

Carnegie Mellon University

Materials Science & Engineering

presents

Adventures in Bending: Forming Advanced and Ultra High Steel and Other Lightweight Materials

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ABSTRACT:

Recent government emission regulation has motivated weight reductions in vehicles. A majority of a vehicles mass is dependent on its body structure, and currently the body of a mainstream automobile is made of cold stamped steel. Body structures, therefore, need to become lighter, and thus sheet materials have to become stronger (per unit weight) and their forming properties have to be understood. Bending is critical since bending affects most areas of sheet metal forming. A/Prof Rolfe has spent 15 years investigating the bending properties of many high strength sheet metals. This talk will review some of the insights collected from him and others at forefront of research forming high strength materials.

Most of the projects undertaken by A/Prof Rolfe have been industry focused, including projects with local Australian manufacturing partners, Ford Motor Company, and Wuhan Iron and Steel Corporation (China). During his talk he will provide answers to some industrial questions, such as: How can we form these incredibly high strength materials into useful shapes? Also the age old manufacturing question – does variability in a stamped sheet panel come from the vehicle manufacturer or the steel supplier? What are the downstream effects of bending such high strength material? Why have automotive manufacturers moved to hot stamping (quenching) of steel? The answers to these questions rely on having a more fundamental understanding of the materials themselves.

BIOGRAPHY:



Bernard Rolfe completed a combined Economics and Engineering degree with honors in 1995 from the Australian National University (ANU). During his degree he was employed as a graduate research engineer at the BHP Research Labs, investigating better control systems for hot strip steel mills. After he obtained his degree he worked for several years as a Business Systems consultant with Andersen Consulting (Accenture) before returning to the ANU to pursue a PhD in novel methods of inverse modeling metal forming processes (completed in 2002). This research included an IMechE award winning journal paper. In 2005 Bernard joined Deakin as a Lecturer in Mechanical Engineering. In 2008 Bernard led the Deakin's successful team for "Creating the Model-T for the 21st Century – a Global University Challenge". This vehicle concept outclassed several other top Universities around the world to be awarded joint winner along with the concept from the University of Aachen (RWTH), along with \$25000 prize money. In 2015 Bernard received the Vice Chancellor's award for Industry Engagement.

Currently Bernard is an Associate Professor (Mechanical) at Deakin University in Australia. He has been a part of over fifteen successful nationally competitive large research grants, totaling over \$15 million in awarded funds. He has published over 150 refereed articles. He is the light weighting theme leader at the AutoCRC, and on the Academic Advisory Board of FISITA. His current research focus is the forming of light weight structures, including the development of better material models for metal forming.

Doherty Hall 2210, 11:30AM
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