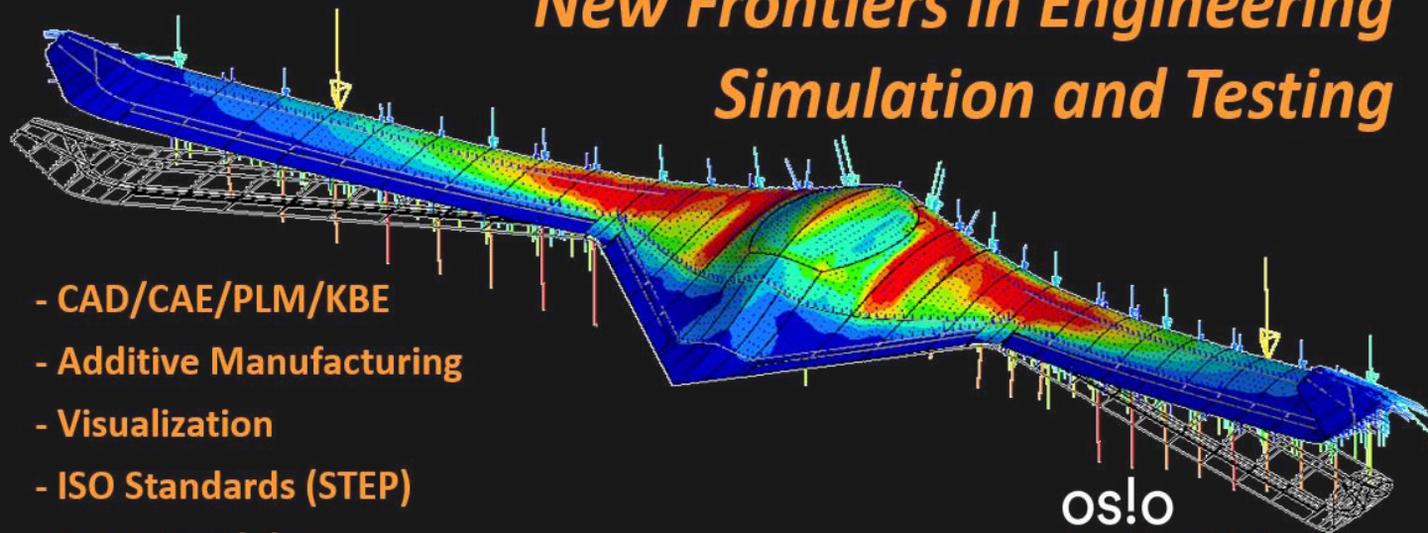


# New Frontiers in Engineering Simulation and Testing



- CAD/CAE/PLM/KBE
- Additive Manufacturing
- Visualization
- ISO Standards (STEP)
- Interoperability
- Long Term Archiving

os!  
innovation  
week



- Jotne will conduct a seminar on the subject of “New Frontiers in Engineering Simulation and Testing”. The seminar will help companies explore new capabilities in Simulation and Test Data Management and how to use ISO standards to increase the interoperability of engineering and PLM/ILS information.
- The seminar will highlight recent advancements in CAD/CAM/CAE/PLM, including Additive Manufacturing, that enable standards-based product lifecycle management.
- Presentations will be given by; Lockheed Martin, Jotne, Eker Design, NTNU, Norwegian Defence Research Establishment (FFI), SINTEF and EU/I4MS in addition to an interactive demonstration session at the end of the day.

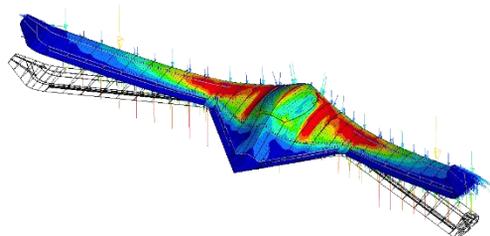


When: October 20, 2016, starting at 08:30  
Where: Oslo Military Society, Myntgaten 3, Oslo, Norway  
Registration: [www.jotneit.no/oiw](http://www.jotneit.no/oiw)

# New Frontiers in Engineering Simulation and Testing

October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

08:30 - 09:00	<b>REGISTRATION AND COFFEE</b>
09:00 - 09:30	<b>KEY NOTE SPEAKER</b> Presenter: Katinka Van der Lippe, Eker Design
09:30 - 10:00	<b>LOCKHEED MARTIN - INTRODUCTION TO ENGINEERING EXCELLENCE</b> Presenter: Mike Jahadi, Lockheed Martin Aeronautics Company
10:00 - 10:45	<b>CRYSTAL: OPEN SIMULATION DATA MANAGEMENT AND TESTING</b> Presenters: Chris Johnson, Lockheed Martin and Jochen Haenisch, Jotne
10:45 - 11:00	<b>COFFEE BREAK</b>
11:00 - 11:30	<b>SOFT WING IMPACTOR FOR CRASH TESTING OF AVIATION MASTS (ICAO/FAA)</b> Presenter: Terje Rølvåg, NTNU
11:30 - 12:00	<b>THE IDEALISM PROJECT - MULTIDISCIPLINARY DESIGN AND OPTIMISATION</b> Presenter: Kjell Bengtsson, Jotne
12:00 - 13:00	<b>LUNCH</b>
13:00 - 13:30	<b>ADDITIVE MANUFACTURING IN MILITARY OPERATIONS</b> Presenter: Ole Fretheim, Norwegian Defence Research Establishment (FFI)
13:30 - 14:15	<b>OVERVIEW ON NEW VISUALIZATION AND ADDITIVE MANUFACTURING SOFTWARE TECHNOLOGIES, UPDATES FROM VELASSCO AND CAXMAN</b> Presenters: Heidi Dahl and Tor Dokken, SINTEF
14:15 - 14:45	<b>EU/I4MS COLLABORATIVE PROJECTS AND OPPORTUNITIES</b> Presenter: Silvia de Maza, EU I4MS
14:45 - 15:00	<b>COFFEE BREAK</b>
15:00 - 17:00	<b>DEMONSTRATIONS AND INFORMAL DISCUSSIONS</b>



## Registration and Contact info:

Web: [www.jotneit.no/oiw](http://www.jotneit.no/oiw)

Mail: [simdm@jotne.com](mailto:simdm@jotne.com)

Phone: +47-23 17 17 00

# New Frontiers in Engineering Simulation and Testing

October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

08:30 - 09:00 **REGISTRATION AND COFFEE**

09:00 – 09:30 **KEYNOTE SPEAKER**

Presenter: Katinka Van der Lippe, EKER DESIGN

This presentation will focus on Design and Visualization in product development, the creative development tools and the connection to the user. Further it will highlight how the designer adds to the development process - tools and methods.

**Katinka von der Lippe** is an Industrial designer with long operational experience and knowledge in design processes, design thinking and design strategy. After graduating with a Master in Industrial Design from Oslo School of Architecture and Design (AHO) she has 17 years of operational leadership in innovation projects from concept through to complete product or service. Currently Head of Design at Eker Design, Fredrikstad. Previously 14 years with TH!NK Global as head of Design of the TH!NK City electric car, the concept 5-seater TH!NK Ox and cabriolets. She has won notable design awards such as; Red Dot Design Award, British Design Award and the NF Honors Award.



09:30 – 10:00 **LOCKHEED MARTIN - INTRODUCTION TO ENGINEERING EXCELLENCE**

Presenter: Dr. Mike Jahadi, LOCKHEED MARTIN AERONAUTICS COMPANY

**ABSTRACT:** The 21st century military business environment will be one of reduced defense funding and increased customer expectations. Lockheed Martin has a rich history dedicated to continual improvement of processes and tools to reduce costs while increasing capabilities of their products. Dr. Mike Jahadi, Lockheed Martin Aeronautics Company will highlight several case histories from Lockheed Martin's past to present. He will discuss a fully integrated suite of tools and processes that would make a major impact on costs and span times.

**Dr. Mike Jahadi** is responsible for the identification and prioritization of new technologies in support of product design manufacturing and analysis of all CAD/CAM/CAE related research and development activities within LM Aeronautics. He has more than 30 years of experience in engineering disciplines related to design, analysis and CAD/CAM engineering and system integration, as well as supervising/implementing and managing the development of advanced CAD/CAM systems and methods, long-range planning, and providing technical lead and direction for the CAD/CAM activities in support of all programs at LM Aero-Fort Worth. Dr. Jahadi is President and Chairman of the PDES, Inc. Executive Board. In addition, he is Associate Fellow member of the American Institute of Aeronautics and Astronautics (AIAA). Dr. Jahadi holds a B.S. and M.S. in Structural Engineering from Mississippi State University and a Ph.D. in Mechanical Engineering from Southern Methodist University. He is also registered Professional Engineer in state of Texas.



# New Frontiers in Engineering Simulation and Testing

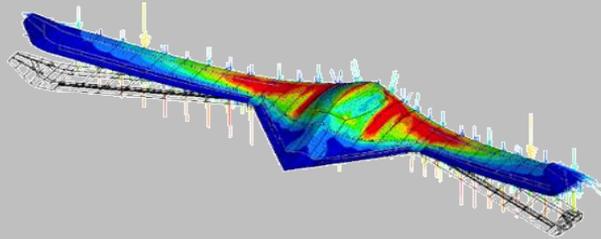
October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

10:00 – 10:45 **CRYSTAL: OPEN SIMULATION DATA MANAGEMENT AND TESTING**

Presenter: Chris Johnson, LOCKHEED MARTIN and Jochen Haenisch, JOTNE

**ABSTRACT:** Collaborative multi-disciplinary design, analysis and test data management and correlation (CRYSTAL)

Structural testing is well integrated in the development processes of complex systems such as aircraft, however, during execution and especially after completion of these processes finding information is inefficient and time-consuming with data spread over many applications, files, formats and locations. Lockheed Martin Aeronautics and Jotne, explore and implement a system architecture for central storage of design, simulation and test data that enables interoperability and long-term archival and retrieval (LOTAR) through configuration control. This architecture is based on the international standard STEP, ISO 10303. STEP is already widely used for sharing of 3D models for design by file exchange. CRYSTAL is extending the use of the standard into a new domain, that is, engineering analysis and simulation like FEM/CFD/DEM, and adds methods of implementing it by providing access to a central product data repository through APIs and web-services. Even beyond these existing capabilities of STEP, CRYSTAL will take the lead of a standardization activity to enlarge the STEP lifecycle model to integrate also structural testing and its correlation to design and simulation. The benefit that such a comprehensive product data repository can give to industry, however, depends on the interoperability of their current and future tools with the standard and, through the standard, with other tools. CRYSTAL will, therefore, deliver a tool kit to lower the threshold for vendors to link their corresponding domain applications into this architecture.



**Mr. Chris Johnson**, a Senior Staff Aerospace Engineer with Lockheed Martin Aeronautics Company, currently is a member of the Advanced Structures group in the Advanced Development Programs (Skunk Works). He has over 30 years experience in the design and analysis of aerospace structures, and in developing CAD and CAE tools and standards necessary for those tasks. His expertise includes computer aided design and analysis, finite element modeling of flight vehicles, multi-disciplinary optimization and software development and architecture. He is a member of the Long Term Archiving and Retrieval, Engineering Simulation and Analysis working group (LOTAR EAS). He has been active in the ISO 10303-209 ed2 project and has experience with STEP recommended practices and translator development. Mr. Johnson has a M.S. in Mechanical Engineering from the Virginia Polytechnic Institute and State University (Virginia Tech), 1986; and a B.S. in Mechanical Engineering from Virginia Tech, 1984



**Mr. Jochen Haenisch**, is Director Defence and Aeronautics in Jotne where he joined in 2001. He took a master's degree (Dipl.-Ing.) in Naval Architecture at the RWTH Aachen, Germany and wrote his diploma at the NTH in Trondheim, Norway, in 1984. On his first employment at the Centre of Industrial Research in Oslo he continued his engagement in computer aided design, now with a focus on data exchange. This naturally brought him to the STEP community in ISO/TC 184/SC 4 as early as in 1990. From surface modelling he moved on to life-cycle models, including PLCS, for maritime applications when he joined Det Norske Veritas. With his skills in IT systems and data modelling Jochen has participated in and managed both R&D projects and industrial implementation activities. Jochen is Deputy Convener for ISO/TC 184/SC 4/WG 12, STEP Product Modelling and Resources and chairman of the Norwegian national committee for STEP at Standards Norway.”.



# New Frontiers in Engineering Simulation and Testing

October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

10:45 – 11:00 **COFFEE BREAK**

11:00– 11:30 **SOFT WING IMPACTOR FOR CRASH TESTING OF AVIATION MASTS**

Presenter: Professor Terje Rølvåg, NTNU

**ABSTRACT:** The International Civil Aviation Organization (ICAO) and the Federal Aviation Administration (FAA) has performed physical testing of aviation masts in order to define frangibility requirements wrt, impact force and energy transmitted from a mast to an aircraft during a collision. All aviation masts have to comply to these requirements. This presentation describes an attempt to model and verify a virtual model of a wing impactor based on static and dynamic compression test analyses. The motivation was to define and validate a standard Finite Element (FE) model that could ultimately reduce the need for physical crash testing of aviation masts. The FE model was validated and optimized based on physical lab tests.

**Professor Terje Rølvåg**, holds a MSc. and a Ph.D. within non-linear finite element dynamics from NTNU, Trondheim. Rølvåg's research interests cover computer science applied to engineering applications, focusing on the simulation of behaviour and strength of electromechanical products. The simulation techniques are based on non-linear Finite Element formulations and control science. His working experience includes SINTEF, Fedem Technology AS and TRAC, the latter in combination with an adjunct professorship at the Department of Engineering Design and Materials (IPM), NTNU. Since 2003 he has been a full time professor within the Engineering Design group at IPM. He has started more than 6 spin off companies from NTNU.



11:30 – 12:00 **THE IDEALISM PROJECT - MULTIDISCIPLINARY DESIGN AND OPTIMISATION**

Presenter: Mr. Kjell A. Bengtsson, JOTNE

**ABSTRACT:** The IDEaliSM - Development framework for Multidisciplinary Design and Optimisation - solutions lie in three main deliverables: an advanced integration framework for distributed Multidisciplinary Design and Optimisation, an Engineering Language Workbench (a set of domain specific and high-level modelling languages, ontologies and data standards) and a methodology for service-oriented development processes to redefine the product development process and information architecture to enable collaboration between service oriented Competence Centres in Distributed Development Teams. The project is an ITEA initiative and part of the EUREKA Cluster programme.

**Mr. Kjell A. Bengtsson**, is a Vice President in Jotne, has a Mechanical Engineering background and a diploma in Marketing. He started out at Volvo Car and General Electric doing CAD/DB applications and later management positions, and is now VP at Jotne EPM Technology, a world leader in PLCS/STEP/Express applications. Kjell has been exposed to the STEP, PLCS and other related (ISO TC84/SC4) standards for the last 25 years and is actively involved in neutral database implementation projects in the most complex defense and aerospace sector projects. Kjell is a Member of the Board of the PDES, Inc organization and supports other industry organizations like NIFRO, FSI, ASD, NATO IIG and more.



# New Frontiers in Engineering Simulation and Testing

October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

12:00 – 13:00 **LUNCH**

13:00 – 13:30 **ADDITIVE MANUFACTURING IN MILITARY OPERATIONS**

Presenter: Mr. Ole Fretheim, Norwegian Defence Research Establishment (FFI)

**ABSTRACT:** Additive manufacturing can change the supply chain for spare parts in military operations. Spare parts supply in military operations is complex and costly. Using AM in operations represents opportunity for big savings but is also challenging due to verification of production quality. FFI deployed a container equipped for part design and additive manufacturing during the military operation “Cold Response” this winter. Experience from the operation will be covered in the presentation.

**Mr. Ole Fretheim:** has a MSc degree in mechanical engineering from Norwegian University of Science and Technology (NTNU). Fretheim is currently head of the Mechanical Design and Workshop at the Norwegian Defence Research Establishment (FFI). His team is involved in complex mechanical projects, currently instruments for NASA 2020 Mars Rover. For more than 10 years, Fretheim held key positions in the Think EV program as vehicle program- and production manager.



13:30 – 14:15 **OVERVIEW ON NEW VISUALIZATION AND ADDITIVE MANUFACTURING SOFTWARE TECHNOLOGIES, UPDATES FROM THE VELASSCO AND CAXMAN PROJECTS**

Presenters: Dr. Heidi Dahl and Dr. Tor Dokken, SINTEF

**ABSTRACT:** The challenges posed by Digitization, Cloud Computing, Big Data and Additive Manufacturing (AM) have prompted a need for theoretical improvements of the mathematical foundation of data representations and algorithms. The seventh framework project (FP7) VElLaSSCo – Visualization For Extremely Large-Scale Scientific Computing (2013-2016) – addresses the Big Data challenges of large simulations, while the H2020 Research and Innovation Action CAXMan – Computer Aided technologies for Additive Manufacturing (2015-2018) – addresses analysis based design and process simulation for Additive Manufacturing. SINTEF's activities in both projects build on the novel theory of Locally Refined (LR) B-splines, developed in cooperation between SINTEF and the University of Oslo. The talk will address the volumetric LR B-spline approximation and visualization developed in VElLaSSCo, demonstrating the improved interactivity of the LR B-spline models for features such as cut planes and iso-surfaces. It will also present the approach of CAXMan of interoperability between analysis based design for AM, AM process planning, thermal and residual stress simulation of the AM process plan, quality control of the shape produced by AM, as well as final finishing by subtractive/abrasive process.

# New Frontiers in Engineering Simulation and Testing

October 20, Oslo Military Society, Address: Myntgaten 3 - Entrance: Kongens gate

**Dr. Heidi E. I. Dahl** is a Research Scientist at the Geometry Group of the Department of Applied Mathematics of SINTEF ICT in Oslo, Norway. She is and has been part of the coordination teams of several FP7 and H2020 research projects, including the role of Quality Assurance Coordinator in the FP7 Integrated Project IQmulus (2012-2016). She is also SINTEF's Principal Investigator in the FP7 project VELAССo (2013-2016), using LR B-spline approximation of volumetric data from Finite and Discrete Element Methods to create compact models well suited for interactive interrogation and visualization. Her current scientific interests include the practical applications and theoretical development of LR B-splines, as well as the use of abstract geometric frameworks such as Geometric Algebra in practical applications such as volumetric parametrizations for Isogeometric Analysis.



**Dr. Tor Dokken** is Chief Scientist and the Research Manager of the Geometry Group in the Department of Applied Mathematics of SINTEF ICT in Oslo, Norway. He is currently the coordinator of the H2020 Factories of the Future Research and Innovation project CAxMan (2015-2018), and the fp7 Integrating Project (2012-2016) IQmulus - A High-volume Fusion and Analysis Platform for Geospatial Point Clouds, Coverages and Volumetric Data Sets. His current scientific interests concern the use of the newly-developed concept of LR-splines in various practical applications, among them data fusion, approximation of big data points sets, and design and analysis for additive manufacturing.



14:15 – 14:45 **EU/I4MS COLLABORATIVE PROJECTS AND OPPORTUNITIES**

Presenter: Ms Silvia de la Maza, I4MS

**ABSTRACT:** I4MS, ICT Innovation for manufacturing SMEs, is a EUR 110 million initiative from the European Commission, within the 'Factories of the Future' public private partnership launched in 2013 and designed to support the adaption of innovative ICT by SMEs. Through eleven large projects in four key areas, such as HPC Cloud-based simulation, advanced robotics, CPS/IoT and smart sensors, I4MS brings SMEs end-users and suppliers directly into research and innovation projects, introducing them to innovative technologies and supporting the adoption of such technologies or supporting them to move their technology from the lab to the market. In April 2016, the European Commission presented its set of measures and recommendations with the aim of fostering European industrial competitiveness by supporting companies in their digital transformation. One of those measures promotes the creation and reinforcement of Digital Innovation Hubs in every European region, which will support industries lagging behind, especially SMEs and mid-cap companies, in the uptake of digital technologies.

# New Frontiers in Engineering Simulation and Testing

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**Ms Silvia de la Maza** graduated as a mechanical engineer in the University of the Basque Country (Spain), and she has an MSc on Knowledge Management from Cranfield University (UK). Since 2005, she has been involved in the creation, coordination and management of projects at national and European level, starting as a project manager and later as the R&D manager in Innovalia Association. She has a wide experience in European Projects such as FP7 FOF Linkeddesign, FP7 FOF Thermobot, ITEA2 Create, FP6 MULTINET, FP6 SWOP, FP6 AMi4SME. She is also involved in various Associations and industrial clusters such as COTEC, EFFRA, AFM.

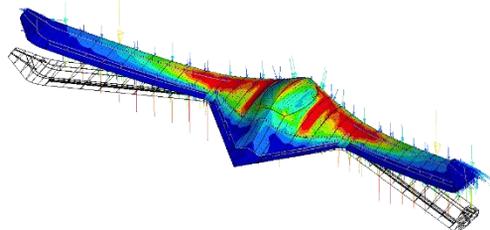
Silvia de la Maza is coordinating the consortium for the H2020-FoF-9-2015 I4MS-Growth and has successfully coordinated the consortium for the FP7-FoF I4MS-Gate that has positioned I4MS as a unique brand for the future of European Manufacturing SMEs. Ms de la Maza has also worked as an external expert for the evaluation of the H2020 program 2014-2015-2016, the Produktion2030 program (Swedish R&D Program) and the regional program Gaitek (Basque Country, Spain).



14:45 – 15:00 **COFFEE BREAK**

15:00 – 17:00 **DEMONSTRATIONS AND INFORMAL DISCUSSIONS**

This session provides the interaction amongst the participants and presenters. You will be able to discuss your needs and requirements and see demonstrations of software and Additive Manufacturing systems (3D printing).



**Registration and Contact info:**

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