI Group (Bronze Sponsor) and JSTAMP (Bronze Sponsor) for the financial support given;

The organisers of the three benchmarks in general for their various contributions on the preparation of these challenging case studies about sheet metal forming. Regarding benchmark 1 (BM1), we would like to acknowledge the contributions of Crown Technology, from Martin Watson and his research team composed by Helen Huang, Andrew Lockley and Rosie Moffat for the coordination and dedication to this benchmark. We would like also to thank Alcoa Technical Center, USA, particularly Robert E. Dick, for the cup testing
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Regarding benchmark 2 (BM2), we would like first of all to thank Jaguar Land Rover for the industrial benchmark study on springback prediction of a complex industrial sheet metal formed part. We would like also to acknowledge Dr. Marta Oliveira from the University of Coimbra, Portugal, for her guidance and expertise, which turned out to be fundamental for the success of this benchmark. We are also very grateful to Dr. Sumit Hazra from Warwick University, UK, and his team for the discussions and for the 3D measurements of the thickness distribution and springback profiles at the different cross-sections.

Regarding benchmark 3 (BM3), we are really grateful to Professor Pierre Manach and his team at the University of Bretagne Sud and IRDL institute in France. Professor Pierre Manach and his team performed all of the necessary material testing and characterisation for warm forming conditions and conducted as well all the experiments required for the success of this benchmark;

The Steering Committee for their approval for the organisation of this important conference in Bristol UK. In particular, we are thankful for the guidance and mentorship given by the Chair of the Steering Committee, Professor Jeong Whan Yoon from Deakin University, Australia;

Miss Claire Garland from the Institute of Physics for her excellent support on the construction of the website and for the professionalism in dealing with several different requests from conference delegates;

Miss Vivien Calway of the University of the West of England, UK, for efficiently managing all of the secretarial tasks that were thrust upon her throughout the preparations for the conference.

We also greatly appreciate the devoted services of everybody involved somehow in this conference but are not explicitly recognised in any printed form.

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