NAFEMS Americas: Open House

February 3rd, 2017

NAFEMS

Agenda

Welcome & Introduction
Andrew Wood, NAFEMS Americas Regional Representative

NAFEMS Overview
Matt Ladzinski, NAFEMS Americas VP

NAFEMS Training
Tony Abbey, NAFEMS Training Manager

NAFEMS PSE
Tim Morris, NAFEMS CEO

NAFEMS Events
Tim Morris, NAFEMS CEO
Rod Dreisbach, The Boeing Company (retired) & NASC Chair
Andrew Wood, NAFEMS Americas Regional Representative

Q & A Session

Close

NAFEMS

OVERVIEW

NAFEMS is the International Association for the Engineering Modelling, Analysis and Simulation Community

34 YEARS OF NAFEMS

SettingSimulationStandards

Principal Aims

A not-for-profit organization, serving more than 1,200 organizations, and our principal aims are to:

- **Improve the professional status** of all persons engaged in the use of engineering simulation
- Establish **best practices** in engineering simulation
- Provide a focal point for the **dissemination and exchange of information** and knowledge relating to engineering simulation
- Promote **collaboration** and communication
- Act as an **advocate** for the deployment of simulation
- Continuously improve the **education and training** in the use of simulation techniques
- Be recognized as a **valued independent authority** that operates with neutrality and integrity

NAFEMS Council

NAFEMS Council drives the organization forward

Responsible for all policy decisions and manages NAFEMS as a company, directing and controlling the growth and activities of the organization.

NAFEMS Council Members currently include:

- **Chairman**: Costas Stavrinidis
- **Vice-Chairman**: Manfred Zehn
- Rodney Dreisbach
- David Ellis
- Giuseppe Miccoli
- Moji Moatamedi
- Stewart Morrison
- Paul Newton
- Marie-Christine Oghly
- Alexander Ptchelintsev
- Anup Puri
- Martin Wiedemann
- Jim Wood

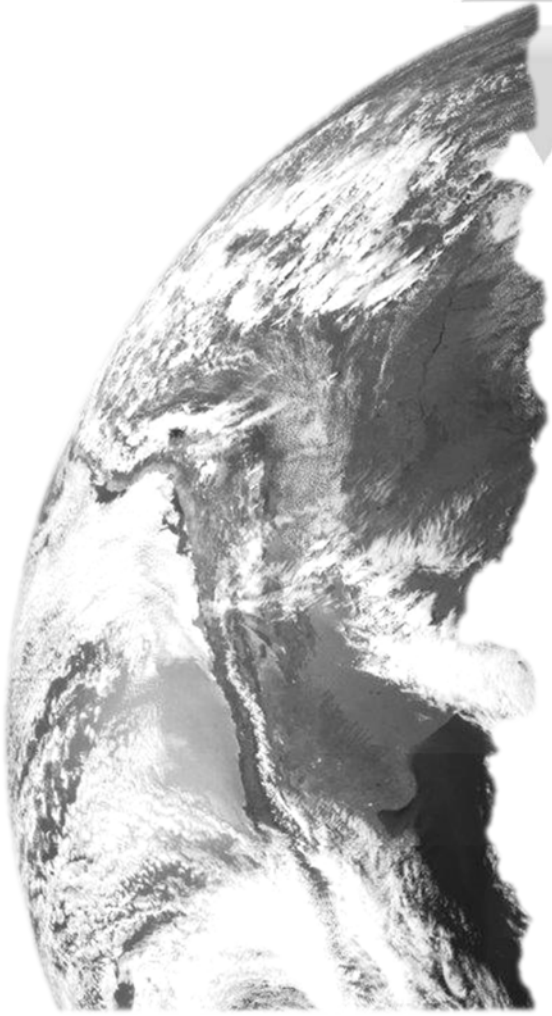
NAFEMS Regional Groups

NAFEMS Regional Groups drive our global exchanges

Unbiased multi-disciplinary engineering expertise that facilitates international industry, academia and government collaboration with the aim of improving product and process simulation, and enhancing quality, profitability, schedules and safety standards.

NAFEMS Regional Groups currently include:

- Americas
- UK
- DACH
- France
- Iberia
- India
- Italia
- Nordic
- Japan
- ASEAN



Americas Steering Committee


Chairman – Rodney Dreisbach (USA)


Brian Duffy (USA)


Graham Elliott (CAN)


Mario Felice (USA)


Ed Ladzinski (USA)


Matt Ladzinski (USA)


Rodrigo Britto Maria (BRA)


Tina Morrison (USA)


Jack Castro (USA)


Dennis Nagy (USA)


Ahmed Noor (USA)


Chris Pieper (USA)


Frank Popielas (USA)

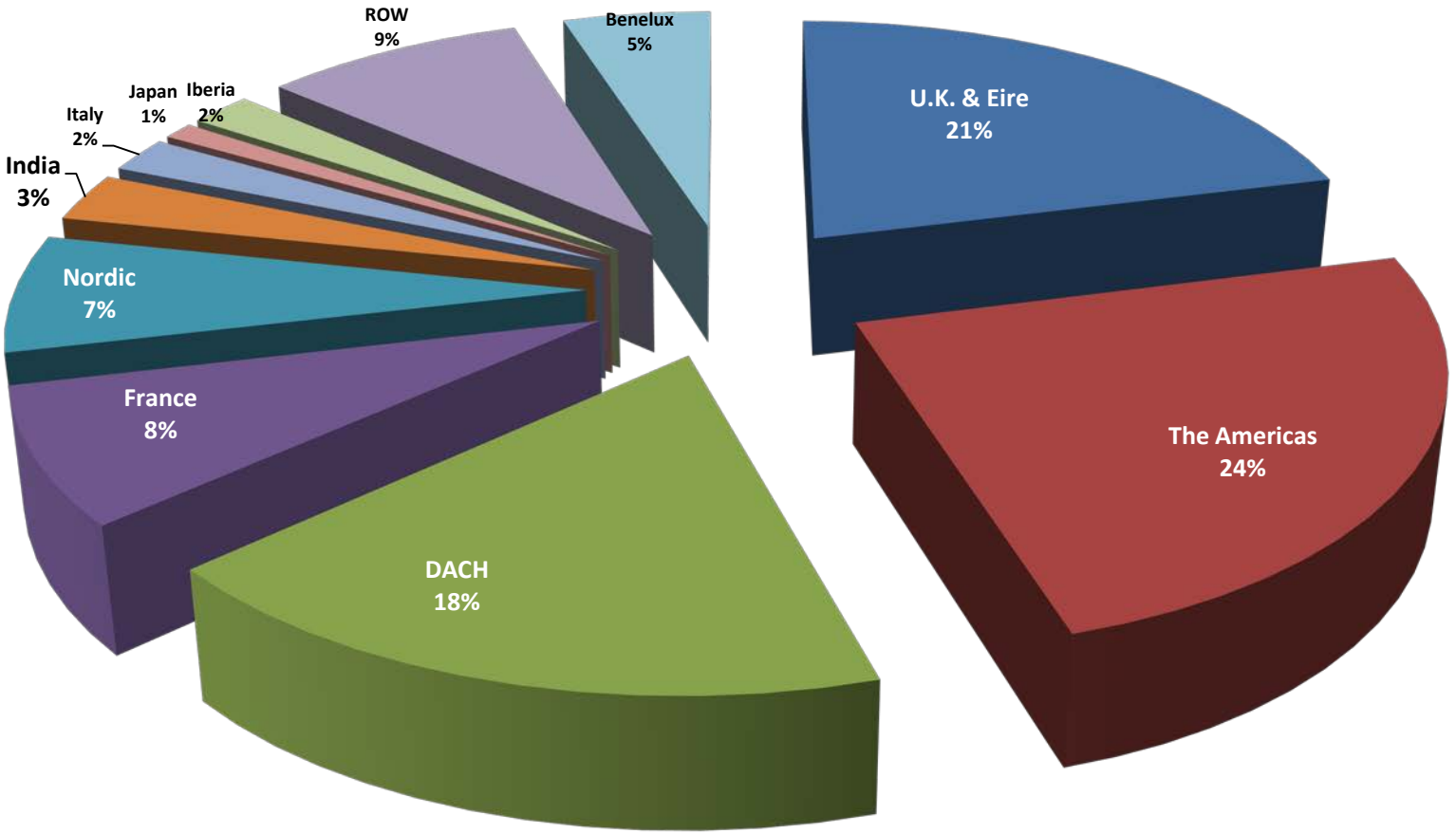

Marcus Reis (BRA)


Chuck Roche (USA)


Andrew Wood (USA)

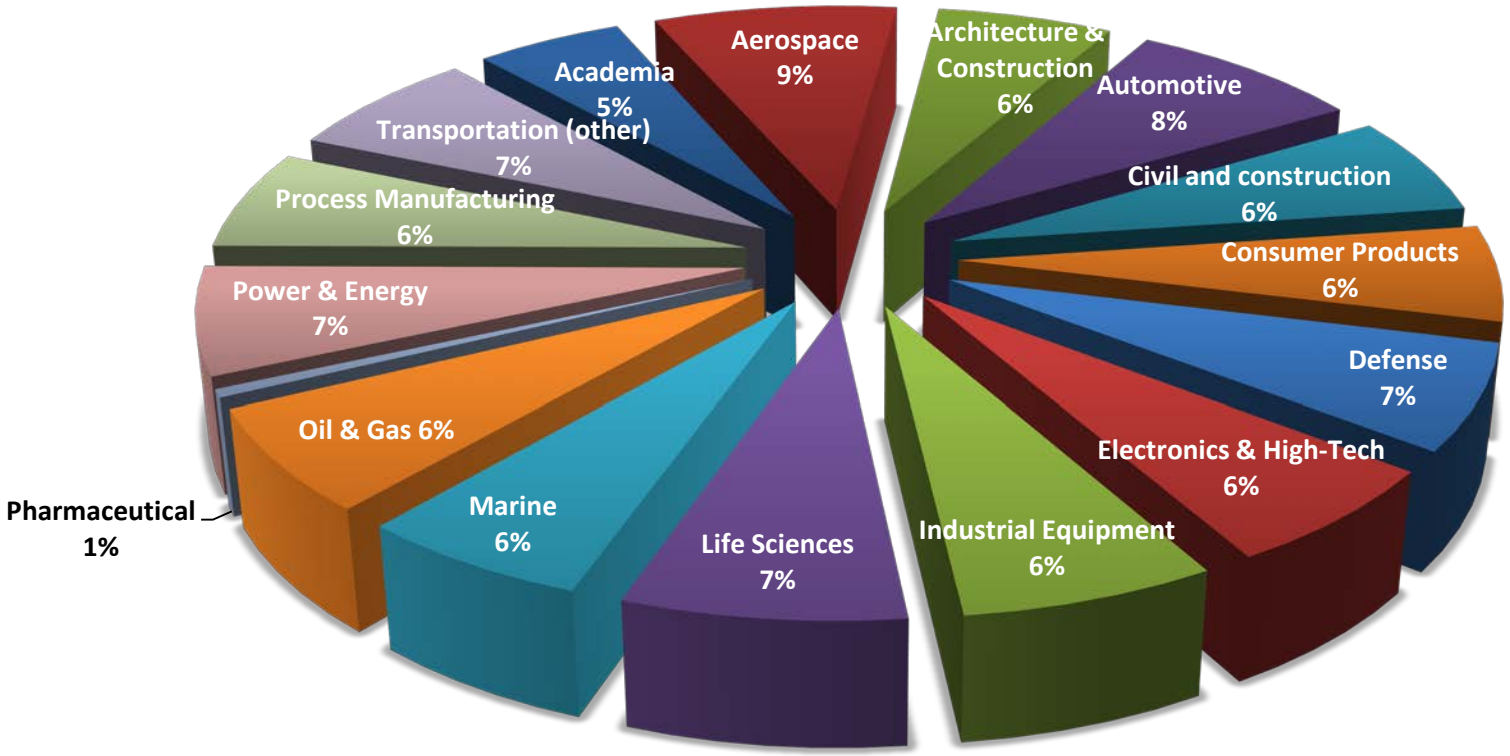
NAFEMS Member Regions

In over 50 countries…



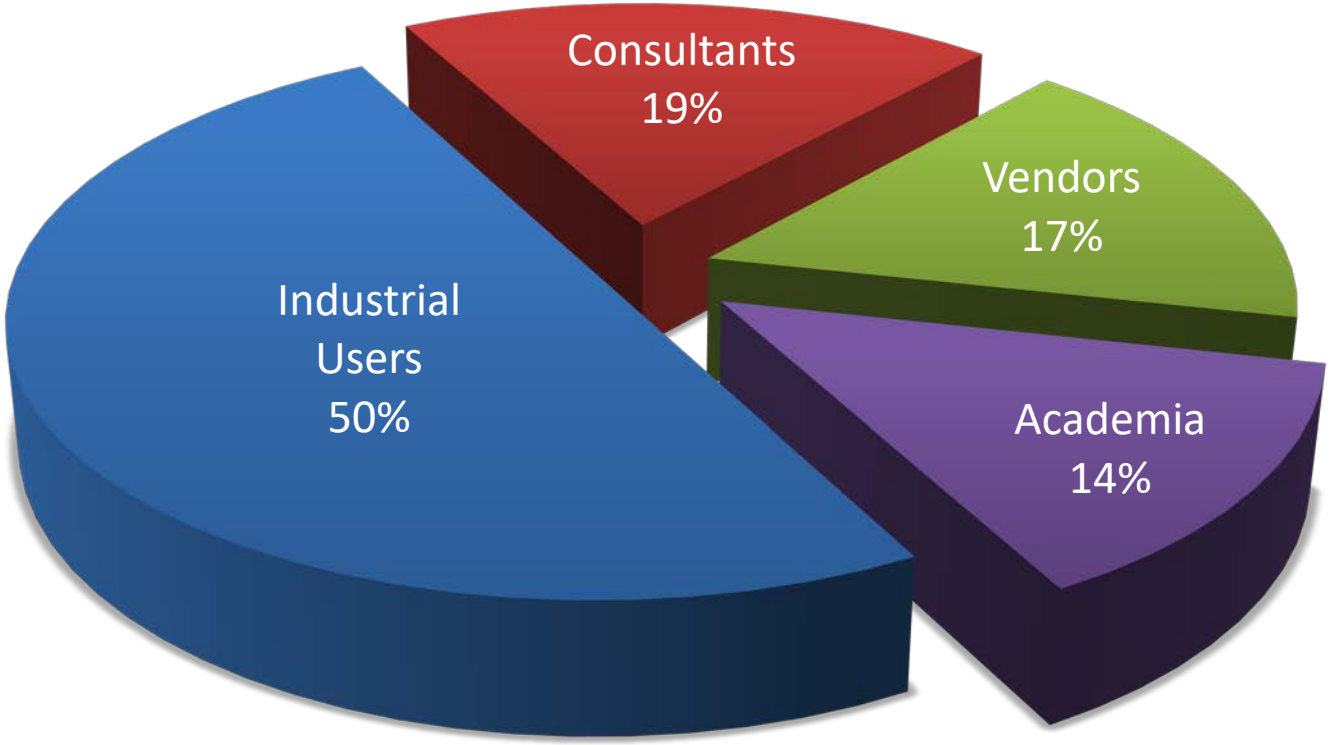
NAFEMS – Membership

- **NAFEMS is a member owned organization**
- **Encompassing many industries ...**



NAFEMS – Membership

- **Across four sectors ...**



NAFEMS Americas Members

NAFEMS Events

We host over 75 independent events every year focused on the issues and trends in engineering simulation

World Congress

NAFEMS World Congress is a biennial global conference which has been a fixture on the simulation calendar for 30 years.

Bringing together the international community in a neutral forum the last Congress in San Diego attracted nearly 600 attendees including industrial users, software vendors and academics.

Conferences

Throughout the year, NAFEMS holds a number of conferences including dedicated regional and specific events across the globe.

Seminars

Several seminars are hosted every year focusing on current areas of interest as well as emerging topic areas.

Webinars

Online webinars take place frequently allowing members to attend our events, no matter where in the world they are.

NAFEMS members benefit from seminar credits enabling many events to be attended inclusive of membership. Members also receive significant discounts on our World Congress and Training.

NAFEMS Working Groups

NAFEMS Working Groups drive our technical activities

Drawn exclusively from our international membership, the working groups identify areas of interest to the simulation community which require educational materials.

NAFEMS Technical Working Groups currently include:

- analysis management
- composites
- computational fluid dynamics
- computational structural mechanics
- dynamics and testing
- education and training
- geotechnics
- high performance computing
- multi body dynamics
- multiphysics
- optimization
- stochastics
- simulation data management
- systems modeling and simulation
- manufacturing process & simulation
- technical liaison group
- vendor advisory board

NAFEMS Publications

NAFEMS has published over 200 analysis and simulation publications. We are widely acknowledged as the premier source for analysis and simulation information.

Every year we produce approximately 8-10 new publications including textbooks, reports, benchmarks and journals.

NAFEMS members receive a library of ~20 of their chosen publications when they join. Discounts are also available on additional publications.

In addition, members receive copies of all new publications as and when they are produced.

NAFEMS Publications

BENCH MARK

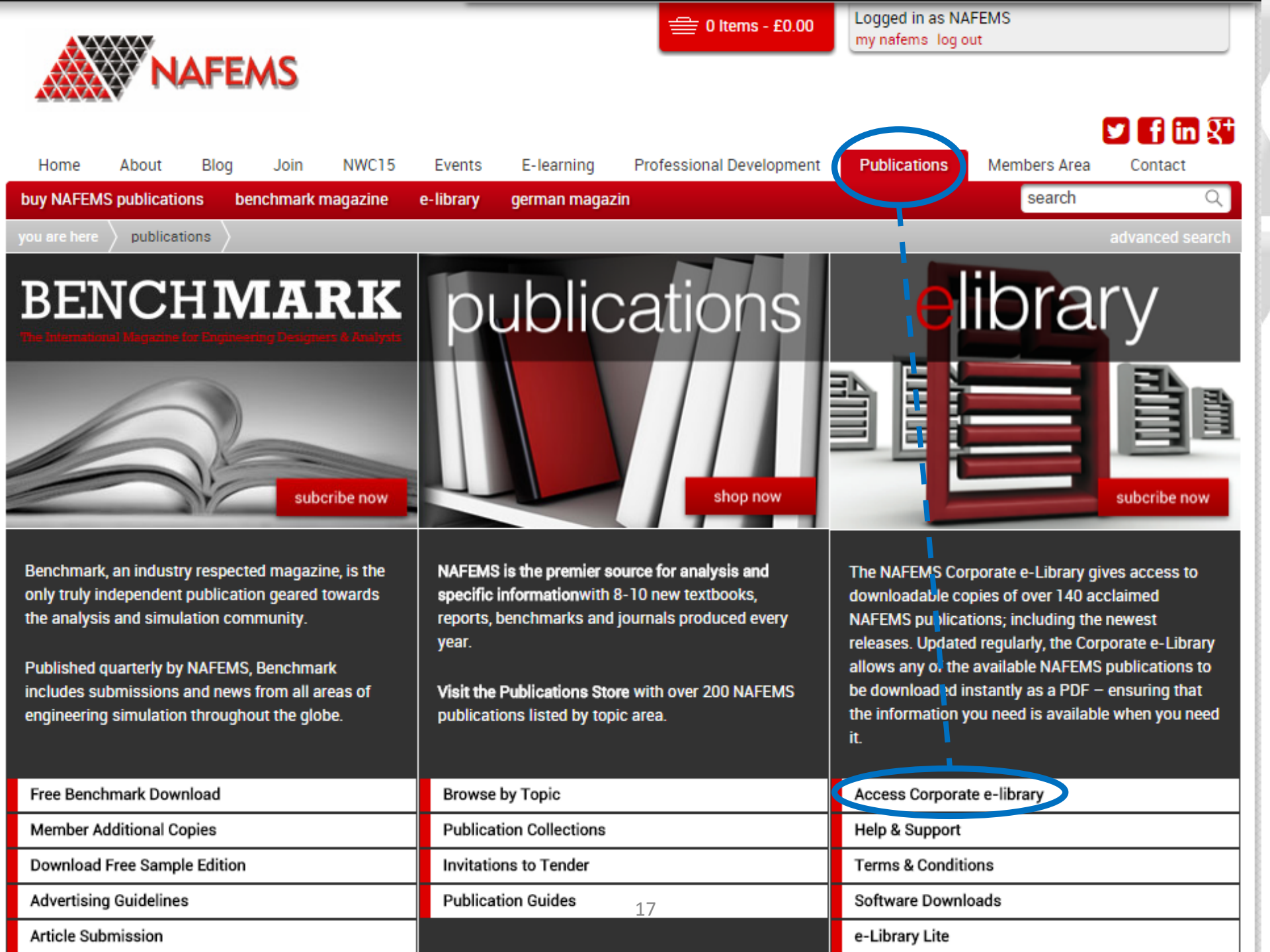
The international magazine for engineering designers and analysts, Benchmark has commanded respect for being the only truly independent magazine specifically focused on analysis and simulation.

NAFEMS elibrary

Available exclusively to NAFEMS members, an optional e-Library subscription gives instant access to over 185 of NAFEMS publications.

NAFEMS Members receive copies of Benchmark magazine every quarter as it's published.

Members can also subscribe to our e-Library service to ensure they have access to the information the need, when they need it.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Benchmark, an industry respected magazine, is the only truly independent publication geared towards the analysis and simulation community.
Published quarterly by NAFEMS, Benchmark includes submissions and news from all areas of engineering simulation throughout the globe.
NAFEMS is the premier source for analysis and specific informationwith 8-10 new textbooks, reports, benchmarks and journals produced every year.
Visit the Publications Store with over 200 NAFEMS publications listed by topic area.
The NAFEMS Corporate e-Library gives access to downloadable copies of over 140 acclaimed NAFEMS publications; including the newest releases. Updated regularly, the Corporate e-Library allows any of the available NAFEMS publications to be downloaded instantly as a PDF – ensuring that the information you need is available when you need it.
Free Benchmark Download
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The NAFEMS Corporate e-Library gives access to downloadable copies of over 140 acclaimed NAFEMS publications; including the newest releases. Updated regularly, the Corporate e-Library allows any of the available NAFEMS publications to be downloaded instantly as a PDF – ensuring that the information you need is available when you need it.

The NAFEMS Corporate e-Library is easily accessed online. Once logged in,subscribed members have instant access to the library and the downloadable publications available creating a NAFEMS reference archive that is available at the click of a button.Within the Corporate e-Library, users can browse the available downloadable publications by:

Browse recent Benchmark Articles

- jan12
- oct12
- Building Simulation Reports Effectiv...
- Modelling Condensation in Automot...

Browse by Recently Added

- The NAFEMS Simulation Capability ...
- Determination and Use of Material P...
- How to Perform Electromagnetic Fin...
- International Journal of CFD Case St...

Browse by Book Type

- Benchmarks
- Guidelines
- How To / Why Do Series
- Reviews, Workbooks and Case Studi...

Browse By Technical Areas

- Acoustics
- Analysis Management
- Beams Plates and Shells
- CFD
- Composites
- Contact & Friction
- Creep
- Data Management
- Dynamics
- Fatigue & Fracture
- Geotechnical
- Introduction
- Joints
- Miscellaneous
- Non Linear
- Non-Deterministic
- Optimisation

Access to 185+ NAFEMS Publications

Why Join?

better collaboration

- Build lasting business alliances
- Exchange knowledge & experience
- Learn about the resources available
- Enhance your company's visibility worldwide

enhanced innovation

- Develop your skills with the latest engineering simulation techniques
- Be at the forefront
- Produced better-engineering products with increased satisfaction

increased productivity

- Optimize the design process
- Minimize costly physical testing

improved quality

- Be committed to the highest standards
- Benchmark your organization's simulation process

Member Benefits

NAFEMS offers a variety of membership types to suit the different companies and institutions involved in engineering simulation.

site membership | a full range of benefits for larger corporations based at one location

NAFEMS site membership provides multiple benefits to your team, including:

- **A publication library (a.k.a. Joining Pack) containing NAFEMS textbooks, report, how-to guides and benchmarks, selected by you**
- **Copies of all new publications as they are produced**
- **Free places at a choice of seminars and conferences, held regularly and internationally each year (*with seminar credits; rule of thumb: 1 credit = ½ day at an event/person*)**
- **Benchmark magazine subscription**
- **Exclusive member discounts on seminars, training courses, e-learning and conferences**
- **Access to the members area of the NAFEMS website including access to the Resource Center, which contains numerous technical papers, seminar proceedings and more**
- **Networking opportunities with individuals representing more than 1,200 member companies**

Member Benefits

corporate membership | a full range of benefits for larger corporations in multiple locations

Specifically aimed at large multinational companies who need to share the benefits of membership across many physical locations, corporate membership is tailored to specifically meet the needs of your company.

small company membership | cost effective membership for small to medium enterprises

Being a small company has its own unique set of circumstances. Small company membership is a cost-effective option for smaller organisations which is tailored to their specific needs.

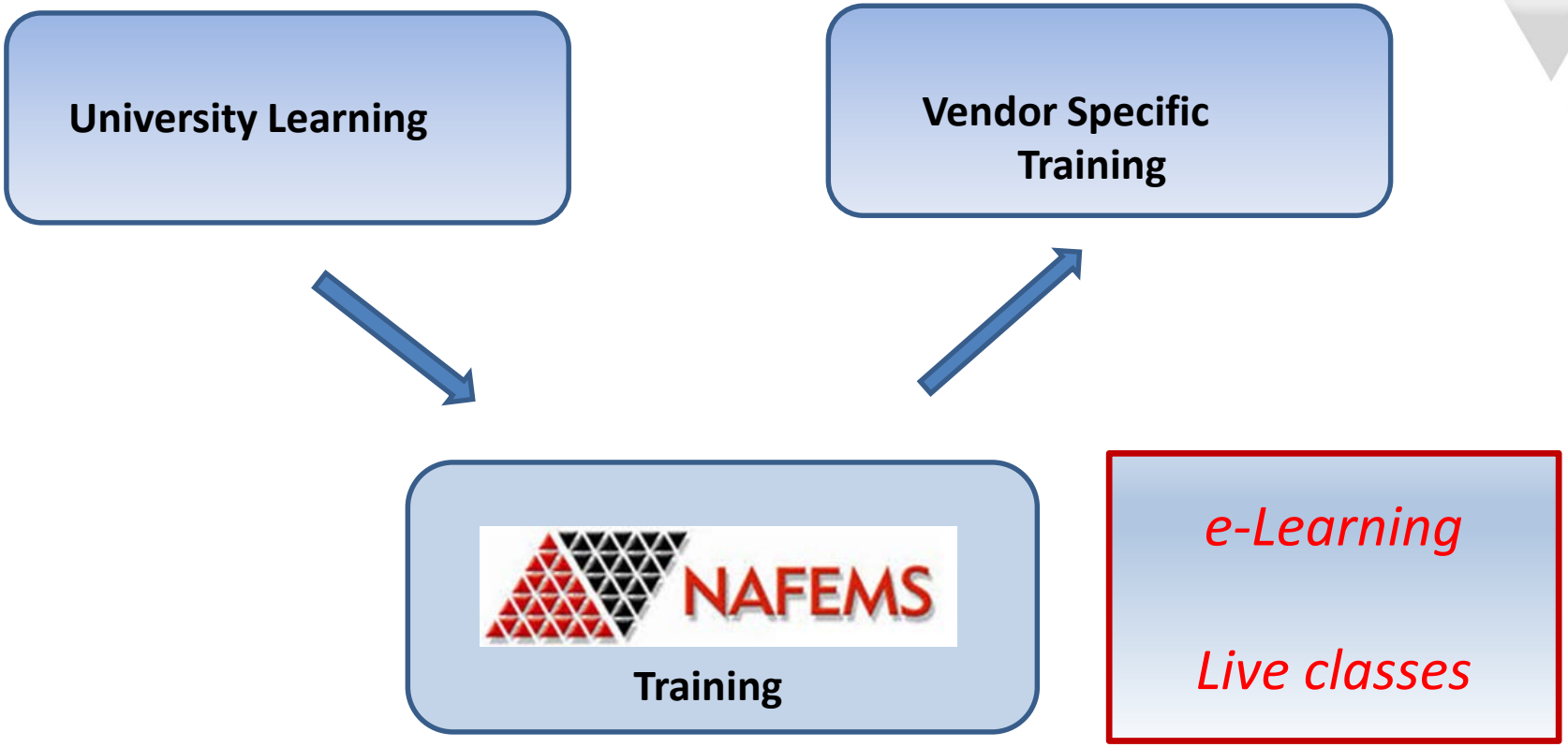
academic membership | benefits of site membership for recognised academic institutions

NAFEMS has always worked closely with the academic arena and one of our key roles is to facilitate collaboration between industry and academia. We offer recognised academic institutions site membership at a favourable rate to encourage this.

NAFEMS

TRAINING

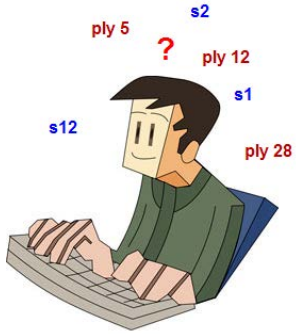
NAFEMS Training – how does it fit in



NAFEMS Training – how does it fit in

The Graduation

The Job

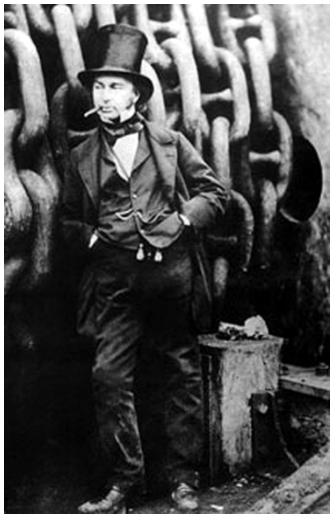


Training

NAFEMS Training – how does it fit in

The Old Role/task

The New Role/task



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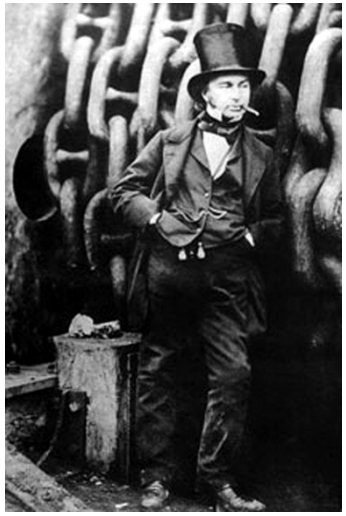
Training



NAFEMS Training – e-Learning

E-Learning

- Measured pace – time to do homework and interact over 6 to 12 week period
- No travel cost, lower fees
- Adaptable to your work schedule, join at any time
- Off-Line discussion, blend in with other training or mentoring activities

Nearly 200 courses completed

Over 6000 students

NAFEMS Training – e-Learning

https://www.nafems.org/e-learning/

Format

- 2 to 3 hours per session
- Q and A
- PDF notes
- Streamable session recording

Forum

- Reading List
- Homework Responses
- In Depth Q and A
- Extends 4 weeks beyond sessions

NAFEMS Training – e-Learning

Titles and Sessions

- Dynamics (5)
- Advanced Dynamics (3)
- Composites (5)
- Non-Linear (5)
- Optimization (4)
- Fatigue and Fracture Mechanics (5)
- Introduction to FEA (5)
- Joints and Connectors in FEA (3)

- Introduction to practical CFD (3)
- CFD for Analysts and Designers (3)
- Turbulence Modeling (2)

NAFEMS Training – Live Training

Physical Face to Face Training at your site

Courses are highly customized

- Your products
- Your models
- Your identified technical areas
- Your training requirements
- Pick from a complete technology list

NAFEMS Training – Live Training

Physical Face to Face Training at your site

Courses are Highly Interactive

- Q and A
- Shared experiences
- Deeper dives
- Scenarios
- Role Playing

NAFEMS Training – upcoming courses

Introduction to FE Analysis
February 6th 2017
5 session Course

https://www.nafems.org/events/nafems/2017/el190/

CFD for Structural Designers and Analysts
February 22nd 2017
3 session Course

https://www.nafems.org/events/nafems/2017/el191/

Complete schedule

https://www.nafems.org/e-learning/schedule/

NAFEMS

PSE

PSE

A New Standard for Simulation Engineers

NAFEMS

What is PSE?

“Professional Simulation Engineer”

The foundation of PSE is a database of over 1400 competence statements.

The competence statements define the abilities, knowledge and skills a simulation engineer should possess

Peer-reviewed over several years by NAFEMS technical working groups and external experts

Technical Areas

- Mechanics, Elasticity and Strength of Materials
- Core Finite Element Analysis
- Materials for Analysis and Simulation
- Fatigue
- Flaw Assessment and Fracture Mechanics
- Nonlinear Geometric Effects and Contact
- Beams, Membranes, Plates and Shells
- Dynamics and Vibration
- Optimisation
- Plasticity
- Fundamentals of Flow, Mass & Heat Transfer
- Core Computational Fluid Dynamics
- Thermo-Mechanical Behaviour
- General Analysis Management
- Verification and Validation
- PLM Integration and CAD-CAE Collaboration
- Simulation Process and Data Management
- Buckling and Instability
- Multi-physics Analysis
- Composite Materials and Structures
- Creep and Time-Dependency
- Multi-Scale Analysis
- Probabilistic Analysis
- Noise, Acoustics and Vibro-Acoustics
- Electromagnetics
- Multi-body Dynamics

PSE

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The Basics

Competence Statements

Core Finite Element Analysis	• Define the meaning of a degree of freedom • Sketch problems showing various forms of symmetry • Discuss checks that may be used post-solution to check for the presence of inaccuracy
Plasticity	• Explain the terms isotropic hardening, kinematic hardening and rate independency • Sketch a stress-strain curve for an elastic-perfectly plastic and bi-linear hardening material.
Nonlinear Geometry and Contact	• Contrast the Newton-Raphson method and the Riks arc-length method • Discuss the limitations of contact algorithms available in a finite element system

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PSE COMPETENCY TRACKER

Plan, Track & Manage Competency

Online Competency Framework & Management System

- *Access PSE Competencies*
- *Browse Educational Resources*
- *Track & Manage Competency*

PSE CERTIFICATION

Multi-Level Certification Scheme

Independent assessment of achievement of competency

- *Recognition of high-level PSE Competencies*

PSE

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About
Testimonials
Using the PSE Competency Tracker
Register
Customisation
FAQs
Credits
PSE Code of Conduct

PSE COMPETENCY TRACKER

PSE Competency Tracker

The PSE Competency Tracker is an **online system for tracking and measuring Professional Simulation Engineer Competencies**. The PSE Competency Tracker allows users to browse the PSE Competencies online and amend their competency record throughout their career. Companies can use the PSE Competency Tracker to track and manage the competencies of their individual staff and pooled workforce.

3

PSE COMPETENCY TRACKER
Access Here

The PSE Competency Tracker is a:

- Competency Framework for Simulation Engineers
- Educational Resource Guide
- Online Competency Management & Tracking System

Introducing PSE Competency Tracker (PDF)

PSE
COMPETENCY TRACKER

Measuring & Tracking Competency

- Individuals can plan and monitor their development as a simulation engineer, tracking their competencies as they are achieved.
- Companies can do the same for their staff, creating a database of the combined simulation skills of their workforce.

ANONYMOUS USER ACCESS

As an anonymous user you will be able to browse the PSE Competencies and educational resources.

You will not be able to access the tracking and management functionality of the PSE Competency Tracker.

To use these features you must register/log in.

Click here to access the Competency Tracker

REGISTERED USERS ACCESS

Please log in to the PSE Competency Tracker below

Login id:

Password:

Login

Forgot password?

USER REGISTRATION

Access to the PSE Competency Tracker is exclusive to NAFEMS members and those applying for PSE Certification.

NAFEMS members can register here.

NAFEMS

powered by ENGINSOFT

Multi-Level Certification Scheme

Competencies can be claimed at Entry, Standard and Advanced Level

Entry

- Employs available software tools in an effective manner
- Able to work in a supervised capacity when provided with clear guidelines
- Doesn't take on general tasks without supervision
- Typically applies to trainees and/or technician level staff working under the supervision of a person(s) with appropriate competence who will sign off the results

Standard

- Has sufficient knowledge and comprehension of theory to employ available software tools in a safe and effective manner
- Able to work in an independent manner without supervision
- Conducts appropriate checks on results
- Is aware of their own limitations when faced with new or novel problems
- Observes professional practices

Advanced

- Can take on a range of complex, novel tasks without supervision
- Plans analysis strategies and validation studies
- Provides effective advice and guidance

Applicants advance to the next PSE level as their competency develops

PSE

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BENCH MARK
THE INTERNATIONAL MAGAZINE FOR ENGINEERING DESIGNERS & ANALYSTS FROM NAFEMS
July 2016 Issue
Confidence in Results
NAFEMS Professional Simulation Engineer
An Industrial Case Study
Ian Symington, Technical Officer NAFEMS, Member of the PSE Board
"Because of the ever increasing demand for FEA, ASML's Design Engineers are encouraged to perform basic FEA by themselves. By introducing a customized PSE within ASML, the chance that engineers are unconsciously incompetent on relevant areas is significantly reduced"
Fred Huizinga – Group Leader Mechanical Analysis, ASML
PSE
Case Study - ASML
Tailoring the PSE Process
"PSE doesn't just test our Designers on their knowledge of a short list of core competencies. It's equally important that they are aware of their own limits, and how to get assistance from within the company from the analysis experts"
Fred Huizinga – Group Leader Mechanical Analysis, ASML
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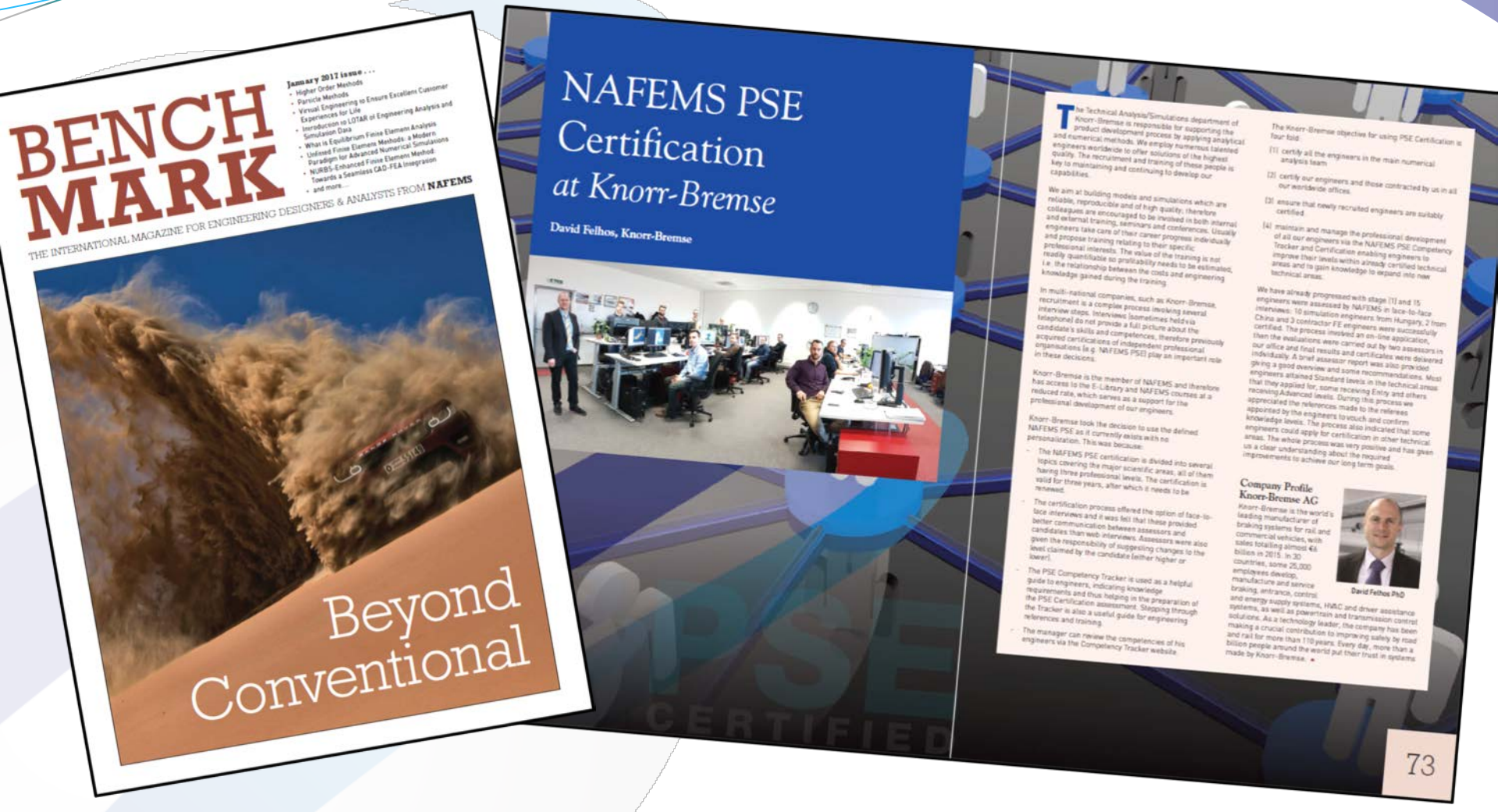
BENCH MARK
THE INTERNATIONAL MAGAZINE FOR ENGINEERING DESIGNERS & ANALYSTS FROM NAFEMS
January 2017 issue . . .
Higher Order Methods
Parasolid Methods
Virtual Engineering to Ensure Excellent Customer Experiences for Life
Introduction to LOTAR of Engineering Analysis and Simulation Data
What is Equilibrium Finite Elements Analysis
Paradigm for Advanced Numerical Simulations
Unified Finite Element Methods: a Modern
NURBS-Enhanced Finite Elements Method:
Towards a Seamless CAD-FEA Integration
and more...
Beyond Conventional
NAFEMS PSE Certification at Knorr-Bremse
David Felhos, Knorr-Bremse
The Technical Analysis/Simulations department of Knorr-Bremse is responsible for supporting the product development process by applying analytical and numerical methods. We employ numerous talented engineers worldwide to offer solutions of the highest quality. The recruitment and training of these people is key to maintaining and continuing to develop our capabilities.
We aim at building models and simulations which are reliable, reproducible and of high quality; therefore colleagues are encouraged to be involved in both internal and external training, seminars and conferences. Usually engineers take care of their career progress individually and propose training relating to their specific professional interests. The value of the training is not readily quantifiable so profitability needs to be estimated, i.e. the relationship between the costs and engineering knowledge gained during the training.
In multi-national companies, such as Knorr-Bremse, recruitment is a complex process involving several interview steps. Interviews (sometimes held via telephone) do not provide a full picture about the candidate's skills and competences, therefore previously acquired certifications of independent professional organisations (e.g. NAFEMS PSE) play an important role in these decisions.
Knorr-Bremse is the member of NAFEMS and therefore has access to the E-Library and NAFEMS courses at a reduced rate, which serves as a support for the professional development of our engineers.
Knorr-Bremse took the decision to use the defined NAFEMS PSE as it currently exists with no personalization. This was because:
- The NAFEMS PSE certification is divided into several topics covering the major scientific areas, all of them having three professional levels. The certification is valid for three years, after which it needs to be renewed.
- The certification process offered the option of face-to-face interviews and it was felt that these provided better communication between assessors and candidates than web interviews. Assessors were also given the responsibility of suggesting changes to the level claimed by the candidate (either higher or lower).
- The PSE Competency Tracker is used as a helpful guide to engineers, indicating knowledge requirements and thus helping in the preparation of the PSE Certification assessment. Stepping through the Tracker is also a useful guide for engineering references and training.
- The manager can review the competences of his engineers via the Competency Tracker website.
The Knorr-Bremse objective for using PSE Certification is four fold:
[1] certify all the engineers in the main numerical analysis team
[2] certify our engineers and those contracted by us in all our worldwide offices
[3] ensure that newly recruited engineers are suitably certified
[4] maintain and manage the professional development of all our engineers via the NAFEMS PSE Competency Tracker and Certification enabling engineers to improve their levels within already certified technical areas and to gain knowledge to expand into new technical areas.
We have already progressed with stage [1] and 15 engineers were assessed by NAFEMS in face-to-face interviews: 10 simulation engineers from Hungary, 2 from China and 3 contractor FE engineers were successfully certified. The process involved an on-line application, then the evaluations were carried out by two assessors in our office and final results and certificates were delivered individually. A brief assessor report was also provided giving a good overview and some recommendations. Most engineers attained Standard levels in the technical areas that they applied for, some receiving Entry and others receiving Advanced levels. During this process we appreciated the references made to the referees appointed by the engineers to vouch and confirm knowledge levels. The process also indicated that some engineers could apply for certification in other technical areas. The whole process was very positive and has given us a clear understanding about the required improvements to achieve our long term goals.
Company Profile
Knorr-Bremse AG
Knorr-Bremse is the world's leading manufacturer of braking systems for rail and commercial vehicles, with sales totalling almost €6 billion in 2015. In 30 countries, some 25,000 employees develop, manufacture and service braking, entrance, control and energy supply systems, HVAC and driver assistance systems, as well as powertrain and transmission control solutions. As a technology leader, the company has been making a crucial contribution to improving safety by road and rail for more than 110 years. Every day, more than a billion people around the world put their trust in systems made by Knorr-Bremse.
David Felhos PhD
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PSE

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PSE For Individuals…

- Educational Framework for Engineering Analysis
- Self paced learning
- Competencies linked to educational resources
- Mentoring
- Achievement of distinctive and internationally recognised qualification
- A clear path for career and skill progression
- Increased value to current and future employers
- Enhanced analytical skills

PSE For Companies…

- A clear way to demonstrate the company's commitment to quality standards
- Incorporate competencies into your organisations competency management framework
- Easier recruitment of high calibre staff
- Reduced risks when employing consultants and subcontractors whose staff are Professional Simulation Engineers (PSEs)
- Increased employee motivation
- Creating and maintaining competitive edge

PSE

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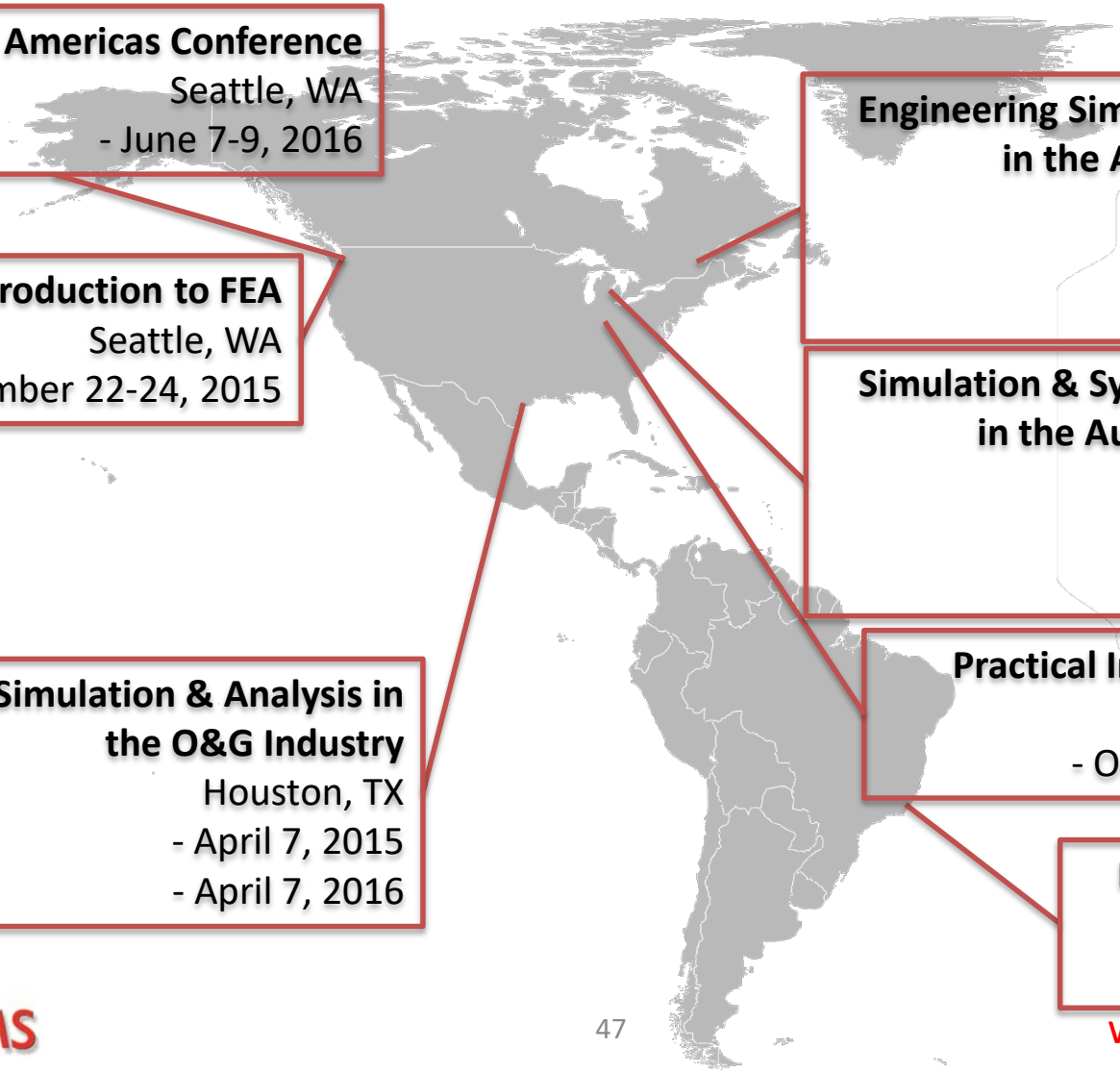
EVENTS


NWC
NAFEMS
NAFEMSWORLDCONGRESS 2017
nafems.org/congress
A WORLD OF ENGINEERING SIMULATION • 11-14 JUNE 2017 | STOCKHOLM | SWEDEN

NAFEMS Public Events | Americas | 2015-16



2016 NAFEMS Americas Conference
Seattle, WA
- June 7-9, 2016

Practical Introduction to FEA
Seattle, WA
- September 22-24, 2015

Engineering Simulation & Analysis in the O&G Industry
Houston, TX
- April 7, 2015
- April 7, 2016

Engineering Simulation & Analysis in the Aerospace Industry
Montreal, QC
- October 6, 2015
- October 4, 2016

Simulation & Systems Engineering in the Automotive Industry
Troy, MI
- March 17, 2015
- April 28, 2016

Practical Introduction to FEA
Columbus, OH
- October 20-22, 2015

NAFEMS Discovery
São Paulo, SP
- June 9-10, 2015

Simulation 20/20:
The Next 5 Years

The Business, Technological and Human Enablers Driving Change Over the Next Five Years

Democratization	Simulation Governance	Business Challenges
▪ Expert Knowledge Capture & Reuse ▪ Usability ▪ Accessibility ▪ Next-Generation Computing Architectures	▪ Simulation Governance and Model Management ▪ Risk Mitigation ▪ Managing Simulation ▪ Verification, Validation & Uncertainty Quantification	▪ ROI ▪ Licensing Models ▪ Communication ▪ Influence of SMEs ▪ Vendor & End-User Collaboration
Started: August 2015 Ended: November 2015 **nafems.org/2020**	Started: December 2015 Ended: June 2016 **nafems.org/2020**	Start Date: June 2016 End Date: November 2016 **nafems.org/2020**

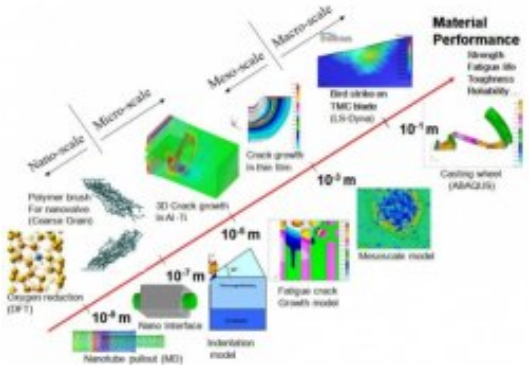
NAFEMS Americas

Multiscale and Multiphysics Modeling & Simulation - Innovation Enabling Technologies

March 28-29, 2017

Columbus, Ohio, USA

Abstracts and agenda now published!



Sessions on Composites, Electromagnetics, Fabrication Physics, Fluid-Structure Interaction, Life Sciences, Multiphysics: Enabling Technologies, Multiphysics: Product Durability, Multiscale Modeling, Optimization, and Stochastics

Email americas@nafems.org for more information,
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NAFEMS Americas

Engineering Analysis & Simulation in the Automotive Industry: Electrification & Advanced Lightweighting Techniques

April 27, 2017

Troy, MI, USA

Deadline to submit an abstract: February 17, 2017

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Upcoming Events Cont'd

- **Webinars**
  - Structure Genome: A Revolutionary Multiscale Approach to Bridging Materials Genome and Structural Analysis
    - Dr. Wenbin Yu, Purdue University, CWG
    - Feb. 28th, 11am Eastern
  - Usually have one every month
- **On-Site Events**
  - Engineering Analysis & Simulation in the Aerospace Industry (Wichita, KS)
    - Fall 2017
  - Fatigue (Location TBD)
    - Fall 2017
    - Also to include a training course option on 2nd day

Q&A

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