

# Steel and Fiber Ropes Seminar

Topics: Rope properties, performance, service life, regulations, inspection, maintenance and disposal.

SPECIALIST  
SEMINAR

November 27<sup>th</sup>-29<sup>th</sup> 2017  
Grimstad, Norway

**Registration:**  
[deltager.no/ropes2017](http://deltager.no/ropes2017)

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## World-class competence on ropes

Teknova is proud to present some of the world's most regarded ropes experts in a specialist seminar in Grimstad, Norway. For three days, we aim to bring forward the technical, safety and regulation aspects of steel and fiber ropes.

The seminar will be punctuated by technical talks and case studies. The targeted audience includes engineers, crane designers, chief scientists, researchers, rope users and manufacturers. The communication level at the workshop will be technical but adapted to non-specialists.



# Map of Grimstad

- 1: University of Agder, Grimstad
- 2: Scandic Hotel Grimstad

# Welcome to Grimstad

Don't let the cozy small-town wooden houses or the spectacular archipelago fool you. Grimstad is a vibrant and technology savvy university city.

True, you should explore the city center by foot and buy a “porke” (pastry). But you should also recognize that Grimstad once was a technology development hub for mobile giant Ericsson, and that a lot of tech competence has spun off in other directions after Ericsson scaled down.

The University of Agder in Grimstad is the regional powerhouse for technology studies. It is well supported by the brand new 15 million US dollar Mechatronics Innovation Lab, located on campus.

Grimstad is also home of Teknova's headquarters, and it will serve as a perfect location for the 2017 Specialist Steel and Fiber Ropes Seminar.



# Program

## November 27<sup>th</sup> Day 1 | Focus on Fiber Ropes

12:30 - 13:00	Workshop registration and coffee at the University of Agder, Grimstad
13:00 - 13:10	Opening address by Dr. Thomas J.J. Meyer, Business Developer Manager at Teknova.
13:10 - 13:20	NODE in a nutshell by Marit Dolmen
13:20 - 13:30	Overview of research activities in the research centre SFI Offshore Mechatronics by Prof. Geir Hovland, UiA

### Session 1

13:30 - 15:00	<b>Limits, challenges and opportunities for the safe use of fiber rope in running application by Rudolf Kirth</b> <ul style="list-style-type: none"><li>• Limits are very often determined by the fiber properties, what can we expect from high performance fibers and what not?</li><li>• What is critical for the lifetime of fiber ropes and what not?</li><li>• Where do we have to make concessions and where can we expect more (compared to “well known” steel wire rope)?</li><li>• Influence of rope design on rope property.</li><li>• Where do we have confidence in the data, where can we use ropes without any uncertainty, and where are the big challenges for the future?</li><li>• What can a designer do to treat this new material well and reduce the risk to a manageable level?</li></ul>
15:00 - 15:15	<i>Coffee</i>

### Session 2

15:15 - 16:45	<b>General learnings from the new FEM guideline 5.024 by Rudolf Kirth</b> <ul style="list-style-type: none"><li>• What kind of life time determining factors must be taken into consideration?</li><li>• What can designers do to manage all the challenges with this new material?</li><li>• What can we learn for all kinds of lifting operations from the new FEM guide line?</li><li>• According to the new guideline, what is needed for certification?</li><li>• What is needed to make the use safe?</li></ul>
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**November 28<sup>th</sup> Day 2 | Focus on Fibers and on Steel Wire Ropes****Session 3**

- 09:00 - 10:30 **High Performance Fibers and their use in engineered ropes for dynamic applications by Paul Smeets, DSM Dyneema®**  
This presentation will start with a brief introduction on high performance fibers in general. The second topic will be the introduction to the rope manufacturing, properties and applications of these engineered ropes based on high performance fibers. With regard to applications the speaker will focus in this presentation on running rope applications, based on Dyneema® fiber which is the leading high performance fiber in marine, offshore and land applications where dynamics and fatigue life time are paramount.

10:30 - 10:45 *Coffee*

**Session 4**

- 10:45 - 12:15 **Influence of Environment on Corrosion of Wire Rope in Seawater by Prof. Richard Chaplin**
- Example of mooring rope corrosion offshore Papua New Guinea
  - Inadequacy of current policies
  - The process of wire rope corrosion – sequence of different phases
  - Factors affecting rate of corrosion
  - SCORCH JIP (Seawater Corrosion Of Rope and Chain)

12:15 - 13:00 *Lunch*

**Session 5**

- 13:00 - 14:30 **The Tension/Torsion response of Wire Rope by Prof. Richard Chaplin**
- Torque developed under tension when the ends are restrained
  - Rotation under tension without restraint
  - The representation of torque/tension measurement at fixed rotations
  - Torsional stiffness
  - Characteristic torsional properties of chain and fibre rope
  - The influence of twist on rope properties (strength, stiffness, fatigue)

14:30 - 14:45 *Coffee*

## Session 6

- 14:45 - 16:15     **Case studies of applications and operations where rope torsion is an issue by Prof. Richard Chaplin**
- Deep shaft mine hoisting
  - Kinking and hocking – torsional instabilities
  - Interactions between mooring line components with different properties – two case studies
  - Cabling

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19:00     *Dinner (please register)*

**November 29<sup>th</sup> Day 3 | Focus on Testing**

## Session 7

- 09:00 - 10:15     **Wire Rope NDT by Prof. Richard Chaplin**
- Available technologies
  - The principles of magnetic NDT for wire rope
  - What are the indicators of rope degradation?
  - Sensor systems and signal processing
  - Local Faults (e.g. broken wires) and Loss of Metallic Area (e.g. corrosion)
  - What can be measured reliably?
  - What are the operational problems?
  - The importance of inspection frequency
  - Recommendations for best assurance of rope safety
  - Future developments

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- 1015: - 11:15     **Explore the hidden world behind MRT Signals by Dr. Stephane Pernot, Letscan**
- Most of valuable MRT signal information which is related to low amplitude components remains unexplored
  - Novel idea: track the evolution of instantaneous frequencies of MRT signals to explore weak signals
  - Compute wavelet scalograms of magnetic signals by means of robust and efficient wavelet algorithms
  - Dive at the heart of signals to reveal hidden secrets such as wear, corrosion, incipient defaults and other potential rope anomalies.
  - Demo of Wirelet software illustrates the exploration of common case studies
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11:15 - 11:30 *Coffee*

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11:30 - 11:45 Feedback from attendees

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## Session 8

- 11:45 - 12:45 **Lifting and Mooring systems – qualification and testing by Hans-Erik Berge, DNV GL**
- Presentation of an update on state-of-the-art testing of mooring and lifting systems
  - How has this supported qualification of new solutions?
  - How testing has been an essential part to extend the service life of existing systems
  - An update on recent standards development
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12:45 *Lunch*

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## Speakers



### **Rudolf Kirth**

Rudolf Kirth is a chemist and a mechanical engineer. He studied at the Technical University Vienna (Austria). Kirth worked for almost 20 years as Technical Director for one of the biggest fiber rope producers in the world, with sites on 3 continents. He has experience in rope design, production and application. For more than 10 years he replaced wire rope with fiber rope and designed unique rope designs with outstanding properties. Kirth has successfully managed an international project for the change of wire rope to fiber rope in crane application. During his whole career he worked with high performance fibers, also in composites. In 2017 Kirth started his own business as consultant for rope manufacturers, crane manufacturers and users of fiber rope.



### **Richard Chaplin**

Richard Chaplin studied Engineering at Cambridge University. He then spent 39 years as academic engineer at the University of Reading, lately as Head of Department for all undergraduate engineering programs as well as for engineering research. Chaplin established the Reading Rope Research group in 1980, investigating rope fatigue modelling and service simulation, non-destructive testing, system design and regulation, inspection, failure investigation, maintenance and discard. He is now retired, but still operating a consultancy practice where the majority of work undertaken relates to offshore rope applications, such as mooring, lifting, A&R, diving bell hoisting, deepwater lifting, riser tensioners and double drum winch mechanics.



## Paul Smeets

Paul Smeets has an analytical chemistry background (BSc). He started working in the pigment and resin industry with application development and technical service for the paint and printing ink industry. Within DSM he started in 1986 at DSM Research in projects for DSM Resins, DSM Engineering Plastics and DSM Dyneema. Smeets has some 15 years of experience in the field of high performance fibers for amongst others engineered ropes based on Dyneema® HMPE fibers. Application areas range from deep-sea up to space and from surgical threads to mine hoisting ropes. At the moment Smeets works as Application Development Manager on new fields for Dyneema®, amongst others in “running rope” applications for deep-sea, land crane and deep-shaft mining applications.



## Hans-Erik Berge

Hans-Erik Berge is Business Lead for Materials Technology and Laboratories in Bergen (Norway), including qualification and testing of lifting and mooring systems. The newly established “Technology Centre for Offshore Mooring and Lifting” in Bergen is supporting the Oil & Gas, Maritime, Offshore wind, Aquaculture and other industries, with testing capabilities and providing confidence Berge holds an MSc in Structural Engineering from the Norwegian University of Science and Technology and UMIST in Manchester (UK). Berge has worked with DNV GL for 20 years within the oil & gas industry, holding various management and business development positions, covering verification, technology qualification and technical advisory.



## Stephan Pernot

Stephane Pernot (PhD) has been a senior lecturer for more than 10 years at the ENTPE, a French college of engineering, working in the fields of non-linear dynamics, vibration, monitoring, signal processing and wavelets. He also spent a year as an invited Professor at the University of Bristol (UK), to study and to experiment with essentially non-linear vibration absorbers in the BLADE earthquake laboratory. He then moved at the STRMTG (French authority) and became a rope specialist for ropeways. Pernot recently founded a start-up involved in rope inspection services and development of innovative technologies for rope condition assessment. He is involved in the rope expert commission of the OITAF and is a member of the OIPEEC management committee.

Teknova is an independent non-profit institute for applied R&D. Its core competences include the fields of *Smart Instrumentation, Modelling & Simulation, and Energy & Environmental Technologies*. A team of talented and dedicated researchers working at the forefront of scientific innovation, bring forward solutions that create value to the customers - mainly within the process, oil & gas, and cleantech industries.

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