29th international

North Sea Flow Measurement Workshop

The world premier event for flow measurement of oil and gas

- Papers covering the latest technology developments
- Manufacturers and exhibitors showcasing the latest available technologies
- Informal event with excellent networking opportunities

25.– 28. October 2011, Tønsberg, Norway

Photo: Bjarne Riesto, Norway

North Sea FLOW Measurement Workshop

NFOGM NORSK FORENING FOR OLJE OG GASSMÅLING

nel technology for life

Tekna

Welcome

On behalf of the Program Committee it is my pleasure to welcome you to the 29th international North Sea Flow Measurement Workshop.

THE WORLD VENUE FOR STATE OF THE ART FLOW MEASUREMENT TECHNOLOGY

The objective of the conference is to maintain its position as the world venue for presentations and discussions of the state of the art technologies related to oil and gas measurement. The workshop focuses on the practical applications of such technology.

As in recent years the number of abstracts has been outstanding and very relevant for the scope of the workshop. The technical committee is confident that the final program contains topics which will be found very relevant for all working with flow measurement of oil and gas. All presentations are supported by a written paper.

ADDRESSING CHALLENGES AND LATEST DEVELOPMENTS

Many field developments now rely on the use of multiphase and wet gas metering. In this years workshop you will find many presentations covering the latest development and experience within this field.

Ultrasonic meters for gas and oil are now widely used, and we are happy to present a program containing many presentations on these technologies.

Metering engineers also face other challenges related to e.g. sampling, coriolis meters, high viscosity products, cold products, condition monitoring, quality assurance. Presentations will also be held on these subjects.

A poster session will address Gas reference, Large stack & Flare Gas Test Facility, Venturi diagnostic system and virtual computer systems. The poster session gives the possibility to discuss the topics with the presenters

THESE ARE THE MAIN TOPICS OF THE PROGRAM

- Wet gas measurement
- Multiphase measurement
- Liquid Ultrasonic meters
- Liquid metering
- Gas Ultrasonic meters – condition monitoring
- Quality assurance
- Test facilities, venturi diagostics, virtual flow computers

MANUFACTURERS EXHIBITION

Many manufacturers and service companies present their products at stands during the work shop. Hence the venue provides an excellent opportunity to get in touch with many suppliers of metering equipment and measurement solutions and to get an update on their products.

SHORT COURSES - METERING ENGINEER ESSENTIALS

Are your sure you have the essential knowledge of a metering engineer? In cooperation with Christian Michelsen Research we can offer two short courses on carefully selected topics.

- Natural gas parameter calculations
- Ultrasonic Flow Meters – Technology basis

The two courses will be held during Monday afternoon and Tuesday before lunch.

Do not let this opportunity to take compressed courses on these essential topics pass by. The courses will be held by highly qualified instructors with long experience.

EXCELLENT NETWORKING OPPORTUNITIES

A very important part of the workshop is the ideal environment it provides for informal dialogue with your business connections. You will find many central people from regulators, operators, manufacturers, research institutions and engineering companies at the venue, hence the workshop provides excellent networking opportunities.

Take this unique opportunity, meet the players and get updated on state of the art within Oil and Gas Measurements in Norway in October 2011.

Yours sincerely

Dag Hendrik Fløtlo,
Chair of NSFMW ´2011

MONDAY 24 OCTOBER 2011

1500 **Short course**
1900 Natural Gas Parameter Calculation

TUESDAY 25 OCTOBER 2011

0800 **Short Course**
1200 Ultra Sonic Flow Meters – Technology Basis

NB!
To attend the short courses a separate registration is required

NSFM WORKSHOP 2011

1200 **Registration and lunch**

1300 **Welcome**
Program chair Dag Hendrik Fløtlo, Statoil, Norway

1310 **Key Note**
Fiscal Measurements when the Requirements of different Nations should be maintained
- Cross border activities related to the Norwegian Continental Shelf
Project Director Eva Halland, Norwegian Petroleum Directorate, Norway

WET GAS

Chair: Dag Hendrik Fløtlo, Statoil, Norway

1330 **(1) Venturi Meters and Wet Gas Flow**
Rick de Leeuw, Shell, The Netherlands, Richard Steven, CEESI, Canada

1400 **(2) Orifice Plate Meter Response to Wet Gas Flows**
Richard Steven, CEESI, Canada, Gordon Stobie, ConocoPhillips, UK
Andrew Hall, BP Exploration Operating Company Limited, UK,
Bill Priddy, BP Exploration Operating Company Limited, UK

1430 **Break /Refreshments**

MULTIPHASE

Chair: Douglas Griffin, DECC, UK

1500 **(3) Subsea Multiphase Measurements: where we are and what 's Next from an Operator Perspective**
Jean Paul Couput, Total, France

1530 **(4) Blind testing of a Dual Mode Multiphase Wet Gas Meter at the Alaska Alpine Oil Field and the CEESI Wet Gas Test Facility**
Gordon Stobie, ConocoPhillips, UK, Andrew Hall, BP, UK
Arnstein Wee, Multi-Phase Meter AS, Norway

1600 **Break/Refreshments in the exhibition area**

1630 **(5) First-ever Validation of a Multiphase Flow Meter on Extensive ranges of GVF (0-100%), WLR (0-100%), Pressure (4-30 bar), and Flow Regimes from Stable to Unstable in a Well controlled Flow-loop Facility**
Vincent Pequignot, Viraj Konde, Vishal Dhanuka, Hamza Matallah,
Bruno Pinguet Schlumberger, India

1700 **(6) The Effects of Scale in Subsea Multiphase Flow Meters**
Neil Barton, NEL, UK, Klaus Zanker, Letton Hall Group, USA,
Gordon Stobie, ConocoPhillips, UK

1730 **Poster session**

Authors will be present for poster discussions

1. **The "Gas Oil Piston Prover", a new Concept in realizing Primary Reference Values for (high- pressure) Gas Volume in The Netherlands- Results**
Mijndert van der Beek, Rens van den Brink, Dutch Metrology Institute, The Netherlands

2 **New Large Stack & Flare Gas Test Facility**
Aaron Johnson, Nist, Eric Hartman, CEESI, USA

3. **Velocity Profile Sampling in Large Stack & Flare Gas Piping**
Eric Harman, CEESI, USA, Aaron Johnson, Nist, USA
4. **A Diagnostic System for Venturi Meters in Single Phase and Wet Gas Flow Applications**
Jennifer Ayre, Swinton Technology, Ben Glover, Centrica Energy, Deverapalli Vijay, Petronas, Malaysia, Carigali and Richard Steven, DP Diagnostics, USA

5. **Field implementation of Virtual Flow Computer Systems for Fiscal Measurement and Allocation Calculations on the Centrica Energy Upstream Offshore Production Facilities in The Netherlands**
Blaza Jovanovic and Jacek Krawaczynski, Centrica Energy Upstream, The Netherlands

1930 **Dinner**

WEDNESDAY 26 OCTOBER 2011

MULTIPHASE

Chair: Kåre Kleppe, Statoil, Norway

0830 **(7) Multi-Phase Flow Measurement by using Multi-Path Ultrasonic Flow Meter**
Shirley Ao, GE Energy Services Measurement, USA, Claudio Barreiros Da Costa e Silva, Luiz Augusto De Andrade and Cleber Barreto Taranto, PetroBras, Brazil

0900 **(8) An Extensive worldwide Review of Performance in Heavy Oil of a combination of a Multi-Gamma Ray Fraction Meter and Venturi in Heavy Oil**
Bruno Pinguet Schlumberger, France

0930 **(9) Multibeam Gamma-ray Measurements and Electrical Tomography for improved Multiphase Flow Metering**
Stein-Arild Tjugum, Roxar, Norway, Camilla Sætre and Geir Anton Johansen, The University of Bergen, Norway

1000 **Break/Refreshments**

1030 **Manufacturers and Vendor Sessions**
Vendors presentations in parallel sessions

1300 **Lunch**

LIQUID ULTRASONIC METERS

Chair: Per Lunde, University of Bergen and CMR, Norway

1400 **(10) The Influence of Flow Conditioning on the Proving Performance of Liquid Ultrasonic Meters**
G J Brown, D R Augenstein, T Cousins, and B Griffith,
Caldon Ultrasonics, Cameron, UK

1430 **(11) Field Experience Proving Liquid Ultrasonic Meters Using a Small Volume Prover and Master Meter**
Dave Seiler, Peter Syrnyk, Daniel Measurement and Control, USA

1500 **(12) How accurate are Flow Meters in Practical Conditions; beyond the Calibration**
Jankees Hogendoorn, André Boer, Herman Hofstede, KROHNE Altometer, The Netherlands

1530 **Break / Refreshments in the exhibition area**

1600 **(13) Operational Experience with Liquid Ultrasonic Meters**
Dag Fløtlo, Jostein Eide, Øyvind Heggholmen, Maron Dahlstrøm and Øyvind Risa, Statoil, Norway

1630 **(14) Gas and Liquid Ultrasonic Transducer Technology – Latest Developments and what it means for Diagnostics**
Skule E. Smørgrav, Atle K. Abrahamsen, FMC Kongsberg Metering, Norway

1700 **End of day 2**

1930 **Dinner**

THURSDAY 27 OCTOBER 2011

LIQUID METERING

Chair: Rolf Skatvedt, Trainor, Norway

0900 **(15) Sampling, Mixing and Quality Measurement. Comparing 35 Years of Field Experience with Design Tools and the Measurement Standards**
Mark Jiskoot, Jiskoot Ltd, USA

0930 **(16) Measurement of Flow in Viscous Fluids using a Helical Blade Turbine**
Christopher Mills and Bob Belshaw, NEL, UK

1000 **(17) Experience with compact Provers on cold Products**
Ole-John Melkevik, Statoil, Norway, Asle Fosen, Gassco, Norway

1030 **Break/Refreshments in the exhibtiton area**

1100 **(18) Are Coriolis Mass Meters suitable for Fiscal Liquid Applications?**
Ole Øiestad, Intertek, Norway, Steinar Fosse and Steinar Vervik, Norwegian Petroleum Directorate, Leif E. Falnes, Norske Shell, Norway

1130 **(19) The Performance of Coriolis Meters in Two Phase Liquid/Gas Flows**
Amy Ross, NEL, UK

1200 **Lunch**

GAS ULTASONIC METERS - CONDITION MONITORING

Chair: Steinar Fosse, Norwegian Petroleum Directorate, Norway

1300 **(20) Further Developments In The Design & Implementation of An Advanced Online Condition Based Monitoring System & A Dirty Meter Prediction Model For Custody Transfer Ultrasonic Gas Flow Meters**
Jim Witte, ElPaso, USA, Mike Thackray, Elster-Instromet, Belgium, Jeff Tilden, Elster-Instromet, USA, Peter Kucmas , Elster-Instromet, USA, Martin Novak, Elster, Instromet, Belgium

1330 **(21) The Detection of Corrosion and Fouling and the Operational Influence on Ultrasonic Flow Meters using Reflecting Paths**
Jan Drenthen, Marcel Vermeulen, Hilko den Hollander, Martin Kurth, KROHNE, The Netherlands

1400 **(22) Considerations on the Influence of Deposits or Changes in Wall Roughness on the Validity of the Calibration and Long Term Accuracy of Ultrasonic Gas Flow Meters**
Volker Herrmann, Toralf Dietz, SICK Germany
Henk Riezebos, KEMA Nederland BV, The Netherlands

1430 **(23) A Proposed Ultrasonic Meter Recalibration Interval Tool**
Thomas Kegel, CEESI, Canada, Stephen English, Atmos Energy, USA

1500 **Break/Refreshments in the exhibition area**

QUALITY ASSURANCE

Chair: Richard Patton, NEL, UK

1530 **(24) Real-Life Experiences and Lessons Learned implementing the new European Measuring Instruments Directive**
Jim McCabe and Alistar McGhee, SGS Metering, UK

1600 **(25) Gross Meter Error Detection and Elimination by Data Reconciliation**
Phil Stockton, Accord Energy Solutions Ltd, UK, Allan Wilson, Intertek, UK, Helen Little, Accord Energy Solutions Ltd, UK

1630 **Closing remarks and end of technical program**

1930 **Aperitif**

2000 **Banquet**

The Reciprocity Band rides again.....

FRIDAY 28 OCTOBER 2011

Breakfast from 0700

0830 **Transport to Sandefjord Airport Torp**

SHORT COURSES

The organisers have the pleasure to introduce two Short Courses up front of the workshop. We think the two topics will be of interest to the group of people attending the workshop.

VENUE
Quality Hotel Tønsberg – Room Mostein
Price pr course: NOK 2000,- + Vat

REGISTRATION
To attend the course a separate registration is required. Please tick the course of interest when you register to the workshop via Teknas website

SHORT COURSE 1
Natural Gas Parameter Calculations
Time: Monday, October 24, 1500 - 1900

GENERAL DESCRIPTION
The calculation of natural gas parameters are described, with emphasis on the basic calculations that is needed in flow metering applications.

COURSE CONTENT
1. Relevant standards
2. Equation of state (general)
   - Ideal gas
   - Real gás
3. ISO 6976 – gas parameters for natural gas at reference conditions
   - Calorific value
   - Density
   - Relative density
   - Wobbe Index
4. CO2 emission factor
5. AGA 8, ISO 12213 – compressibility / density at line conditions
6. Calculations from volumetric flow rate to flow rates for standard volume, mass and energy

LECTURERS
Reidar Sakariassen, MetroPartner, Norway
Kjell-Eivind Frøysa, Christian Michelsen Research Instrumentation, Norway

The two lecturers are highly recognized and holds many years of experience within the field.

SHORT COURSE 2
Ultrasonic Flow Meters - Technology Basis
Time: Tuesday, October 25, 0830 - 1200

GENERAL DESCRIPTION
Ultrasonic flow meters are today in industrial operation on gas and oil flow metering, for applications as sales metering, allocation metering, emission metering (fuel and flare gas). The course gives a basic introduction to this metering technology, with focus on the important parameters to control for ultrasonic flow meters (USM).

COURSE CONTENT
1. Basic principle
2. Ultrasonic transducers
3. Transit time and transit time difference detection
4. Geometry
5. P&T corrections
6. Flow profile
7. Single path and multiple paths
8. Installation effects, bends etc
9. Self-diagnostics
10. Oil flow metering
    - Proving
    - Master meters
    - High viscosity effects
11. Gas flow metering
    - Flow calibration
12. Applications
    - Custody transfer
    - Allocation
    - Fuel gas metering
    - Flare gas metering

The program might be subject to change related to circumstances beyond the organizers control

North Sea Flow Measurement Workshop 2011

Sponsors and Exhibitors

The organizers thank the sponsors for exhibiting during the workshop.

A PRIORITERT
PRIORITAIRE

DISTRIBUERT AV POSTEN NORGE
posten
NORGE P.P. PORTO BETALT

Retun to: Tekna, Postboks 2312 Solli, N-0201 Oslo

REGISTRATION

- **www.teknakurs.no/intconf**
- **kurs@tekna.no**
- **telephone: +47 22 94 75 60/61**

Layout og trykk: helli.no

GENERAL INFORMATION

REF NO
1102550

TIME
25. – 28. October 2011

VENUE
Quality Hotel Tønsberg, Norway

TECHNICAL COMMITTEE
Dag H. Flølo, (Chairman) Statoil, Norway
Steinar Fosse, Norwegian Petroleum Directorate, Norway
Douglas Griffin, Department of Energy & Climate Change, UK
Kåre Kleppe, Statoil, Norway
Per Lunde, University of Bergen and CMR, Norway
Richard Paton, NEL, UK
Rolf Skatvedt, Trainor, Norway
Lise Pettersen Sletta, Teekay Petrojarl Production AS, Norway

FEES
Member of NIF/NFGOM: NOK 8000,-
Non-members: NOK 9000,-
Lecturers: 4500,-
Exhibitors
Standard package NOK 20 000,-
Package Plus 25 000,-
Short course fee NOK 2000,- pr course.
All above prices will be added 25% Vat

Exhibitors fee is additional to the delegate fee, exclusive accommodation
All fees includes refreshments during the workshop and CD proceedings.

PROCEEDINGS
CD proceedings will be handed out to all delegates on-site.
No printed versions will be available.
Registered delegates can download papers one week prior to the event from Teknas website.
Proceedings will also be available for sale through the Energy Institute, UK

EXHIBITION AND SPONSORSHIP OPPORTUNITIES
The large numbers of sponsors who exhibit makes this event a complete arena for cross sharing of experiences, discuss the challenges the need of technology developments

Exhibitor Standard Package
3x2 m floor space
Table/tablecloth/chairs/electricity
Logo included in conference distribution material

Exhibitor Package
Conditions as above
In addition: Conference room /projector for company presentation during Manufactures Session. Inclusion in a Vendor Brochure distributed to all delegate on-site

There is limited space available for exhibitors. First come, first served basis
Contact lio@tekna.no if any questions

ACCOMMODATION
Quality Hotel Tønsberg
Single room NOK 1390,- pr night
Double room NOK 1205,- pr person pr night
Both alternatives include 3 meals pr day.
Room reservation to be made when register to the workshop

BANK DETAILS
Bank name: DnBNOR
Bank account: 1644 2555 803
Swift: DNBANOKKXXX
IBAN NR: NO8016442555803
Ref code 1102550 include company and delegates name

CANCELLATION POLICY
Cancellations before 28 September: NOK 1200,-
Cancellations after 17 October: Full fee
Written cancellation only.

HOW TO GET THERE
Tønsberg can be reached by airplane through Oslo Airport Gardermoen or Torp airport Sandefjord.
Oslo Airport Gardermoen is situated 1 hour and 30 minutes with train from Tønsberg. Train departure from Gardermoen every hour.
Torp airport Sandefjord is situated 35 minutes from Tønsberg. Transportation is available from the airport, taxi or regular bus, travel time is 25 minutes.
NB! Be aware of the following when booking your flights:
In international flight-schedules both airports Oslo Gardermoen and Torp in Sandefjord might be registered as destination – Oslo.
Notify that Torp airport -Sandfjord is the closest airport to Tønsberg.

RETURN HOME – 28. OCTOBER
After the conference, in the morning of the 28th October there will be a coach leaving Quality hotel at 0830 for Torp airport – Sandefjord.

ORGANIZER AND SECRETARIAT
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