University of Birmingham

Dr Khamis Essa BSc, MSc, PhD

Lecturer

School of Mechanical Engineering (/schools/mechanical-engineering/index.aspx)

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About

Dr. Essa is a lecturer in process modelling within the school of Mechanical Engineering. Following his PhD, Dr. Essa developed research projects in cooperation with Rolls-Royce, BAE systems and the MTC. During his PhD, Dr. Essa was the postgraduate finite element ABAQUS trainer at the University of Birmingham. Dr. Essa published more than eight journal papers, two conference papers and one text book based on his PhD research. He is awarded the Hufton Postgraduate award for his research achievements and has been nominated to the Birmingham International Employee of the Year award for his contribution to teaching.

Qualifications

Lecturer in Process Modelling

- PhD in Finite Element Modelling of Incremental Sheet Forming, University of Birmingham, 2011
- MSc in Tube Spinning processes, University of Alexandria, 2007
- BSc in Manufacturing Engineering, University of Alexandria, 2003

Biography

Dr. Essa holds a PhD in Mechanical Engineering from the University of Birmingham (2011), BSc and MSc degrees from the University of Alexandria, in Mechanical and Production Engineering. Following his PhD, Dr. Essa joined Partnership for Research in Simulation of Manufacturing and Materials (PRISM2) as a research staff leading research projects in cooperation with Rolls-Royce, MTC and the newly established centre CASIM2.

The majority of his research has focussed on the application of finite element (FE) modelling using ABAQUS and DEFORM software to simulate a variety of manufacturing processes such as hot isostatic pressing, additive layer manufacturing, dual-material upsetting, metal spinning and single point incremental forming (SPIF) processes. His process modelling experience extends to the use of Computational Fluid Dynamics in industrial applications using Flow-3D, ProCAST and Sigma Soft software. He developed a numerical model to predict the distortion of ceramic core during wax injection in investment casting.

His research interests include; manufacturing of auxetic structures from superelastic alloys using additive layer manufacturing for defence applications, Net-shape manufacturing using combined material processing techniques such laser fabrication and hot isostatic pressing for aerospace applications.

Teaching

Teaching Programmes

- BEng/MEng Mechanical Engineering

Teaching Modules

- Process Modelling
- Research and Professional Skills

Postgraduate supervision

Dr. Essa is interested in supervising doctoral research students in the following areas:

- Computational modelling and experimental testing of Net-shape hot isostatic pressing without dedicated tooling
- Developing of finite element models for machining of fiber reinforced composites.

Research

Research Themes

- Modelling of Manufacturing Processes
- Incremental Sheet Forming
- Hot Isostatic Pressing
- Selective Laser melting SLM
- Direct Laser Fabrication DLF
- Forging Processes
- Fluid-Solid interaction in investment casting
- Design of Experiments

Current Research Projects

- Hot Isostatic Pressing of RR-1000 Nickel-based Superalloys for the manufacturing of small aerospace casing demonstrator funded through PRISM2.
- Net Shape Manufacture of INC718 Superalloy Engine Casing NESMONIC, funded by Clean Sky, 2013
- Additive layer manufacturing of superelastic-auxetic structures, research proposal submitted to the Centre of Defence Enterprise CDE.

Publications

Books

- Essa, K., 2011. Conventional Spinning and Single Point Incremental Forming: Numerical Investigation and Statistical Analysis. LAP LAMBERT Academic Publishing GmBH, Germany, ISBN: 978-3-8454-4355-3.

Journal Publications

- Essa, K., Kacmarcik, Hartley, P., I., Plancak, M. and Vilotic, D., 2012. Upsetting of bi-metallic ring billets. Journal of Materials Processing Technology, 212(4): pp.817-824.
- 4. Hartley, P.;Plancak, M.;Essa, K.;Vilotic, D.;Movrin, D., 2012. Deformation analysis during bi-metallic coining operations. Steel research international journal (Accepted and in-print).
- Essa, K. and Hartley, P., 2010. An evaluation of shear deformation mechanisms in single point incremental forming using a dual-level finite-element model. Computer Methods in Materials Science CMMS, 12(1): pp.37-50.
- Essa, K. and Hartley, P., 2010. Investigation on the effects of process parameters on the through-thickness shear strain in single point incremental forming using dual level FE modelling and statistical analysis. Computer Methods in Materials Science CMMS. 10(4): pp. 1-11.
- Essa, K. and Hartley, P., 2010. An assessment of various process strategies for improving precision in single point incremental forming. International Journal of Material Forming, DOI 10.1007/s12289-010-1004-9.
- Essa, K. and Hartley, P., 2010. Optimization of conventional spinning process parameters by means of numerical simulation and statistical analysis. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture. 224(11): pp. 1691-1705.
- Essa, K. and Hartley, P., 2009. Numerical simulation of single and dual pass conventional spinning processes. International Journal of Material Forming. 2(4): pp. 271-281.
- Essa, K. and Hartley, P., 2009. Numerical investigation on the effect of roller-trace in dual pass cup spinning. Journal for Technology of Plasticity. 34(2009): pp. 15-25.

Conference Publications

- Hartley, P.;Plancak, M.;Essa, K.;Vilotic, D.;Movrin, D., 2012. Deformation analysis during bi-metallic coining operations. Proceedings of the 14th International Conference on Metal Forming.
- Essa, K., 2009. Investigation of the forward tube spinning process by numerical simulation. BlueBEAR user forum, University of Birmingham.

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