

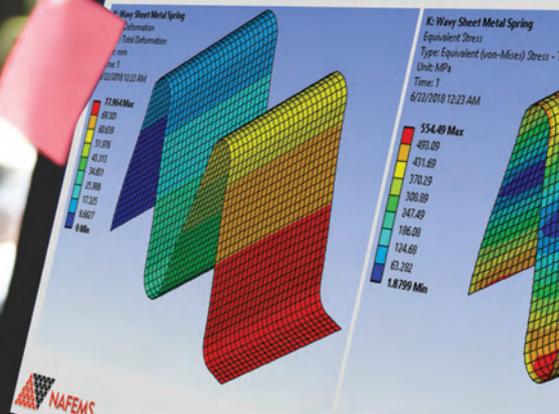




## Sources of Error

- Nonlinear vs linear

Large deflection = On



NAFEMS

# NAFEMS IS THE INTERNATIONAL ASSOCIATION FOR THE ENGINEERING MODELLING, ANALYSIS AND SIMULATION COMMUNITY.

A not-for-profit organisation, our principal aims are to:

Improve the professional status of all persons engaged in the use of engineering simulation

Establish best practice 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 recognised as a valued independent authority that operates with neutrality and integrity

OUR MISSION IS TO PROVIDE KNOWLEDGE, INTERNATIONAL COLLABORATION & EDUCATIONAL OPPORTUNITIES FOR THE USE AND VALIDATION OF ENGINEERING SIMULATION.

# Why Join?

More than 1,400 companies worldwide are members of NAFEMS, ranging from major global corporations through small-scale engineering consultants.

## Stronger Collaboration

### **BUILD LASTING BUSINESS ALLIANCES**

Forge lasting professional relationships throughout the world of engineering simulation by participating in our working groups, attending and presenting at our seminars and conferences, and getting involved in the activities of your regional steering committee.

### **EXCHANGE KNOWLEDGE & EXPERIENCE**

Be a part of the community. The challenges you face every day are shared with other NAFEMS members throughout industry and beyond. Learn from their experience, and pass on your own knowledge.

### **LEARN ABOUT THE RESOURCES AVAILABLE**

Your organisation doesn't exist in a bubble. We can empower you with the knowledge you need to take the correct business-critical decisions based on your unique requirements.

### **ENHANCE YOUR COMPANY'S VISIBILITY WORLDWIDE**

We are the only organisation that brings together major software developers, manufacturers, consultancies, and academic institutions from across the globe in an independent network of peers. Ensure your organisation is visibly part of this global community.

## Increased Productivity

### **OPTIMIZE THE DESIGN PROCESS**

Learn about potential pitfalls and pick up time saving techniques.

### **MINIMISE COSTLY PHYSICAL TESTING**

Increase confidence in your company's engineering simulation capabilities.

## Improved Quality

### **BE COMMITTED TO THE HIGHEST STANDARDS**

Membership reinforces your focus on best practice, and gives you the tools you need to reach the highest possible standards.

### **BENCHMARK YOUR ORGANISATION'S SIMULATION PROCESS**

Learn first-hand about the experiences of other organisations similar to your own, and measure yourself against them.

## Enhanced Innovation

### **DEVELOP YOUR SKILLS WITH THE LATEST ENGINEERING SIMULATION TECHNIQUES**

Your skills need to keep pace with the ever-advancing world of engineering simulation technology. We are the only organisation dedicated to ensuring its members have access to the most advanced, sophisticated methods and thinking in the industry.

### **BE AT THE FOREFRONT**

The competitive advantage provided by being at the cutting edge of simulation technology is immeasurable. NAFEMS keeps you there.

### **PRODUCE BETTER-ENGINEERED PRODUCTS WITH ENHANCED CUSTOMER SATISFACTION**

Customer satisfaction will always be key. Membership provides you with the opportunity to learn how to use the latest technology in the most efficient manner, ensuring your customers will always receive the most innovative and effective products possible.

# Membership Levels

	<b>Entry</b>	<b>Standard</b>	<b>Corporate Select</b>	<b>Corporate Global</b>
	Ideal for small companies and consultancies, or smaller analysis teams. Also appropriate in areas without a NAFEMS Regional Group.	The perfect level of membership for medium-sized organisations who are looking to get maximum benefit from their involvement.	Tailored for companies who need to share the benefits of membership across several teams and locations. Choose what you need, and where you need it.	Meeting the needs of large multi-national organisations. Covers every employee at every site in your organisation. A truly all-encompassing membership option.
Sites Covered	<b>single site</b>	<b>single site</b>	<b>multiple named sites</b>	<b>all sites globally</b>
Free Places at NAFEMS Seminars and Conferences	<b>0</b>	<b>up to 4</b>	<b>multiple</b>	<b>multiple</b>
Copies of new NAFEMS Publications	<b>1</b>	<b>1</b>	<b>multiple</b>	<b>multiple</b>
Copies of Benchmark Magazine	<b>1</b>	<b>3</b>	<b>multiple</b>	<b>multiple</b>
Reduced Rates on NAFEMS Training	✓	✓	✓	✓
Discounted Attendance at all NAFEMS Events	✓	✓	✓	✓
Preferential Sponsorship rates at NAFEMS Events	✓	✓	✓	✓
Access to the PSE Competency Tracker	✓	✓	✓	✓
Discounted PSE Certification for all employees	✓	✓	✓	✓
Access to the NAFEMS Resource Centre	✓	✓	✓	✓
Members-Only Area of the NAFEMS Website	✓	✓	✓	✓
Participate in our Technical Working Groups	✓	✓	✓	✓
Use of the NAFEMS Member Logo on your Website	✓	✓	✓	✓
Company Details, Description and Links on nafems.org	✓	✓	✓	✓
Post your Press Releases and News on nafems.org	✓	✓	✓	✓
Promotion of your Events on nafems.org	✓	✓	✓	✓

**THERE IS A 1 YEAR MINIMUM TERM FOR ALL MEMBERSHIPS. SIGNIFICANT DISCOUNTS ARE AVAILABLE ON LONGER TERMS.**

**ACADEMIC INSTITUTIONS CAN TAKE ADVANTAGE OF THE BENEFITS OF OUR STANDARD MEMBERSHIP FOR THE PRICE OF ENTRY. CONTACT THE TEAM FOR FURTHER DETAILS.**

# Technical Working Groups

Our working groups are at the heart of everything we do. Drawn from our experienced international membership, the technical working groups identify areas of interest to the community, gaps in educational materials, requirements for further research, and opportunities for collaboration in engineering analysis and simulation.

We work hard to identify areas of genuine need and interest within the community, and our technical working groups take the lead in that process. The groups draw together a potent blend of leading engineering practitioners, academic researchers, and software vendors, giving a unique, independent insight and perspective into every aspect of engineering analysis and simulation.

As a NAFEMS member, you have the opportunity to participate where you have relevant experience and knowledge. You also benefit from the combined experience and cutting-edge thought leadership that comes from this well-established working group community.

## Technical working groups currently include:

- Analysis Management
- Composites
- Computational Fluid Dynamics
- Computational Structural Mechanics
- Dynamics and Testing
- Education and Training
- Geotechnics
- High Performance Computing

- Manufacturing Process Simulation
- Multi Body Dynamics
- Multiphysics
- Optimisation
- Simulation Data Management
- Stochastics
- Systems Modeling & Simulation

We engage the analysis and simulation community with more than fifty events each year, including conferences, seminars, workshops, open forums and webinars. As the only truly independent organisation dedicated exclusively to engineering simulation, our events represent the broadest and most accurate view of the technology available.

## World Congress

As the only truly independent, international event dedicated to engineering simulation, the biennial NAFEMS World Congress has been a fixture on the calendar of everyone involved in the community for the past three decades. The last Congress welcomed over 600 attendees, all of whom were keenly focussed on analysis and simulation. This is undoubtedly the most prestigious and highly focussed simulation and analysis forum available to the international community, and is held in the highest regard by users, software vendors and academics alike.

Our members receive significant discounts on the World Congress registration fee.

## Conferences

Each year, we organise a number of conferences across the globe. As well as our well-established Regional Conference programme, we also put together a range of more specialised events in order to give the community a real sense of focus around specific areas. Conferences on SPDM, multiphysics, additive manufacturing and verification & validation are already a key part of the programme, as well as industry specific conferences on areas such as automotive and aerospace.

As a NAFEMS member, you can use any available seminar credits towards discounted or even free attendance at these events.

## Seminars

Numerous seminars and workshops take place internationally each year, focussing on current topics of interest, as well as emerging technology areas. These range from half-day to full-day events, up to full two-day programmes, providing a multitude of opportunities to engage with your peers, share your knowledge, and stay at the cutting edge of simulation.

Depending on your level of membership, you and your colleagues will be able to attend many of these seminars for free each year.

## Webinars

As a member, you can attend our webinar programme for free. Covering a wide variety of technology areas, and hosting presentations from a range of industry experts, our webinars are a great way to engage with the community in a bite-sized way.

**YOU AND YOUR COLLEAGUES CAN ATTEND MANY OF THESE EVENTS FOR FREE EACH YEAR AS PART OF YOUR MEMBERSHIP PACKAGE.**

# PSE

PSE (Professional Simulation Engineer) Certification allows engineers and analysts within the international simulation community to demonstrate competencies acquired throughout their professional career. Independently assessed by NAFEMS, the international association of the engineering analysis, modelling and simulation community, the certification enables individuals to gain recognition for their level of competency and experience as well as enabling industry to identify suitable and qualified personnel.

The Certification incorporates an extensive range of competencies across various analysis types. It is multi-level, supporting the philosophy of lifelong learning and continuous professional development. PSE Certification is suitable for both experienced engineers/analysts and those in the early stages of their professional career.

Providing a standard of competency for the international simulation community, successful applicants receive recognition as a Professional Simulation Engineer (PSE) at Entry, Standard or Advanced Level. As competencies are developed, PSEs will advance to the next level.



## PSE MODULES

### ■ Finite Elements Analysis (Core)

- Mechanics, Elasticity and Strength of Materials
- 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

### ■ Computational Fluid Dynamics (Core)

- Thermo-Mechanical Behaviour
- Management General
- Verification and Validation
- PLM Integration and CAD-CAE Collaboration
- Simulation Process Data Management
- Buckling and Instability
- Multi-physics Analysis
- Composite Materials and Structures
- Fundamentals of Flow, Porous Media, Heat Transfer
- Creep and Time-Dependency
- Multi-Scale Analysis
- Probabilistic Analysis
- Noise, Acoustics and Vibro-Acoustics
- Electromagnetics
- Multi-body Dynamics

## THE PSE CERTIFICATION STANDARD

PSE Certification is based on the simple concept that the 'Professional Simulation Engineer' certificate is achieved by an independent assessment of workplace competency.

The Certification requires the accumulation of competency in workplace experience in the specification, planning, execution and interpretation of numerical analysis applied to design, simulation or product verification, and adequate performance in executing these functions to a high standard. It also requires competency of an appropriate level of underpinning theoretical knowledge and sufficient product knowledge to enable the analyst to understand the context, purpose and value of his/her analysis work.

PSE Certification targets both the experienced analyst and the newcomer to simulation. The experienced simulation engineer is required to present documented and attested evidence of academic and workplace competency to become certified. An appropriately qualified newcomer to simulation is expected to follow a structured training programme under the guidance of a suitably qualified Industrial Mentor.

## PSE CERTIFICATION HAS BEEN DESIGNED TO:

- Recognise and record achievement by award of a formal certification following an independent assessment of workplace competency
- Assist companies in demonstrating the competency of staff to external organisations
- Promote best practice in engineering analysis
- Increase the pool of competent engineering analysts, thereby enhancing the competitiveness of industry
- Provide a standard of competency for the international simulation community

## CLASSROOM COURSES | E-LEARNING | IN-HOUSE TRAINING

NAFEMS has been providing the engineering analysis, modelling & simulation community with world-class, code-independent training since 1983. Our unique position as an international non-profit, with no affiliation to any software code or provider, means that we are the only organisation in a position to cater for the specific training needs of everyone involved in engineering analysis.

### QUALITY

Our training courses are taught by some of the leading figures within the analysis community who are unrivalled in their experience and expertise. Our tutors are chosen on the basis of their knowledge and practice of the technology.

All training focuses on practical applications and background theory. We have sought out the very best tutors in the industry to deliver an outstanding learning experience for the community. Every single course that we provide is thoroughly reviewed, fully accredited and continuously assessed by NAFEMS to ensure the highest level of quality for our members.

We offer classroom-based training, live online e-learning, and tailored training solutions, all backed by the experience and knowledge that comes with nearly 40 years as a pillar of the simulation community.

### FLEXIBILITY

Hectic schedules and limited budgets can often stand in the way of meaningful professional development. That's why we are committed to a programme of training that meets the needs of the community, from our short classroom-based courses, live e-learning, customised in-house training, and, increasingly, on-demand and self-paced learning. We are confident that you will find a training solution that not only meets your needs, but fits around your budget and workload.

### VARIETY

Covering both FEA and CFD, our courses range from introductory through basic to advanced levels, ensuring that we provide the training needed for those relatively new to technology, those who wish to refresh previous knowledge, and those experienced practitioners who wish to develop their knowledge even further.

We are committed to providing training that is of real value to the end user. Course content is being continually updated based on changes in the technology and student feedback, and new courses are commissioned regularly, in order to meet the needs of the community.

**AS A MEMBER, YOU AND YOUR COLLEAGUES WILL BENEFIT FROM AN EXCLUSIVE 30% DISCOUNT ON ALL NAFEMS TRAINING COURSES**

# Resource Centre

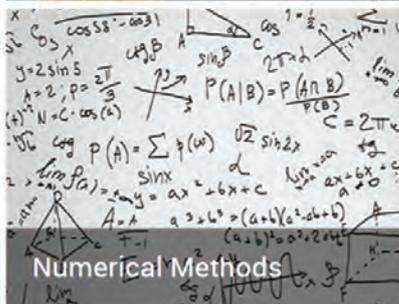
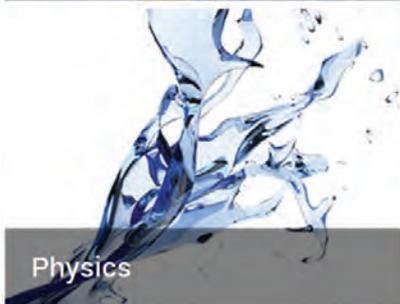
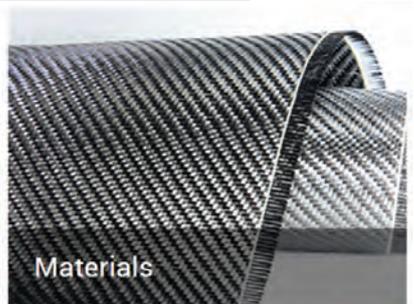
The NAFEMS Resource Centre is a database which contains hundreds of presentations, books, webinar recordings, magazine articles, journals, and more, which have been categorised and tagged in one central accessible location.

Over the past 35 years, we've gathered a wealth of information on engineering analysis, modelling and simulation. The resource centre provides our members with easy access to this valuable material.

It's simple to use. Relevant material can be found by searching by keyword, filtering by multilevel technical categories or filtering by author, organisation, or type of resource.

There are currently over 1,500 resources available with this number growing weekly. Members have access to numerous types of resource as part of their membership, including presentations from previous events, conference papers, webinar archives, and much more.

[nafe.ms/resource](http://nafe.ms/resource)



## Publications

Over the past 35 years, we have produced over 200 books covering the cutting-edge of engineering analysis and simulation. Many of the codes you work with today were tested against benchmarks produced by NAFEMS, while most of our publications have been written by industry experts, reviewed extensively by our working groups, and are available at significant discounts to our members.

Each year, we produce a plethora of how-to guides, industry surveys, technical textbooks, academic journals, best-practice guidelines and much, much more.

# BENCH MARK

# eLibrary

Published quarterly, benchmark is the only truly independent publication focussed specifically on analysis and simulation. With content encompassing all areas of engineering simulation from across the globe, articles in benchmark cover every aspect of engineering analysis across all industries from aerospace to biomedical engineering.

Available *exclusively* to NAFEMS members, an optional e-Library subscription gives ultimate access to the NAFEMS resource centre. Your subscription, combined with your membership privileges will enable you to download complete publications, proceedings, presentations, magazine articles, and much much more. E-Library ensures that the information you need is available when you need it.

**WHEN YOU JOIN, YOU'LL RECEIVE A LIBRARY OF YOUR CHOSEN NAFEMS PUBLICATIONS. ALL NEW PUBLICATIONS WILL BE SENT TO YOU AS AND WHEN THEY ARE PRODUCED. YOU'LL ALSO RECEIVE COPIES OF BENCHMARK MAGAZINE EVERY QUARTER.**

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Join us



**NAFEMS**

+44 (0) 1355 225 688

[join@nafems.org](mailto:join@nafems.org)

[nafems.org/joinus](http://nafems.org/joinus)