

09:30 **OPENING OF CONFERENCE**

**PLENARY SESSION**

**Engineering Simulation as Viewed from the Boardroom**

Robert Joyce, Robert Joyce  
Recently Retired Ex Group Engineering Director and Executive CTEE Member at Jaguar Land Rover (JLR)

**Modelling, Analyses & Simulation: The Link with Artificial Intelligence to improve Design for Manufacturing & Services**

Phill Cartwright, CFMS

11:05 REFRESHMENT BREAK

**ADDITIVE MANUFACTURING**

**Meeting the End-to-End Process Challenges of Additive Manufacturing with a Platform Approach**

Stuart Nixon, Dassault Systèmes

**The Simulation of Residual Stress and Mechanical Performance of EBM-Manufactured Titanium Test Specimens**

Akash Gupta, CBM

**Simulation of the Stress Concentration around Pores in 3D Printed Components**

Karl-Michael Nigge, Volume Graphics GmbH

**ELECTRIC VEHICLES**

**Fast Charging - An Attractive Option for EVs Owners with Range Anxiety**

Geetan Damblanc, Siemens Simcenter: Amesim

**Thermal Management System Design, Simulation and Optimisation of Air Conditioning Systems for Plug in Hybrid Electric Vehicles**

Richard Merrett, Mentro

**Vibro-Acoustic Analysis of a Permanent Magnet Machine for Electrical Vehicles**

Gaurav Kumar, Siemens PLM Software

**SOLVER METHODS**

**3D Beam Elements Abstracted from 3D Solids FE Models with Shear Correction**

Ian McLuckie, AIES Ltd.

**Towards Industrial LES using High Order Discontinuous Galerkin Method**

Andrei Cimpoeru, CFMS Services

**DISCUSSION SESSION**

**Analysis Planning & Simulation Data Management, Complementary Techniques to Assure Confidence in Simulation Results**

Althea de Souza, Quesada Solutions Ltd.

12:45 LUNCH

**PLENARY SESSION**

13:45 **Envisioning Product Creation in the Coming Intelligence / Hyper-Connectivity / Mass Customization Era**

Ahmed Noor, Old Dominion University, Norfolk, VA.

**Making the Digital Twin Real: Challenges for Simulation**

Bill Dawes, University of Cambridge

REFRESHMENT BREAK

15:15

**DIGITAL TWIN**

**On the Way to a Digital Prototype - Wish or Already Reality?**

Nils Wagner, INTES GmbH

**In Support of the Digital Twin: A Geometric Paradigm to Model Performance Degradation and Assess System Robustness**

Richard Evans, Cambridge Flow Solutions

**ACOUSTICS**

**Force Based Squeak and Rattle assessment in CEVT vehicles interior**

Athanasios Fokylidis, BETA CAE Systems

**An Integrated Overview for Aero-acoustic Testing in Automotive Design**

Samson Cooper, Siemens Simcenter Solutions

**FATIGUE & FAILURE**

**Effect of Mitigation on Partial Failure of Storage Tank Using Computational Fluid Dynamics**

Islem Megdiche, Liverpool John Moores University

**Modelling of Double-Twisted Wire Mesh with Material Failure Criteria**

Hassan Al-Budairi, University of Glasgow

**Progressive Damage Model for Filament Wound Tubes**

Tassos Mesogitis, National Composites Centre

**DISCUSSION SESSION**

**Standardisation for Material Data Interfaces in CAE Workflows'**

Gino Duffett, NAFEMS

16:55 REFRESHMENT BREAK

**SIMULATION FOR DESIGN ENGINEERS**

**NAFEMS Publication - A Designers' Guide to CFD**

Michael Clapp, 80/20 Engineering

**Enabling Non-Expert Users (Designers and Analysts) Across the Enterprise to Discover Better Designs, Faster by Automating Design Exploration**

Stephen Boot, Siemens Simulation & Test

**BIOMEDICAL**

**Creating Simulation Ready Animal and Human Body Models from 3D Medical Image Data for Computational Modeling**

Rebecca Bryan, Synopsys

**An Inverse Finite Element Methodology to Derive Non-linearly Viscoelastic Material Properties**

Grigorios Grigoriadis, Imperial College London

**WORKSHOP SESSION**

**Sheet Metal Formability Material Properties, Failure and Simulation - OnDemand Training Course Review**

Trevor Dutton, Dutton Simulation

18:00 **END OF DAY 1**

DAY 1

## PLENARY SESSION

08:30 **Additive Manufacturing Technology: Enhancing Process Optimisation and Part Performance through Simulation**  
Tyler London, TWI Ltd

### OPTIMISATION

**Applications and Limitations of Structural Optimisation**  
John Crew, Cummins Ltd.

**CAB Cushion Shape Optimization Based on Genetic Algorithm and Numerical Analysis**  
June Young Song, Hyundai Mobis

### SIMULATION SUPPORTED DESIGN

**FE Model using Three Constitutive Soil Models to Test Structural Performance of a New Design for Manhole Buried in the Soil**  
Alaa Abbas, Liverpool John Moores University

**A Model-based Design Methodology for Rapid Preliminary Landing Gear Design**  
Elias Allegaert, Siemens PLM

### ACADEMICS SYMPOSIUM

**Big Simulation – Future Issues**  
KEYNOTE PRESENTER: Jim Boyle, University of Strathclyde

**Equilibrium Finite Elements in the Education of Engineers**  
Angus Ramsay, Ramsay Maunder Associates Limited

### WORKSHOP SESSION

**How to Build and Manage Simulation Engineer Competency**  
Nawal Prinja,  
Technology Director (Nuclear), WOOD Plc

10:10 REFRESHMENT BREAK

### NEXT LEVEL

**Applying Artificial Intelligence Machine Learning for 3D CAD model searches and classification**  
Peter Chow, Fujitsu Laboratories

**Combined solid modelling and meshing to create a new standard for CAD and CAE**  
Ian McLuckie, AIES Ltd.

**Taking Simulation to the Next Level - Finite Element Model and Engineer**  
Rodrygo Zaroni, Siemens Gamesa Renewable Energy / Brunel Netherlands

**Moving Simulation to the Cloud: Challenges and Opportunities**  
Steven Rossiter, AglieTek Engineering

### RENEWABLES

**Minesto Deep Green - Optimisation of the Power Takeoff System for a Novel Tidal Energy Device**  
Anthony Mosquera, Applied Computing & Engineering Limited

**Comparison of Different Techniques of Modelling an ultra-low speed Vertical Axis Wind Turbine**  
Ahmad Zakaria, Universiti Kuuala Lumpur

**Fluid-Structure Interaction of a Rigid Wing for Minesto Deep Green, a Tidal Wing Device**  
Daniel Hung, Applied Computing & Engineering Limited

### ACADEMICS SYMPOSIUM

**Simulation Education; Recognising Evolving Industry Requirements and Individual Needs when Dealing with Large Class Sizes**  
Declan Nolan, Queen's University Belfast

**Virtual Engineers of the Future: Recognising and Nurturing Talent in Undergraduate Degree Programmes**  
Lee Margetts, Manchester University

### ACADEMICS SYMPOSIUM: DISCUSSION SESSION

**Attracting and Retaining Women in Engineering Simulation**  
Althea de Souza, Quesada Solutions Ltd.

### WORKSHOP SESSION

**From Materials Testing through Stress Simulation and Experimental Validation**  
Andrew Halfpenny,  
Director of Technology , HBMPrenscia

12:10 LUNCH

## PLENARY SESSION

13:00 **Democratization of Simulation through Creation of a New Paradigm in Engineering Education by Combining Hands-on Simulations and Online Learning**  
Rajesh Bhaskaran, Cornell University

### MULTIBODY

**Comparison and Validation of Non-linear Flexible Rear Beam Axle in a Multi Body Systems Model**  
Peter Delves, Dassault Systèmes

**Numerical Modeling of Acceleration Response of Rockfall Catch Fences under Impact Loading**  
Hassan Al-Budairi, University of Glasgow

### THERMAL

**EV Drive-cycle Performance: Optimization and Thermal Analysis**  
Markus Andres, Siemens Simcenter: HEEDS

**Design and Simulation of Thermal Management Solutions for Professional LED Luminaires**  
Tamas Deak, Philips Lighting Hungary Kft.

### ACADEMICS SYMPOSIUM

### WORKSHOP SESSION

**How to Demonstrate Design Code Compliance using FEA**  
Nawal Prinja,  
Technology Director (Nuclear), WOOD Plc.

14:40 REFRESHMENT BREAK

### CONNECTIONS

**Contact Assembly Sequence Modelling**  
Vijay Narayanan, Siemens PLM

**Bolt Preload Modeling Methods**  
Prabu Ravindren, Siemens PLM Software Inc.

**Tribology Solutions for Fluid Lubricated Sliding Bearings**  
Ian McLuckie, AIES Ltd.

### AUTOMATION

**Using Template Driven CFD Technology for Advanced Automotive and Marine Applications**  
Sean Horgan, 80/20 Engineering Ltd.

**Automating the Structural Reliability Analysis of Trawl Pullover Using Isight**  
Arjun Rajkumar, Dassault Systèmes

**Automatic Hexahedral Meshing for Structures using the 3D Medial Axis**  
Shakeel Seebooa, International TechneGroup Ltd.

### ACADEMICS SYMPOSIUM

## PLENARY SESSION - CLOSING REMARKS

16:45 **CLOSE OF CONFERENCE**

DAY 2

# DAY 1 DISCUSSIONS & WORKSHOPS

## WORKSHOP SESSION

### Sheet Metal Formability Material Properties, Failure and Simulation - OnDemand Training Course Review

**Trevor Dutton, Dutton Simulation**

This workshop, led by Trevor Dutton, is an opportunity to review the proposed training material for a new OnDemand training course on Sheet Metal Forming Simulation. The course is intended to assist those involved in the design of sheet metal components to identify the key material properties and potential failure modes during manufacture. The course will demonstrate how CAE methods can be used to simulate the manufacturing method in order to identify any potential problems with the process.

During the one hour workshop, attendees will be encouraged to provide feedback on both the proposed technical content and the method of delivery, helping to ensure that the final delivered course meets NAFEMS member expectations and requirements.

## DISCUSSION SESSION

### Analysis Planning & Simulation Data Management, Complementary Techniques to Assure Confidence in Simulation Results

**Althea de Souza, Quesada Solutions Ltd.**

Essential steps in simulation governance for an analyst are to record what you plan to do to analyse an engineering problem and then to record what you assumed, what you did, what you found and what you concluded. While this is stating the obvious, consistent record keeping is essential for peer review, justification of results, quality compliance, subsequent further analyses and building a knowledge base. However record keeping can be dull and time consuming and it's easy to forget to record assumptions which were obvious at the time but which may not be obvious three months or three years later. This can be a significant barrier to the effective implementation of a Simulation Data Management (SDM) system, despite the wide ranging benefits that such systems can provide. In this discussion, we invite you to consider how a simple approach can be effective in developing simulation records that work for you and set the building blocks for a full SDM system in the future.

## DISCUSSION SESSION

### Standardisation for Material Data Interfaces in CAE Workflows'

**Gino Duffett, NAFEMS**

The VMAP project (vmap.eu.com) aims to develop a standard for the transfer of material data within complex Computer Aided Engineering (CAE) simulation workflows such as those found in virtual manufacturing simulation process and product design.

This workshop/discussion will enable interested parties to discuss their simulation process requirements, and the material data transfer, with VMAP to enable the standardization process to be more open and far-reaching and encourage the participation of more software vendors.

It would also enable contact with parties interested in playing a part in the open and vendor-neutral 'Material Data Exchange Interface Standard' community that the project will create. This community will provide best-practice guidelines and will ensure that standardisation efforts continue into the future.

# DAY 2 DISCUSSIONS & WORKSHOPS

## ACADEMICS SYMPOSIUM: DISCUSSION SESSION

### Attracting and Retaining Women in Engineering Simulation

**Althea de Souza, Quesada Solutions Ltd.**

We all know there is a shortage of simulation engineers in the UK. We have too few engineering graduates and they don't all get jobs in engineering, let alone in simulation. We need to attract and retain more people and one group that continues to be under-represented is women. Even when women become simulation engineers, they may not stay long term. Why is this and how can the situation be improved? The biggest challenges are often around suitable role models, confidence, flexible working patterns and returning after a career break. Come along and consider the role NAFEMS could play to address these issues and others that arise.

## WORKSHOP SESSION

### How to Build and Manage Simulation Engineer Competency

**Nawal Prinja, Technology Director (Nuclear), WOOD Plc**

This lecture will focus on "maintenance and further development of expertise and skills" required by many industry regulators. Methodology to build and manage this competency in an organisation will be introduced along with the new Professional Simulation Engineer (PSE) qualification. PSE certification covers 26 technical areas and has more than 1400 competency statements for simulation engineers at every stage of their career. It is specific to analysis & simulation using FEA and CFD but is not specific to any particular software package.

The talk will present a sample of competency statements from selected technical areas covering:

- Core FEA
- Fundamentals Of Computational Fluid Dynamics
- Flaw Assessment And Fracture Mechanics
- Fatigue And Simulation Management

## WORKSHOP SESSION

### From Materials Testing through Stress Simulation and Experimental Validation

**Andrew Halfpenny, Director of Technology , HBMPrensia**

A small spring clip has been designed as part of a kitchen draw closing mechanism. The clip was found to fail prematurely during qualification test and this has led to a long delay in production. The manufacturer is keen to avoid similar problems in the future and wants to model this type of component using FE.

In this workshop we consider the entire design process for the spring clip. We start by testing the base material in a fatigue test and derive an SN fatigue curve. The physics of fatigue is introduced and particular attention is paid to the likely statistical spread of life in real components.

An FE model of the component has been produced and a fatigue analysis is run to determine where and when the failure will occur. Practical guidance on FE modelling techniques are given to ensure the best possible fatigue results.

Finally a physical qualification test is run using a working scaled model of a real fatigue test rig. This rig was developed in-house by nCode's laboratory technicians. It is used to test very small components and to train our apprentices. The correlation between the test life and predicted life is discussed.

## WORKSHOP SESSION

### How to Demonstrate Design Code Compliance using FEA

**Nawal Prinja, Technology Director (Nuclear), WOOD Plc.**

This lecture is aimed at practising engineers who are keen to utilise Finite Element Analysis (FEA) in the design process.

There are two basic approaches to the design of engineering components and structures: design by rule and design by analysis. In the design by rule approach, rules and limitations set by a design standard are adhered to. The design by analysis approach requires either analytical or computational effort to predict stress levels and this is where the FEA is often used. The workshop will highlight the main issues in using FEA in conjunction with design codes and covers various aspects of FEA practice and assessment of a design. Since most of the design codes were written before the advent of FEA, it is important to appreciate the importance of various classes and categories of stresses used in the design codes.

The talk will highlight the biggest change in history of structural design codes and explain how uncertainty is being accounted for through the use of probabilistically calibrated partial safety factors instead of the traditional 'factor of safety'. This change has been introduced through the new Eurocodes which have replaced the old BS codes. The basic principles used in the two types of design codes (allowable stress codes and limit state codes) along with code treatments for design against failure will be discussed.