PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

11th Petroleum and Chemical Industry Conference Europe

Electrical and Instrumentation Applications

June 03rd – 05th, 2014
Amsterdam, The Netherlands

Final Program

www.pcic-europe.eu

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Conference Site

Renaissance Amsterdam HOTEL
Kattengat 1, Amsterdam, 1012 SZ Netherlands

Tel: 31.20.621.2223
Fax: 31.20.627.5245

www.renaissanceamsterdam.nl

PCIC EUROPE COMMITTEE MEMBERS

Executive and Technical Program Committee

Jean-Charles Guilhem, 2B1st Consulting (F), Chair

Justin Mason, BP (UK), Vice Chair Technical Chair
Hans Meulenbroek, Eaton (NL), Vice Chair Local Committee Chair
Bert Engbers, ABB (NL), Vice Chair Sponsors
Jeremy Andrews, Siemens (DE), Secretary
Philippe Angays, Technip (F), Tutorials Chair
Caroline Vollet, Schneider Electric (F), Technical Secretary
Pascal Egli, Schneider Treuhand (CH), Treasurer
Patrick Leroux, Total (F), Committee Advisor
Terence Hazel, Consultant for Schneider Electric, Honorary
Technical Advisor
Jacques Tastet, Technip (F), Tutorial Advisor
Jan Verstraten, Dow Chemical (NL)
Andre Muileboom, ExxonMobil (NL)
Graeme Peck, Hess (UK)
Peter Pieters, SABIC (NL)
Paul Donnellan, Shell Global Solutions (NL)
Tord Gordal, Statoil (N)
Ben Johnson, Thermon (USA)
Bruno Leforgeais, Total (F)
Felix Seibl, ZVEI (DE)

Organisation Committee

Jean-Charles Guilhem, 2B1st Consulting (F)
Justin Mason, BP (UK)
Philippe Angays, Technip (F)
Caroline Vollet, Schneider Electric (F)

Local Committee

Hans Meulenbroek, Eaton (NL)
Mark Stam, Rockwell Automation (NL)
Sabbah Doudou, ABB (NL)
Bas Snijders, Eaton (NL)
Maria Noriega, Shell (NL)

Contacts

Jean-Charles Guilhem, 2B1st Consulting (F)	jean-charles.guilhem @pcic-europe.eu
Justin Mason, BP (UK)	justin.mason@pcic-europe.eu
Philippe Angays, Technip (F)	philippe.angays@pcic-europe.eu
Caroline Vollet, Schneider Electric (F)	caroline.vollet@pcic-europe.eu

11th Annual PCIC Europe Conference 2014 in Amsterdam

Dear guests,

On behalf of the local committee, we are pleased to welcome you to Amsterdam.

Amsterdam is the largest city and the capital of the Netherlands. It has a broad spectrum of recreational and cultural sights that range from fascinating old buildings, canals, squares and museums.

The origins of the city lie in the 13th century, when fisherman living along the banks of the River Amstel built a bridge across the waterway near the IJ, then a large saltwater inlet.
Wooden doors on the bridge served as a dam; these protected the town from the IJ, which often flooded the early settlement. The mouth of the river Amstel, where the Damrak now is, formed a natural harbor, which became important for trade.

In the 15th and 16th century cultural life in Amsterdam consisted mainly of festivals. During the later part of the 16th century Amsterdams Rederijkerskamer (Chamber of Rhetoric) organized contests between different Chambers in the reading of poetry and drama. In 1638 Amsterdam got its first theatre. Ballet performances were given in this theatre as early as 1642. In the 18th century French theatre became popular. Opera could be seen in Amsterdam from 1677, first only Italian and French operas, but in the 18th century German operas. In the 19th century popular culture was centered around the Nes area in Amsterdam (mainly vaudeville and musichall). The metronome, one of the most important advances in European classical music was invented here in 1812 by Dietrich Nikolaus Winkel. At the end of this century the Rijksmuseum and Gemeentelijk Museum were built. In 1888 the Concertgebouworkest was established. With the 20th century came cinema, radio and television. Though the studios are in Hilversum and Aalsmeer, Amsterdams influence on programming is very strong. After World War II popular culture became the dominant cultural phenomenon in Amsterdam.
With the conference location in the centre of Amsterdam you will be easily exposed to all the historic and cultural experiences and know why…. IAMsterdam!
Enjoy your stay and have a safe journey back.

The Local Committee PCIC-Europe 2014:
Maria Noriega, Sabbah Doudou, Mark Stam, Bas Snijders & Hans Meulenbroek

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Welcome to Amsterdam

Dear conference attendees

In selecting Amsterdam for the 11th Petroleum and Chemical Industry Committee (PCIC) Europe Conference, we intended to come back to the center of the Western Europe in a country where the Oil & Gas and Petrochemical industry has always been on the leading edge.

In that respect The Netherlands concentrate world class end users, engineering companies, manufacturers and institutions operating globally because of their recognized expertise.

Easy to reach from anywhere in Europe and in the world, the choice of Amsterdam illustrates the strategy of PCIC Europe Committee to reach all profiles of electrical and automation engineers. Many companies of the Oil & Gas and Petrochemical industry suffer from a gap between the generations of engineers. Through the technical program and especially the Tutorials, PCIC Europe ambitions to close this gap and improve the overall level of competence of the electrical and automation engineers.

But the PCIC Europe Conference is not only a local or regional event, every year we are very pleased to welcome more and more attendees from North America, Middle-East and Asia. In that respect the first registrations at the Amsterdam Conference are confirming this cross boarders trend. The other trends that we are pleased to observe over the years are related to the balance between end users and manufacturers and the increasing percentage of junior engineers. These evolutions confirm how much PCIC Europe has been recognized as the most efficient learning place over the years.

But the Amsterdam Conference will show that PCIC Europe Conferences are not only the best class to learn about electricity and automation in the Oil & Gas and Petrochemical industry, but also the most friendly event to network and boost its visibility to the key players in presenting papers, opening Hospitality suites or sponsoring.

Welcome to Amsterdam

Jean Charles Guilhem
Chair PCIC Europe

The 2014 technical program

The Technical Committee of PCIC Europe welcomes you to your 2014 Amsterdam conference



The presentation of high quality technical papers and the discussions during and after the conference make it very interesting for all attendees.

The PCIC Europe conference is a rare opportunity for end-users, engineering companies, manufacturers and regulatory bodies to be able to meet and discuss matters of vital importance to the industry.

PCIC Europe is the established premium forum for the exchange of experience on the practical application of electrical and instrumentation technology in the petroleum and chemical industries with conference topics targeted at you our professional audience of engineering companies, end-users and equipment suppliers. Please enjoy the uniqueness of this occasion to meet similar like-minded professionals and engage in stimulating discussions on topical areas of industry relevant technical subjects.
For 2014 the conference program continues to support this industry focused agenda with an inspiring program of tutorials, plenary sessions and technical papers clearly aligned to the following strategic topics:

- Personal Safety
- Extreme Environments
- Good Design Practice
- Equipment, Systems and Components

Again in 2014 PCIC Europe continues its strong relationship with the Industrial Applications Society of IEEE for the technical co-sponsorship of the event. Following conference, papers voted by attendees as presenting the most significant technical content will be proposed for publication in the Industrial Applications Transactions and Magazine with all papers presented at the 2014 PCIC Europe conference will be digitally archived on IEEE Xplore website for reference.
The following pages lay-out in summary the intended program for you to make the best opportunity of this learning event and to guide your choice of specific seminars to attend and please don't forget:
"…Let's make Amsterdam 2014 your learning event!"

Looking forward to meeting you at conference.

Justin Mason - Vice Chair (Technical Chair)
Philippe Angays - Tutorials Chair
Caroline Vollet - Technical Secretary

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

PCIC Europe Mission

To provide an international forum for the exchange of electrical applications technology relating to the petroleum and chemical industry, to sponsor appropriate standards activity for that industry, and to provide opportunity for professional development.

PCIC Europe Strategies

1. The PCIC Europe Annual Technical Conference will be held in locations of industry strength, and its location will be rotated annually in an effort to attract national and international participation.

2. PCIC Europe will proactively promote participation by a broad base of PCIC Europe representatives, with an emphasis on both younger and retired engineers.

3. Attendees will be encouraged to participate in technical activities including authorship of papers and standards development.

4. The quality of PCIC Europe paper offerings is essential for the PCIC Europe mission to succeed and will be given highest priority. **Preference will be given to application oriented papers.**

5. The technical content of the PCIC Europe Annual Conference will be continuously evaluated and updated to reflect the evolving needs of the industry.

6. Participation of users, manufacturers, consultants and contractors will be encouraged in the activities of PCIC Europe to strengthen the conference technical base.

7. PCIC Europe will offer tutorials directed towards enhancing the technical, communication, and interpersonal skills of petroleum and chemical industry engineers.

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

PCIC Europe 2014 Amsterdam Conference sponsored by

Platinum Sponsors

ABB

EATON
Powering Business Worldwide

PROJECT SMART EXPLORER

Rockwell Automation

Schneider Electric

Roxtec

SIEMENS

Gold Sponsors

TOTAL

Silver Sponsors

ABTECH www.abtech.eu

HVPD

etap

INDUSTRIAL LIGHTING SYSTEMS UK LTD

HUBBELL

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

schedule at a glance

Monday, 2. June 2014		Hospitality Rooms Hours
18:00 - 21:00	Registration	18:00 – 24:00
Tuesday, 3. June 2014		
8:00 - 18:00	Registration	
8:30 - 10:15	Tutorial 1	
10:15 - 10:45	Coffee Break	
10:45 - 12:30	Tutorial 2	
12:30 - 13:20	lunch	12:30 – 13:20
13:25 - 13:30	Welcome, opening speech	
13:30 – 15:00	Paper presentations	
15:00 - 15:30	Coffee Break	15:00 – 15:30
15:30 – 17:00	Paper presentations	
17:00 - 19:00	Hospitality Rooms are open	17:00 – 19:00
19:00 - 21:00	Welcome reception and cocktail	
21:00 - 24:00	Hospitality Rooms are open	21:00 – 24:00
Wednesday, 4 June 2014		
8:30 – 10:00	Paper presentations	
10:00 - 10:30	Coffee Break	10:00 - 10:30
10:30 - 12:00	Paper presentations	
12:00 - 13:00	Lunch	12:00 - 13:00
13:00 – 14:30	Paper presentations	
14:30 - 15:00	Coffee Break	14:30 - 15:00
15:00 - 15:45	Paper presentation	
15:45 - 16:30	Conference Key Addresses Session	
16:30 - 24:00	Hospitality Rooms are open	16:30 - 24:00
Thursday, 5 June 2014		
8:30 – 10:00	Paper presentations	
10:00 - 10:30	Coffee Break	10:00 - 10:30
10:30 - 12:00	Paper presentations	
12:00 - 12:15	Conference Closing Session	

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Program

Tuesday, 03, June 2014

08:30 – 10:15	Tutorial #1: Lighting in Oil and Gas Plants : State of Art, Choices and Consequences Lighting in oil and gas plant is a safety critical design measure. In this respect having a good perception and awareness of your environment is not only vital for individual personal safety but also essential for plant operation. This tutorial will focus primarily on available technology and the reason for choosing one equipment type over another. The design of the installation and management of major lighting projects will be reviewed together with the maintenance requirements to preserve lighting performance and associated operational issues will be discussed. A comparative review of cost both in term of capital investment and ongoing maintenance requirements will be given for the systems outlined in the tutorial. Marty Cole: Hubbell – Pieter Peters: Sabic - Philippe Angays: Technip
10:15 – 10:45	Coffee Break
10:45 – 12:30	Tutorial #2: Hazardous Area Electrical Installations - Theory & Practice – Avoiding Common Pitfalls Hazardous area electrical installations are a safety critical feature of Oil and Gas project design to reduce potential ignition sources. The purpose of this tutorial is not only to remind the audience of the basis of IEC 60079 series in terms of the definition of zoning and selection of equipment, but also to highlight some common pitfalls in terms of installation practice and ongoing maintenance. Plant managers seldom realize the extent, importance and impact a fit-for-purpose hazardous area management system requires. Many sites only have a rudimentary process to manage all aspects of electrical equipment in hazardous areas, including maintenance. Personnel involved in the design, classification, procurement, installation, operation, inspection, maintenance and review of hazardous area equipment are seldom trained to the skills levels required. The focus of this tutorial is hence presented in terms of the necessary Knowledge; Process and Skills to effect a safe installation and to manage the integrity of the installation over the facility life. The tutorial provides specific guidance and recommendation to avoid these common pitfalls at the key stages of a typical Hazardous Area Management system. Jeff Mc Queen: BP – Chris Turney: F.E.S (EX) Ltd for Energy Institute Philippe Angays: Technip
12:30 – 13:20	Lunch
13:25 – 13:30	Welcome, Opening speech

Koepelkerk

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Program

Tuesday, 03, June 2014

13:30	Plenary, AM-56 Plenary, AM-09	
15:00 – 15:30	Coffee Break	
15:30	Extreme Conditions, AM-57 Extreme Conditions, AM-48	Asset management, AM-38 Asset management, AM-25
17:00 – 19:00	Opening Hospitality Suites	
19:00 – 21:00	Welcome reception Cocktail	
21:00 – 24:00	Opening Hospitality Suites	

Wednesday, 04, June 2014

08:30	Plenary, AM-27	
09:15	Large machines, AM-43	Engineering, AM-12
10:00 – 10:30	Coffee Break	
10:30	Large machines, AM-33 Large machines, AM-29	Engineering, AM-37 Engineering, AM-20
12:00 – 13:00	Lunch	
13:00	Large machines, AM-51 Large machines, AM-17	Engineering, AM-42 Large Machines, AM-24
14:30 – 15:00	Coffee Break	
15:00	Large machines, AM-08	Large Machines, AM-07
15:45 – 16:30	Conference Key Addresses Session	
16:30 – 24:00	Opening Hospitality Suites	

Thursday, 05, June 2014

08:30	Switchgear, AM-30 Engineering, AM-03	Large Machines, AM-45 Engineering, AM-04
10:00 – 10:30	Coffee Break	
10:30	Plenary, AM-53 Plenary, AM-14	
12:00 – 12:15	Conference Closing Session	

Koepelkerk Amsterdam/Den Haag

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

The following 25 papers will be presented at the 2014 PCIC Europe Conference.

Ref.	Title	Authors
AM-03	The Evolution and Lessons Learnt of Data Interoperability/Management of IEDs Intelligent Electronic Devices (IEDs) are widely deployed and growing exponentially in petrochemical plants. They are used in low and medium voltage switchgear and controlgear for protecting, measuring, monitoring/control and storing valuable operational and non-operational data. Plant operators can retrieve, analyze and plan this data for ultimate plant operational efficiency, reliability and economy. In this paper authors share their experience (lessons learnt) of several projects implemented in Asia Pacific over the last 8 years (China, India, Papua New Guinea) and are addressing challenges posed by: - Managing quantity (lots of IEDs) - Managing diversity (many different types of IEDs) - Managing tons of data (efficient redistribution to various applications) - Deal with changes in the (Smart) Grids (various sources, bi-directional, more dynamic) - Dealing with new standards (eg IEC 61850) - Managing cyber security The paper aims to leverage IED management, Smart Grid initiatives and standards (eg IEC 61850, Condition Based Monitoring, Cyber-Security) into a secured-homogeneous data and systematic IED management system for safe and effective plant operation.	Samuel Tong *Eaton EAS* Alexander Bisheh *Shell P & T* Dany St-Arnauld *Eaton EAS* Hans Meulenbroek *Eaton ESS*
AM-04	Temporary Power Generation Installations Offshore Temporary diesel generation is often required to be installed on offshore facilities during production outages to maintain supplies to utilities systems. Platform power systems are often not designed to accommodate connection of temporary generation and engineering is required to ensure the power system operates reliably and safely. The design must consider multiple interfaces with electrical, control and process systems. This paper examines lessons learned from various temporary installations that have been used offshore. Consideration is given to the interface with the main power system, protection and earthing arrangements, non-standard operation of existing equipment and process factors such as fuelling systems. Commercial drivers for various designs and operating scenarios are also analysed. The paper is intended to aid operators in selecting and designing appropriate temporary power installations.	Alex Gaastra *BP* Neil Paterson *BP*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Ref.	Title	Authors
AM-07	**Power Loss Ride-Through in a Variable Speed Drive System** Voltage dips or power interruptions in the grid cause huge problems for the users. The ride-through behavior of frequency converters can be a very good solution to bridge the gap. But how does the whole drive system react in case of power loss? The kinetic energy recovery is only successful when all the important elements in the chain fit together. This paper reconsiders the topic on a power drive system level and gives practical information to the users, based on the experience of a drive manufacturer.	Tino Wymann *ABB MV Drives* Pieder Jörg *ABB MV Drives*
AM-08	**Monitoring of Winding Overhang Vibrations on Large Synchronous Motors** Electric large drives have advantages in operating liquid natural gas plants LNG, as they can be operated very flexibly and have a zero CO2 footprint. Being a rather new application, the reliability of the drive is looked upon critically. In particular the vibration behavior of the stator winding overhang has attracted attention. Any anomaly in vibration amplitudes need to be monitored to prevent potential damage of the drive. In order to collect information based on operational measurement data a customized data acquisition system was installed on selected variable speed motors which are fed by frequency-converters at an E-LNG (Electrical) plant. This paper will present the experience collected during a project in which a monitoring system for Condition Based Maintenance (CBM) of VSDS has been installed at an E-LNG plant and operated for about 2 years. The objective for the E-LNG operator is to gain reliability for the VSDS technology and life cycle considerations through this new monitoring technology.	Lutz Hübner *Siemens AG* Dr Thomas Bosselmann *Siemens AG* Artur Jungiewicz *Siemens AG* Gundar Gabrielsen *Statoil* Ernst Feilkas *Statoil* Kenneth Dybvik *Statoil*
AM-09	**Direct Electric Heating – Application of Multiple Offshore DEH Power Modules** Direct Electric Heating (DEH) was first utilised by Statoil in the 1990's as an alternative subsea Hydrate mitigation measure. Since then the application of DEH has been expanded to a number of projects predominantly around the North Sea. The Shah Deniz project is looking to install the largest single DEH installation to date with up to ten DEH modules planned for a gas platform located within the Caspian Sea. This paper describes the various design aspects that were considered in the design of the topsides facilities to support the application of a large subsea DEH installation in a remote location.	Stephen Bowcock *BP* Martin Robinson *BP* Rob Sawers *BP*

Ref.	Title	Authors
AM-12	**Multiple Earthing Systems for Offshore Production Platforms** Fixed offshore integrated oil and gas facilities will generally comprise accommodation, utilities, production and drilling facilities supplied from on-board centralised power generation via a fully integrated electrical distribution system. In such applications the selection of appropriate methods of system earthing is a key factor in achieving safe and reliable operations whilst meeting the sometimes differing requirements of the topsides and drilling operations. This paper considers the types of electrical power system configurations encountered on major offshore platforms and in particular considers the earth fault tolerance requirements of drilling operations to ensure supplies are maintained whilst moving towards make-well-secure conditions. The benefits and limitations of various options are discussed in relation to operation under both normal and emergency conditions and particular account is taken of achieving safe operations under life support and drilling make-well-secure conditions. The paper also discusses the differing practices worldwide and provides recommendations for achieving a comprehensive and effective integrated power system configuration.	Weslley de Lima *BP Exploration* William Prescott *BP Exploration* Alan Sedge *BP Exploration*
AM-14	**Analysis of Possible LED Failure Mode** New technologies are emerging in illumination field. In particular the LEDs are beginning to spread always more in the world of the lighting. It is very important to analyze and to know the possible failure modes of LED sources in order to design reliable and safe lighting fixtures, especially if we consider the use of LED lighting equipment in potential explosive atmospheres. Indeed they require a quite complex safety system in order not to trigger dangerous gases, vapors and dusts. Today, IECEx Standards do not adequately take into consideration the potential of the actual LED luminaires for Ex environmental, both with white light and with colored light. Nowadays, Standards only consider LEDs adequate for installing in Zone 1, if the luminary is realized by the same protection strategy designed for traditional light sources, for Ex-d mode, or if the luminary guarantees a big limitation in terms of voltage and installed power, for Ex-i mode. In particular, Ex-d LED luminaires are obtained by using the same protection strategy designed for traditional light sources (incandescent, discharge, induction), formed by heavy, thick and flameproof enclosures. Therefore, the safety of such equipment is entrusted exclusively to the mechanical strength of the case and not from the internal electrical equipment. While the flameproof enclosures ensure great heat dissipation to the LEDs, on the other hand greatly reduce luminous efficiency of the appliance itself, since the glass used are also very thick (10% reduction of approximately every 10mm of thickness of the glass). The paper shows a study about currently available LED's electrical and mechanical characteristics, which evaluates different possible causes of failure and their implication with explosive atmospheres.	Kim Fumagalli *Nuova ASP* Roberto Faranda *Politecnico di Milano* Lorenzo Farné *Politecnico di Milano*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Ref.	Title	Authors
AM-17	**Large Synchronous Motor Failure Investigation; Measurements, Analysis and Lessons Learned** In the oil and gas industry, large synchronous motors are used to drive Water Injection Pumps (WIPs) to support the pressure of a reservoir, and to maintain the production level of a reservoir over a longer period. Therefore, failures in such motors will have an adverse impact on operation and production. Even though synchronous motors are superior to induction motors in relation to system voltage regulation and power factor correction, their starting is more complicated. As a result, application of synchronous motors requires careful engineering analysis in the design stage of a project to determine system requirements for a successful operation. This paper presents a failure analysis case study of three 11,000 HP synchronous motors at a Gas Oil Separation Plant (GOSP) along with the starting issues faced prior to the occurrence of a permanent damage. The fundamentals of dynamic motor acceleration requirements to achieve a successful start will be reviewed. In addition, results of site measurements and subsequent computer simulation will be presented. Furthermore, the analysis results were substantiated by a failure root cause analysis report provided by the manufacturer. The paper also presents obstacles faced when dealing with erroneous and limited data availability, and the approaches to overcome these flaws.	Rakan El-Mahayni *Saudi Aramco* Khalid Qahtani *Saudi Aramco* Ahd Gheeth *Saudi Aramco*
AM-20	**Saudi Aramco Experience – Islanding Scheme for Manifa Central Processing Facility** Manifa Central Processing Facility (CPF), the fifth largest oil field in the world, is connected by 25 manmade islands and 20 kilometers of causeways. The current production capacity of heavy crude oil at the CPF is 500,000 barrels per day (bpd). The full production capacity of the plant is 900,000 bpd, which the facility will meet in 2014. The power plant generation includes two combustion gas turbine (CGT) generators and two heat recovery steam generators (HRSGs) providing steam to two steam turbine generators (STGs), with a total generation capacity of about 500 MW. Two tie lines at 115 kV connect the Manifa CPF to the external utility system. A power management system controls the Manifa CPF frequency once the Manifa CPF islands from the external grid. Some of the severe external disturbances require Manifa islanding operation in less than 15 cycles to maintain system stability. This very critical CPF requires the ability to quickly identify an islanding condition correctly. This paper discusses the islanding scheme design details for local and remote signals. For significant power exchange with an external grid, local measurement-based islanding can correctly and quickly identify the islanding condition.	Kahtan Mustafa *Saudi Aramco* Kamal Garg *Schweitzer Engineering Laboratories, Inc.* Rajkumar Swaminathan *Schweitzer Engineering Laboratories, Inc*

Ref.	Title	Authors
AM-24	Managing Technology Step-outs and Optimising Process Performance of Starter-Helper-Generator VFDs on Gas-Turbine Driven LNG Trains The oil and gas industry is considered conservative. However, a few members of the industry came together to design and implement one of the world's largest, most technologically advanced variable frequency drive (VFD) systems in liquefied natural gas (LNG) processing. Operating in one of the world's most demanding environments in Ras Laffan, Qatar, the systems show that large electric drives provide significant benefits through process productivity and flexibility. Additionally, this project depended on many of the well-known advantages of VFDs, including motor soft-starting, adjustable process speeds, load flexibility, high availability and regenerative braking. The benefits also include energy efficiency and low impact on the power system, the machine and the environment. This paper discusses a starter-helper-generator application on the world's largest LNG mega-trains. When the project was conceived there was no standard product available at the required power level that could meet all the project criteria. The project team adopted a process to select the most appropriate VFD technology base, identify where this technology had to be extended (or step-out) and mitigate risk. This equipment has now been in successful operation for more than four years and the paper concludes with a discussion of lessons-learned.	Kevin Deacon *Siemens* Stephen Lanier *ExxonMobil* John Kubik *RasGas* Mark Harshman *Siemens*
AM-25	Ex Inspections – A Journey for Maintenance Engineers Ex installations are safety critical elements. Projects still fail to deliver a good quality Ex installation mostly due to lack of proper planning and execution of the Ex inspections during commissioning phase. The poor quality of Ex installation delivered to the maintenance organization becomes a nightmare as the maintenance organization is neither resourced nor does it have adequate budget to handle this challenge. This paper will discuss the Ex inspection journey of a new non-ATEX site where Ex inspections and Ex equipment records were not properly handled during the project phase. No Ex dossier was delivered as a part of the project. The main challenges faced by the maintenance staff included Ex competency, Ex Inspection strategy, resources constraints and access issues. Over a period of years the site developed a robust competency development process, overcame resources and access issues to deliver a high quality Ex inspection campaign. The journey includes some experiments to overcome the access issues for the Ex equipment installed at an inaccessible height without installing expensive scaffolding. An interesting use of abseilers to execute Ex close inspections and prepare Ex register is discussed with details. Various experiences and lessons learned during the four year journey are shared in this paper.	Shailesh Chauhan *Shell*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Ref.	Title	Authors
AM-27	**Challenges with Integration and Operation of Offshore Oil & Gas Platforms Connected to an Offshore Wind Power Plant** Interconnecting offshore wind power plants with oil and gas installations (O&G) can create a positive symbiosis for both installations. An O&G installation may reduce the emissions generated by gas turbines installed on platforms and the wind farm may reduce the investment costs by removing expensive transmission links to the shore. The power demand of an O&G-installation lies in the same range as a small to medium sized wind power plant. This paper analyzes methods of maintaining secure operation of such offshore interconnected power systems. The combination of high reliability requirements and low system inertia is challenging. Hence, an adequate overall control strategy is of major importance. As such interconnected systems are not yet implemented, this paper is based on a system with typical ratings. The first and main part demonstrates how wind turbines can contribute to an improved robustness and stability of the system. This is realized through a control concept called inertia emulation. The second part of the paper quantifies the impact on O&G operations in terms of fuel saving and wind variability issues.	Atle Rygg Årdal *SINTEF Energy Research* Kamran Sharifabadi *Statoil ASA* Oyvind Bergvoll *Statoil ASA* Vidar Berge *Statoil ASA*
AM-29	**Localized Rotor Overheating of Large Direct On Line (DOL) Motors** Most often, serious reliability problems with large motors particularly synchronous motors may simply go unnoticed especially if the industrial facility's operation is a priority. The nature of such problems is not very well known in industrial applications and can be difficult to detect in the early stages of its development until a motor failure occurs. Localized rotor overheating commonly known as hot spots or black marks for large motors and specifically synchronous motors is one example of such a scenario. This paper will provide insights to the nature of the localized rotor overheating for Direct On Line (DOL) large motors in general, problem detection methods and will propose possible rectification means in order to resolve the problem definitively.	Khalid S. AL-Najdi *SABIC* Juhani Mantere *ABB Oy*

Ref.	Title	Authors
AM-30	**MCC for SIL-Rated Applications** Motor Control Centers (MCC) are used in many complex processes in the (petro) chemical industries. When these processes get out of control the effects may have a great impact on personal safety and the environment. The installations that control such processes require a SIL-rating to safeguard a controlled shut down. As one may know the required SIL-rating depends on the risk of the particular process. The SIL-rating is determined by means of a risk assessment. Introducing SIL to a MCC has an impact on the operating principles and the circuit design and the choice of components. For example requirements for auxiliary contacts to be mechanically linked to the main contacts for reliable feedback on the status. For the high Safety Integrity Levels require redundancy for interrupting a circuit, where a reliable status feedback is of high importance with respect to process safety. In terms of availability or controlled failure rate of applied components, the coordination with protection devices is essential. In addition to typical SIL-classification, parts of the installation (e.g. machinery) may also be defined by its Performance level (PL). This sets requirements for redundancy and MTBF study on components. This paper is a study of the requirements of the user, the risk analysis and required SIL-rating versus the impact on the MCC operating principle and design. Reliability data, MTBF and field experience, of components like contactors, relays and control and protection devices will be taken in account. A realistic case with control concepts and circuits will be analyzed with respect to reliability for process safety.	Bas Bouman *Eaton* John Woestijne *Fluor Consultants* Sybrand de Wit *Fluor Consultants* Niek de Koster *Yara*
AM-33	**What can go wrong during Stator Coil Partial Discharge Measurements according to IEC 60270?** The available literature on partial discharge (PD) analysis suggests that measurements should be performed at higher frequency bandwidth than the conventional IEC 60270 methods, to enhance capability for detection of stator coil defects. In an energized test object, electrical disturbances or noise can strongly influence the observed PD magnitude. Spurious PD could be due to proximate sparking of imperfectly earthed objects, loose connections in the area of the high voltage, electromagnetic radiation, contact noise, broadband noise or loosely applied slot simulating earthing fixtures. Various international standards recommend adjustment of frequency bandwidth to acquire genuine PD signals by enhancing the signal-to-noise ratio. IEEE Std. 1434-2000, suggests an acquisition frequency of 2 MHz with adjustable bandwidth. Once an appropriate data acquisition bandwidth is established, the recommended approach to determine expectations for PD magnitudes on new factory windings is to compare PD magnitudes with the machine manufacturer's historical distribution, developed for windings with similar geometry, voltage rating and insulation system construction. This will be more meaningful than attempting to establish an absolute limit based on voltage rating.	Saeed Ul Haq *GE Power Conversion* Luis H. A. Teran *GE Power Conversion* Meredith K. W. Stranges *GE Power Conversion* William Veerkamp *The Dow Chemical Co.*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Ref.	Title	Authors
AM-37	**Pyrotechnic Current Limiting Devices – from Design to Operation** The trend towards electrical drivers rather than mechanical drivers for offshore installation has led to implementation of large electrical systems and power generation. Due to the offshore environment constraints such as weight and footprint limitations, most of the installation remains operated at voltage of 13,8 kV and lower which leads to specific constraints on the electrical network design. This paper provides an overview of the implementation of pyrotechnic current limiting devices from the design stage through precommissioning, commissioning and up to operation. A case study will also be developed based on fault event which occurred on a FPSO (Floating Production Storage and Offloading) leading to severe damage and its consequences on operation conditions. The pyrotechnic current limiting devices operated correctly when the fault occurred. The damage and production losses were due to other causes which will be highlighted.	Jacques Lavaud *TOTAL Exploration & Production* Bruno Leforgeais *TOTAL Exploration & Production* Terence Hazel *Schneider Electric*
AM-38	**Asset Protection Enhanced by Competency of Electrical Staff: Embrace or Ignore?** On the night of July 6th 1988 167 men lost their lives during an explosion and resulting meltdown of an offshore Oil & Gas platform in the North Sea. Lord Cullen's public enquiry led to 106 recommendations to improve safety at work including employers ensuring the competency of workers. Over the last 20 years, training has been displaced by competency assessment to ensure workers have sufficient knowledge and skills to prevent actions giving rise to danger in the workplace. International electrical standards developed by the IEC for use worldwide (IEC 60079 Parts 14 & 17) specifically apply to Ex equipment protection concepts, safe installation, inspection and maintenance. The European ATEX Directives for the types of electrical protection concepts and safety of workers in explosive atmospheres, became a European legal requirement in the mid to late 1990's and has enhanced safety in explosive atmospheres in Europe and even worldwide. It is imperative that an internationally mobile workforce that serves the requirements of the oil, gas, chemical and fuel industries understand the Directives and Standards, as well as being able to correctly apply them to protect the large capital investment assets. Do you embrace this competency culture or ignore it?	Martin Jones *JTLimited* Peter Bennett *EEMUA*
AM-42	**Long Distance Subsea Transmission** Due to increase in the energy demand and limited easy oil reserves, offshore oil and gas reserves are moving towards deeper water and remote locations. A key enabler for developing such remote fields is subsea long distance power transmission from a local host or from onshore. Final selection, however (long distance transmission vs local host), is dependent on cost and reliability of a system. Subsea power transmission is a complex interaction of many parameters, subsea cable being one the most important factor. Selection of a subsea cable is dependent on many factors: design (voltage drop and gain, cable cross section, capacitance, cable charging current), project (transportation, installation), economic. This paper provides the overview of factors affecting power transmission via subsea cable and demonstrates the influence of technical parameters on the cable capability. These parameters are sufficient to identify the range of transmission voltage and cable cross sections during early stage of the project which should be further verified by specific power system studies e.g. harmonic, dynamic studies.	Varun Raj *Shell*

Ref.	Title	Authors
AM-43	**Induction Motors-Design, Manufactured and Test based on API 541** Generally there are two types of end users of induction motors, i) Basic design based on IEC, NEMA [2] or some other standards and ii) basic design with the addition of the API 541[1] requirement. The second category is mostly used in refinery, power plant, and oil and gas industries where long term reliability is sought. This paper will discuss the basic design, manufacturing and testing and the additional requirements of API 541. In addition, this paper will help answer the following questions: what are API requirements, what benefits do they provide, and is the extra effort necessary or not? Finally it will conclude with the advantages and disadvantages of non API and API motors.	Rajendra Mistry *Siemens Industry* Scott Kreitzer *Siemens Industry*
AM-45	**Oil Leak Causes and Prevention in Large Electric Motors** Oil leaks are a common maintenance problem in large electric motors that can cause down time and even complete failure. The oil can migrate either to the inside of the machine or to the outside environment. This oil migration can be contributed to many factors, but one major cause is due to the differential pressure between the oil sump cavity and the outside environment. A conventional electric motor design does not allow for positive sealing due to the fact that the stationary seal does not contact the rotor shaft. The design intent is to protect the shaft from wear which can be very costly. However, this leaves an open path between the oil cavity and the inboard and outboard environments of the motor. The seals should be designed to provide resistance to any pressure differential in that open space, but often the design robustness is limited by available space and economics. There are valuable rules and procedures to maintain the integrity of the oil seal and its performance. Proper installation and maintenance is critical to prevent leaks even with the most robust designs. This paper will discuss the issues relating to oil leak problems and their prevention.	Emam Hashish *Siemens Industry* Raj Mistry *Siemens Industry* Scott Kreitzer *Siemens Industry* Bill Finley *Siemens Industry*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

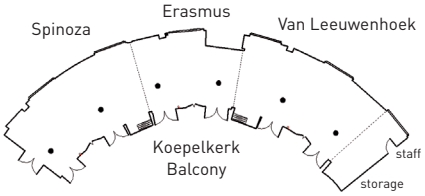
Ref.	Title	Authors
AM-48	**Surface Heating for Arctic Vessels and Structures to Prevent Snow and Ice Accumulation** The world's energy demands have continued to stretch innovation and technology to aggressively pursue oil and gas reserves. Recent advancements in harvesting shale oil have slowed the race to define and develop the offshore Arctic energy resources, but the need to continue the planning and preparations for production is still present. The prevention of accumulation or melting of snow and ice on outdoor stairs, handrails, walkways, and other exposed and uninsulated surfaces represents growing interest for Electrical Heat Trace (EHT) technology. For harsh Arctic environments, EHT is being installed on, in, and/or under surfaces to reduce unsafe icing conditions during normal operations or during emergency conditions. This is particularly important for safety systems and those surfaces associated with emergency personnel evacuation.	Peter Baen *Thermon Industries* Dan Oldford *American Bureau of Shipping*
AM-51	**Reliable Detection of Rotor Bar Failures in Induction Motors Operating in Petrochemical Plants** A compilation of industrial case studies for current based broken rotor bar detection in high voltage induction machines operating in water intake facilities and petrochemical plants is presented in this paper. A technique (Advanced Transient Current Signature Analysis, ATCSA) based on the analysis of the stator transient current is assessed and compared to the widely spread Motor Current Signature Analysis (MCSA) technology. ATCSA relies on the application of advanced signal processing tools that enable to track the signatures created by the fault components across the transient. These 'transient signatures' lead to a reliable understanding of the machine condition and provide much more information than a single frequency peak in a FFT spectrum. The new method has proven to be valid to avoid false positives provided by the classical MCSA, such as those occurring under presence of oscillating load torques or cooling axial ducts. The work verifies the industrial applicability of the approach and its reliability in cases where the classical MCSA leads to false indications. The verification is performed on High Voltage induction motors operating in a petrochemical plant in Korea as well as on a water intake facility at the same country. Some of the motors had actual broken rotor bar faults and false positive fault indications.	Jose Antonino-Daviu *Universitat Politècnica de València* Sang Bin Lee *Korea University* Ernesto Wiedenbrug *Eta Scientific Inc.*

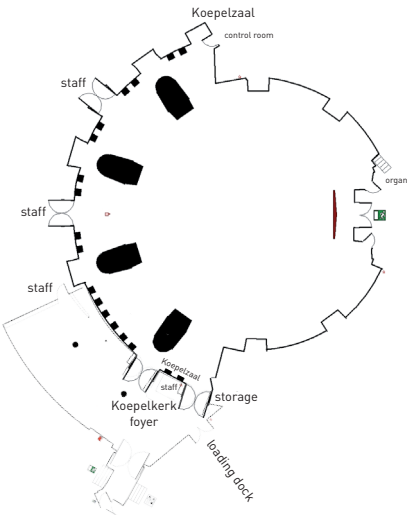
Ref.	Title	Authors
AM-53	**Yikes ! Are Plant Control and Power Assets Safe from Cyber-Attacks?** There are several online monitoring techniques at facilities for critical equipment and asset management. In a world where automated control and power systems are vulnerable to cyber-attacks, Oil and Gas producers find themselves in the difficult position of trying to secure all of their mission critical assets. Although control and power device manufacturers have improved the security capability of their products, many production facilities have control and power assets that are several generations old. Most Oil and Gas Producers are currently, or have already formulated, migration plans to transition to the newer more capable devices. There is a catch. The greatest impediment which arises within the transition to more secure technologies is the lack of comprehensive or accurate installed control asset data. This paper will discuss several systems that have been used for a non-intrusive, scalable and widely applicable control and power asset information management solutions and how they support ISA 99, NIST 800-82 and IEC-62443. The facilities can be shown to provide continuous dynamic asset data and have also been provided for system health and condition monitoring of controls systems.	Janet Flores *Rockwell Automation* Antonio Martinez *Chevron* Joe Zaccaria *Rockwell Automation* Richard Paes *Rockwell Automation*
AM-56	**Global Electrical Safe Work Practices Implementation** This paper outlines the implementation of a enhanced set of global electrical safety procedures, which were developed after a number of fatalities during electrical activities. The Global Electrical Safe Work Practices are an integral part of the company's safe work procedures. Described are the changes initiated by the fatal incidents. Practices itself are changed, Layers of Protection, often referred as barriers are discussed. Finally the global implementation of the Global Electrical Safe Work Practices, including a management system, training in local language of over 3000 electrical workers (electricians, instrument and analyzer technicians and contractors). The results and statistics of 4 years working with the Global Electrical Safe Work Practices showed a significant decrease of incidents and no fatalities to date.	Andre Muileboom *ExxonMobil*
AM-57	**Humidity Effects in Substations** This paper discusses the causes and effects of humidity within indoor substation environments and methods of mitigating these factors. This report briefly explains relative humidity and partial discharge, and the effect of high relative humidity on the inception or level of partial discharge. The report covers the environmental factors in switchgear design standards and the manufacturer's literature. The report covers best practice for the design of substations and internal environment control, the factors affecting the environment within a substation and methods of mitigating these factors. This report demonstrates why it is extremely important to control the substation environment and this can be achieved by minimising moisture ingress into substations and controlling the temperature and humidity within the building.	Tony Byrne *EA Technology Limited*

PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Notes

Main Meeting Rooms in the Intercontinental Hotel





PCIC EUROPE
PETROLEUM & CHEMICAL INDUSTRY COMMITTEE

Joint Call for Papers

2015 Annual Conference Calendar

3rd Middle East Conference

- February, Abu Dhabi UAE

12th European Conference

- June, London, UK

Key Dates

Abstract submission deadline

- May 23rd, 2014

Draft paper deadline

- October 17th, 2014

Final paper deadline

- March 27th, 2015

Welcome to PCIC: PCIC invites you to actively contribute to the exciting program of our forthcoming Middle-East and European conference events in 2015. Present your knowledge and practical experience to our worldwide discipline forum of industry experts, raise your personal and your organisation's profile at a senior industry level and network efficiently amongst your engineering peers. Meet like-minded professionals and enjoy the stimulating discussions as a result of the fruits of your effort. This makes PCIC surely the annual must-attend event for authors and delegates, so why not join in?

Successful authors will: Present their paper or technical tutorial at their selected conference, have their paper or tutorial published with the official conference proceedings and similarly on our website. PCIC may also, with the permission of the author, film the presentation for publication on our website.

Quotations from previous conference attendees:

- "Exposure at international level…meet great personalities"
- "Getting a window on the latest standard changes…"
- "Sharing experiences and expertize from Oil & Gas applications"
- "Opportunity to interact with key people of decision making influence in the region"

Interested? What do you do next:

Well follow the simple instructions at: http://www.pcic-europe.com/authors/call-for-papers.html