

NAFEMS Americas Regional Steering Committee

2022 Annual Review



Dr. Rodney L. Dreisbach

Chair, NAFEMS Americas Regional Steering Committee

February 2023

Contents

- 1. Goal and Objectives of the NAFEMS Americas Steering Committee (NASC) 3
 - 1.1. NAFEMS Americas Geographic Domain 4
 - 1.2. Importance of Engaging with NAFEMS 4
- 2. Membership Data for the Americas Region..... 4
- 3. Events Hosted by the NAFEMS Americas Region..... 5
 - 3.1. NAFEMS Americas Regional Conference 2022..... 5
 - 3.2. Virtual Conference 7
 - 3.3. Industry Events 7
 - 3.4. Webinars 8
 - 3.5. Training Courses 9
 - 3.6. ASSESS Initiative Activities..... 10
 - 3.6.1. ASSESS Congress 2022 10
 - 3.6.2. The ASSESS UM4CES Project 11
- 4. NASC Member Information 12
 - 4.1. A Time of Regional Staff Transition 12
 - 4.2. List of NASC Members 12
- 5. NAFEMS Americas Future Efforts 13
 - 5.1. What to Expect in 2023 13

This document represents an effort by the chair of the NAFEMS Americas Region to provide an overview of the region’s goals and objectives, a recap of 2022 results, and insights into future directions. The objective is to highlight efforts aimed at ensuring members of NAFEMS in the region are able to derive the maximum benefit from their membership and engagement.

1. Goal and Objectives of the NAFEMS Americas Steering Committee (NASC)

The goal of the NASC is to support the mission and goals of the international NAFEMS organization in the Americas Region, with a focus on the engineering simulation requirements defined by the industry, academia, and government entities in North America and South America.

The mission of NAFEMS is to: *Provide knowledge, international collaboration and educational opportunities for the use and validation of engineering simulation.*

The goals of NAFEMS are to:

- Be recognized as the independent authority and trusted source for communicating engineering simulation knowledge, and for sharing best engineering modeling, analysis, and overall simulation practices in developing reliable products and innovative solutions.
- Facilitate unbiased worldwide communication and collaboration between industries, academia, and government organizations for the advancement of best practice in multidisciplinary engineering simulation expertise.
- Develop and deliver training and personal educational opportunities that are aligned with the rapidly advancing engineering simulation technologies.
- Have a strong impact on product quality, development efficiency and safety.

The overall objectives of the NASC are to focus on the cross-functional digital engineering modeling and simulation product development requirements as defined by industry, academia, and governments in North and South America. Its mission is to act as a trusted source and a collaborative resource for the best engineering modeling, simulation and analysis practices in the development and maintenance of safe, reliable, and affordable products. Its focus is to champion and improve best practices, to promote and enrich educational opportunities aligned with rapidly advancing technologies, and to advance the productivity and quality of virtual product development and lifecycle-support engineering processes.

Specific objectives of NAFEMS Americas have been to:

- Promote COLLABORATION within the international engineering modeling, simulation, and analysis community
- Stimulate INNOVATION via sharing knowledge in the use of advanced scientific, engineering, and computing technologies
- Maximize PRODUCTIVITY through improved best practices used in product development and lifecycle engineering processes
- Implant QUALITY in the methods and techniques exploited by the myriad of virtual engineering modeling and simulation processes

Each NASC member should consider themselves as a NAFEMS “agent” who is representing the interests of the engineering simulation industrial end users in the Americas Region. There are two facets to this role:

- Act as a voice of the NAFEMS members within the region (i.e., help identify community needs) and feed that guidance and advice into NAFEMS.
- Support and/or promote a program of NAFEMS events and activities to address the community needs in the region.

1.1. NAFEMS Americas Geographic Domain

The geographic domain covered by the NASC includes all of North and South America. Its volunteer members are generally from the companies and organizations that are members of NAFEMS. As noted in Section 4.2, the current NASC membership includes representatives from the USA, Canada, Mexico, and Brazil.

1.2. Importance of Engaging with NAFEMS

Steps are underway to ensure that our members engage with NAFEMS in a way that benefits their personal professional development. For example, a professional development pathway for members is being implemented that will help them get the most from their membership by growing their technical knowledge and leadership skills. This guide will also assist members in navigating everything NAFEMS offers in a structured manner to meet their professional goals.

2. Membership Data for the Americas Region

For the first time in its history, NAFEMS membership in the Americas Region surpassed 500 member companies. This reflects nearly a doubling in size of member companies in the Americas Region over the past six years.

3. Events Hosted by the NAFEMS Americas Region

To kick off 2022, the Americas region hosted a wildly successful virtual conference on “AI, Data Driven Models & Machine Learning: How Will Advanced Technologies Shape Future Simulation Processes?”

As the world emerged from the global COVID-19 pandemic, the Americas Region held its first in-person regional conference since CAASE18 in Cleveland, OH. Similarly, the annual conference on “Simulation in the Automotive Industry” returned to Troy, MI in December 2022.

The Americas region also hosted a number of webinars on topics, including a well-received series on “Academia & Industry Collaboration: Preparing Students for Careers in Engineering Simulation.”

3.1. NAFEMS Americas Regional Conference 2022

NAFEMS Americas hosted its biennial regional conference, formerly known as CAASE, on June 21-23, 2022, face-to-face, at the Indiana Convention Center in Indianapolis, Indiana! The NAFEMS Americas Regional Conference 2022 (NRC22 Americas) brought together 289 leading visionaries, developers, and practitioners of CAE-related technologies in an open forum to share experiences, discuss relevant trends, discover common themes, and explore future issues, including:

- What is the future for engineering analysis and simulation?
- Where will it lead us in the next decade?
- How can designers and engineers realize its full potential?
- What are the business, technological, and human enablers that will take past successful developments to new levels in the next ten years?

This conference covered a wide range of topics, addressing every aspect of engineering analysis and simulation during a 2.5-day program. More than 100 presentations from industry, software providers, researchers, and academia addressed the following four key themes of the conference:

- Simulation-Driven Design (...of Physical Systems, Components & Products)
- Implementing Simulation Governance
- Advancing Manufacturing Processes & Additive Manufacturing
- Addressing Business Strategies, Challenges & Advanced Technologies

The keynote speakers for the NRC22 Americas were as follows:

- Jillian Steffek, Chief Engineer - Modeling and Simulation, Oshkosh Corporation, “Incorporating STEM, Diversity, and A New Role: Managing a Team of Simulation Experts”
- Vladimir Balabanov, Technical Fellow, The Boeing Company, “Optimization, Machine Learning, & Digital Thread in Structures: Perspective from Boeing”
- Darrel Meffert, Enterprise Simulation Strategy Mgr., Caterpillar Inc., “Changing a Product Development Culture from ‘Test Focused’ to ‘Simulation-Led’ - Sharing the Keys to Caterpillar’s Success in Achieving This Change”
- Chris Davey, R&A Global Manager for Systems Engineering, System Safety, Modelling & Simulation, Ford Motor Company, “Connected and Data Driven - Model Based Systems Engineering, Simulation and System Adaptation”
- Amol Vaidya, Director of Innovation, Owens Corning Science & Technology, “Digital Innovation for Sustainable Future: Simulation Capabilities to Drive Growth”
- Steven Wellborn, Senior Fellow - Turbomachinery Systems, Head of Aerothermal and Functional Design, Rolls-Royce, “Practical Implementation of Digital Twins for Today and Tomorrow”

During the NRC22 Americas Conference, NAFEMS Technical Working Group Discussion Sessions were held on behalf of the Business Impact WG, Engineering Data Science WG, Simulation Governance and Management WG, Optimization WG, Stochastics WG, and the Composites WG.

Other offerings during the NRC22 Americas Conference included the following:

- Nine Complementary World-Class Training Courses
- Eight Free Technical Workshop Educational Sessions
- Ability to network with software vendors and other end users, and to discuss applications of CAE tools in diverse industries
- Interact with more than 22 Hardware and Software Providers showcasing their latest technologies
- Meet IndyCar driver Alexander Rossi of the Andretti Autosport racing team during Tuesday evening’s Networking Reception!

In conjunction with the NRC22 Americas Conference, a free tour was also provided to visit Purdue’s Composites Manufacturing and Simulation Center (CMSC). The CMSC is a partner with NAFEMS in advancing composites simulation across the manufacturing and performance product lifecycle. The CMSC develops and exercises digital twins for composites manufacturing processes including additive manufacturing, thermoplastic sheet forming, compression molding, resin transfer molding, autoclave molding, in a model-based engineering framework to provide industry, government and academic partners with validated decision tools

Valuable insights and takeaways from conference attendees are freely available for download:

nafems.org/events/nafems/2022/nafems-americas-conference/

3.2.Virtual Conference

February 23-24, 2022: AI, Data Driven Models & Machine Learning (ML): How Will Advanced Technologies Shape Future Simulation Processes? This event was a virtual seminar with 234 registrations and 190 attendees which was composed of two parts:

- 5 Invited Speakers:
 - Nikita Jaipuria, Research Scientist - Computer Vision & ML, Ford Motor Company
 - Ankit Agrawal, Research Associate Professor, Northwestern University
 - Uyiosa Abusomwan, Rice University
 - Xun Jiao, Villanova University
 - Nilesh Tralshawala, Xerox PARC

- Panel Discussion:
 - EDSWG hosted panel by Fatma Kocer (Vice-Chair).

3.3.Industry Events

The NASC organized the automotive industry event entitled “Simulation in the Automotive Industry: Driving Convergence to Electrification, Autonomous and Connectivity” that was held on December 7th, 2022 in Troy, MI, USA.

Topics presented and discussed during this event addressed various issues, such as:

1. Electrification

- Batteries
 - Electrochemistry CFD methods for effective thermal propagation and cooling evaluation
 - Simulation methods for fast charging and thermal evaluation
 - Methods for battery system light weighting
 - System optimization balancing of thermal performance vs light weighting for best vehicle range

- E-Motors
 - System level methods for evaluating e-motor efficiency and its effects across attributes
 - Integration of electromagnetic evaluation methods with NVH through co-simulation for evaluating design trade-offs

2. Autonomous Vehicle / ADAS Simulation Technologies

- Effective Methods for integrating Vehicle Models into ADAS application software
- Simulation technologies for Sensors, Cameras, Thermal Imaging, Radar, Lidar image, Sonar sensors
- Simulator technologies for AV Drive evaluations
- Better Pedestrian Vehicle Interaction capabilities (i.e., Driver in the Loop (DIL), Pedestrian in the Loop (PIL))
- ADS modeling for Vehicle Safety (interaction with roadside, vehicle fleet coexisting on highway autonomy, etc.)
- Connectivity simulation technology for AVs
- Traffic network modeling

3.4. Webinars

The webinar series entitled “Academia & Industry Collaboration: Preparing Students for Careers in Engineering Simulation” that was launched by NASC, resulted in holding the following three webinars covering Consumer Goods, Automotive, and Aerospace.

December 8, 2021: The UC Simulation Center – A P&G and University of Cincinnati Collaborative

During this webinar, topics were explored on how the UC Simulation Center was established to support undergraduate and graduate students, post-doctorates, and faculty, and provide them with the opportunity to perform research activities with P&G technical staff. The goal of the Center is for the purpose of:

- Assisting P&G in high performance modeling and simulation of products, systems and processes that are related to product lines.
- Providing experiential learning opportunities to students as an enhancement of their academic experience at UC.
- Developing highly capable talent in simulation for future recruitment by P&G

April 8, 2022: Georgia Tech’s Aerospace Systems Design Laboratory – Developing the Next Generation Workforce through Industry Collaboration

Established in 1992 by Professor Dimitri Mavris as a center for multi-disciplinary design and optimization, systems engineering, and technology assessments, the Aerospace Systems Design Laboratory (ASDL) has since grown to become one of the nation’s premier entities for aerospace systems and complex design.

Discussion during this webinar dealt with how ASDL students engage in collaborative efforts with government agencies and industry organizations around the globe to take their education to the next level. The mission of ASDL has been to be an educational leader in advanced systems architecting, engineering, design, integration and operations, decision making, digital engineering, and large-scale virtual experimentation for complex system design. Its aim is to:

- Train the next generation of highly qualified engineers for academia, industry, and government
- Develop leading design methods suitable for the design of all types of complex systems
- Provide a point of global dissemination for cutting-edge research to academia, industry, and government
- Advocate for research fields critical to the continued maturation of industry

July 21, 2022: The OSU (Ohio State University) Simulation Innovation Center – A Unique Applied Research Center

During this webinar, the panel discussed the history of the collaboration, its successes and challenges, and the vision for the future. It was noted that the center has focused on three primary initiatives:

- Developing innovative modeling and simulation methods for use in applied industry processes.
- Education of undergraduate and graduate students through research opportunities and internships.
- Professional development of practicing engineers in modeling and simulation.

3.5. Training Courses

The Americas Regional Manager had the opportunity to implement the following training course (scheduling, hosting, attendee support, etc.) during April 22nd – May 13th:

“How to Effectively Communicate Innovative Ideas” with course tutor Brian O’Keefe.

The objective of this course is to assist engineers in becoming world class at constructing and delivering messages to others who make business decisions. The focus is on how to deliver clear, compelling, and concise communications, even for very complex ideas, thereby resulting in what is called an “Articulate Engineer.”

This course will continue to be offered in 2023, with the first session starting on February 13. For more information, visit: <https://www.nafems.org/training/e-learning/how-to-effectively-communicate-innovative-ideas/>

3.6. ASSESS Initiative Activities

NAFEMS Americas members have participated in the Annual ASSESS Congress events since its inception in 2015. Of note is that the annual Congress for the years 2020 and 2021 were canceled due to the Covid-19 pandemic. The objective of these events has been to bring together key leadership participants including experts, industry analysts, software providers, researchers, simulation users, and others in the community of model-based analysis, simulation, and systems engineering.

3.6.1. ASSESS Congress 2022

During May 1-3, 2022, the fifth Annual ASSESS Congress was held in Atlanta, Georgia by the ASSESS Initiative for “enabling” strategies related to increasing the use and benefit of engineering simulation. Following the ASSESS Congress, NAFEMS announced their acquisition of the ASSESS Initiative activities and assets in June 2022. The ASSESS Initiative will continue as a self-contained thought leadership effort focusing on “The Future of Engineering Simulation” under the overall NAFEMS umbrella.

The activities of NAFEMS and ASSESS have always been very complementary. Bringing the two organizations together will see the ASSESS activities benefit from the infrastructure, experience, knowledge, reputation, and network that NAFEMS has built over the past nearly 40 years, and NAFEMS will benefit from further extending its longer-term view of engineering simulation. The ASSESS Initiative will act as a part of NAFEMS with an expanded vision: “To lead every aspect of engineering simulation toward a more valuable and accessible future in the medium to long-term, leveraging the expertise and knowledge of top-level figures in industry, government, and academia.”

Joe Walsh, ASSESS founder, will continue to lead the ASSESS Initiative under the auspices of NAFEMS. ASSESS will have the autonomy to chart its own course, make independent recommendations, and decide on which initiatives to pursue. The expectation is that ASSESS activities will continue, only bigger, better, and bolder because of the support and assistance of NAFEMS.

3.6.2. The ASSESS UM4CES Project

A project that was initiated by the ASSESS Initiative and which has had participants from the NASC has been entitled “Unified Model Characteristics for Engineering Simulation (UMC4ES).” This project was launched to address the rapidly growing need for a better understanding of model characteristics related to Engineering Simulation Models. This need is coupled with the significantly expanding role of simulation in performing Model-Based Engineering (MBE). Engineering Simulation metadata (ES Metadata) structures are currently being proposed by multiple initiatives, each of which takes a different approach to defining a pragmatic metadata structure based on its own perspective and goals.

The UMC4ES project is an attempt to define a comprehensive set of model characteristics (metadata) of interest for the complete range of Engineering Simulation Models that can be used across all applications. The objective of UMC4ES is to provide a comprehensive definition of the metadata required to describe the characteristics of all types of Engineering Simulation Models. It is intended for this characterization to describe and link the characteristics of the model and its intended use over its entire lifecycle for all relevant stakeholders to support processes, activities, business purposes, and higher-level models.

4. NASC Member Information

The tireless support provided by the NAFEMS Americas Steering Committee members during 2022 was very much appreciated by the NAFEMS staff as well as by all participating NAFEMS members around the globe.

4.1. A Time of Regional Staff Transition

In June 2022, Kathy Elliott assumed the role of VP of NAFEMS Americas Operations. Following a planned transition, Andrew Wood left NAFEMS in December 2022 to accept a full-time position in pursuit of his dream career in Library Science. Shortly thereafter, Lisa Rimback joined the NAFEMS staff as the Regional Manager for the Americas Operations. We are excited to have Kathy and Lisa driving increased growth and engagement in the region for many years to come.

4.2. List of NASC Members

NAFEMS Americas staff members:

- Kathy Elliott; VP of Americas Operations
- Lisa Rimback; Americas Regional Manager
- Ian Lewis; Americas Sales Manager

NASC volunteers who are generally from NAFEMS company members:

- **Chairman:** Rodney Dreisbach (Engineering Consultant, NAFEMS Technical Fellow and Council Member, Retired Senior Technical Fellow Executive at Boeing; USA)
- Steve Arnold (NASA Glenn Research Center; USA)
- Jack Castro (The Boeing Company; USA)
- Duane Detwiler (Honda Development & Manufacturing of America, LLC; USA)
- Brian Duffy (FutureOn; USA)
- Graham Elliott (De Havilland Aircraft of Canada Limited; CAN)
- Mario Felice (Principal and Founder - virsolTech Engineering Consulting, LLC; USA)
- Francisco Gomez (GE Power; MEX)
- Joshua Huang (Tesla; USA)
- Alexander Karl (Rolls-Royce Corporation; USA)
- Linda Knudsen (Zimmer Biomet; USA)
- Edward Ladzinski (SMS_ThinkTank™, CEO and Managing Partner; USA)
- Matthew Ladzinski (Marketing Campaigns Director, Ansys A&D; USA)
- Laura Michalske (Procter & Gamble Company; USA)

- Mark Palmer (Medtronic; USA)
- Frank Popielas (SMS_ThinkTank™, Managing Partner and Co-founder; USA)
- Bruno Purnode (Owens Corning Science & Technology LLC; USA)
- Marcus Reis (VP, Engineering Simulation and Scientific Software Ltda; BRA)
- Charles Roche (Western New England University; USA)
- Mahmood Tabaddor (Associate Director, Accenture; USA)
- Karim Zouani (Ford Motor Company; USA)

5. NAFEMS Americas Future Efforts

To continue the incredible rate of growth experienced by the NAFEMS Americas region, several exciting efforts have been lined-up for 2023. Furthermore, we are looking beyond the current year to ensure our members are receiving the best value from their membership and engagement.

5.3. What to Expect in 2023

NAFEMS members located in the Americas Region will begin active participation in the five new subcommittees that have been developed.

1. Membership Subcommittee: Look at the NAFEMS member experience and work to refresh and improve the experience. An onboarding process for new members will also be developed.
2. Planning Subcommittee: Develop an event plan for the next few years, focusing on offering relevant and timely content to attendees, both for in-person and online events.
3. WISE Subcommittee: Focus on Women In Simulation Engineering (WISE). Will begin by developing a plan of work, based on the vision they develop for the subcommittee.
4. PSE Subcommittee: Increase the visibility and knowledge of the PSE certification schema that is offered by NAFEMS.
5. Vendor Subcommittee: The NAFEMS member vendors will meet regularly with NAFEMS Americas staff to ensure that the partnership remains strong.

In addition, NAFEMS Americas has begun scheduling events for the calendar year 2023. An e-learning course has been scheduled for February, *How to Effectively Communicate Innovative Ideas*. In March, the NAFEMS ASSESS Congress 2023 will be held in Atlanta, Georgia. The International NAFEMS World Congress will be held in Tampa, Florida, in May, and in September, a virtual event will be held, *Artificial Intelligence and Machine Learning for Manufacturing*.