

09:30 **OPENING OF CONFERENCE**

PLENARY SESSION - Tim Morris, NAFEMS

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

11:15 REFRESHMENT BREAK

1A - ADDITIVE MANUFACTURING

Tyler London, TWI

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

1B - ELECTRIC VEHICLES

Gary Panes, EDR&Medeso Ltd

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

Marco Buonfiglioli, Siemens PLM Software

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

1C - SOLVER METHODS

Trevor Dutton, Dutton Simulation

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

Comparison and Validation of Non-linear Flexible Rear Beam Axle in a Multi Body Systems Model

Peter Delves, Dassault Systèmes

1D - DISCUSSION SESSION

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

Althea de Souza, Qesada Solutions Ltd.

12:55 LUNCH

PLENARY SESSION - Ian Symington, NAFEMS

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

2A - DIGITAL TWIN

Amit Visroliya, National Composites Centre

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

2B - ACOUSTICS

Althea de Souza, Qesada Solutions

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

2C - FATIGUE & FAILURE

Andrew Blows, Jaguar Land Rover

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

2D - DISCUSSION SESSION

Standardisation for Material Data Interfaces in CAE Workflows'

Gino Duffett, NAFEMS

15:20 REFRESHMENT BREAK

3A - SIMULATION FOR DESIGN ENGINEERS

John Verdicchio, Cambridge Flow Solutions

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

3B - BIOMEDICAL

Paul Newton, NAFEMS

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

3C - WORKSHOP SESSION

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

Trevor Dutton, Dutton Simulation

17:00 **END OF DAY 1**

DAY 1

PLENARY SESSION - Tim Morris, NAFEMS

08:45 Additive Manufacturing Technology: Enhancing Process Optimisation and Part Performance through Simulation
Tyler London, TWI Ltd

4A - OPTIMISATION

Bipin Patel, EnginSoft UK Ltd.

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

4B - SIMULATION SUPPORTED DESIGN

Richard White, MSC Software

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

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

4C - ACADEMICS SYMPOSIUM

Jim Wood, J W Analysis

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

4D - WORKSHOP SESSION

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

10:25 REFRESHMENT BREAK

5A - NEXT LEVEL

Brian Miller, Wilde Analysis

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.

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

5B - RENEWABLES

Mark Keating, GexCon

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 Kuala Lumpur

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

5C - 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

5C - ACADEMICS SYMPOSIUM: DISCUSSION SESSION

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

5D - WORKSHOP SESSION

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

12:00 LUNCH

PLENARY SESSION - Paul Newton, NAFEMS

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

6A - DYNAMICS

Nils Wagner, INTES GmbH

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

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

6B - THERMAL

Ian Symington, NAFEMS

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.6D -

6C - ACADEMICS SYMPOSIUM: DISCUSSION SESSION

Current & Perceived Future Challenges in Engineering Simulation Education
Jim Wood, JW Analysis

6D - WORKSHOP SESSION

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

14:40 REFRESHMENT BREAK

7A - CONNECTIONS

Paul Newton, NAFEMS

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.

7B - AUTOMATION

Amit Visroliya, National Composites Centre

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.

7C - ACADEMICS SYMPOSIUM: DISCUSSION SESSION

How Can NAFEMS Provide Better Support to Academics & Students in Engineering Simulation?
Jim Wood, JW Analysis

PLENARY SESSION - CLOSING REMARKS

16:45 CLOSE OF CONFERENCE

DAY 2

DAY 1 DISCUSSIONS & WORKSHOPS

3C- 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.

1D - 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.

2D - 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

5C - 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.

6C - ACADEMICS SYMPOSIUM: DISCUSSION SESSION

Current & Perceived Future Challenges in Engineering Simulation Education

Jim Wood, JW Analysis

We are keen to receive input from both industrialists and academics in this discussion session. Even if you can't manage along, we would be happy to accept your input before or after the event. The call presentations contains a wealth of relevant topics. Meanwhile here are a few stimulating thoughts and questions ...

- Do industrialists see any perceived shortcomings in new graduates in this area?
- Do industrialists feel that they have sufficient opportunity to influence University Programme/Course Committees?
- Has the design pendulum swung too far in general and are there any significant technical gaps?
- Interest in Validation of simulation remains strong, with emphasis on uncertainty quantification and comparison with experimental test ... do engineering degrees have these 2 areas and the necessary underpinning well covered?
- Will a significant move to on-line learning, for engineering degrees be welcomed, by industry and what are the challenges that this might bring for academia?
- Where are the issues with respect to Computer-based Assessment?
- What are the challenges of the internationalisation agenda for engineering simulation?
- Is articulation + credit accumulation and transfer, alive and well amongst UK Colleges and Universities?
- Is engineering education integrated, inclusive and representative or can we do better?
- Has UK education got the right focus now on the teaching agenda?
- Are teaching & research licenses from vendors value for money?
- Lessons from participation in "Grand Challenges"?
- The list is endless!

7C - ACADEMICS SYMPOSIUM: DISCUSSION SESSION

How Can NAFEMS Provide Better Support to Academics & Students in Engineering Simulation?

Jim Wood, JW Analysis

Participants in this discussion session are encouraged to bring along their thoughts on this broad topic. Please feel free to provide your thoughts before or after the event. The call presentations contains a wealth of relevant topics. Meanwhile here are a few stimulating thoughts and questions ...

Should NAFEMS have a student membership?

Is NAFEMS "approval" of simulation modules in degree courses attractive, as well as providing an awareness to future simulation engineers;

Can we make the NAFEMS annual final year project prize more attractive and how?

What kind of resource material from NAFEMS would/does academia find most useful ...

- Text books (with or without supporting slide packs);
- Coursework/Case Studies for undergraduate use, presented within an industrial context;
- Benchmarks;
- Online self-learning learning courses;
- Access to webinar recordings;
- Provision of local guest lectures from NAFEMS industrial members?

DAY 2 WORKSHOPS

4D - 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

5D - 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 rig 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.

6D - 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.