MOTORS, DRIVES AND SWITCHGEAR FORUM

WHAT YOU WILL GAIN FROM ATTENDING THIS FORUM:

• Learn how to specify protection and speed control requirements for motors
• Learn about new switchgear and drives innovations and components through case studies and practical discussions
• Improve maintenance of motors and drives
• Learn how to select types and ratings of circuit breakers and switchgear
• Troubleshoot and fix faults on motors and drives
• Find practical solutions to your drives & switchgear problems
• Network with industry experts and peers

WHO SHOULD ATTEND:

• Users of LV and MV distribution boards, motor control centres, variable speed drives and substations in the industrial, commercial, manufacturing and utility sectors
• Electrical engineers
• Maintenance engineers
• Power system engineers
• Electrical engineering consultants and designers
• Engineering managers
• Project companies and systems integrators
• Product managers
• Electrical maintenance supervisors and technicians
• Instrument and control engineers
• Instrument technicians
• Maintenance personnel
• Mechanical engineers
• Operations personnel
• Plant engineers
• Process control engineers
• Service technicians

17th & 18th June 2014
Mercure Hotel
BRISBANE, AUSTRALIA

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The forum has been engineered for you to meet and exchange ideas on best practice in switchgear (incl. circuit breakers), motors, drives, and associated distribution systems. The forum will highlight the latest technologies, the most effective industry practices, and accelerate improvements in standards and regulations.

MOTORS: It is estimated that electrical drives and other rotating equipment consume about 50% of the total electrical energy used in the world today (and this figure increases to 70% if you only consider industry). The cost of maintaining electrical motors can be a significant amount of the budget in manufacturing and mining industries. Attendees will leave the forum with a fundamental understanding of protection, control and maintenance, to safeguard and troubleshoot electrical motors and drives.

DRIVES: The main application of drives technology is for variable speed drives. This is a cost effective method to match drive speed to load demands and is an excellent opportunity to reduce operating costs and improve overall efficiencies in your applications. The forum will discuss the latest developments as far as power electronics and approaches to control.

SWITCHGEAR: Switchgear and circuit breakers are critical components in electrical distribution systems and their operation significantly affects the overall operation of the system. Medium voltage switchgear, which represents most of the switchgear installed on electrical distribution systems will be an area of discussion.

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**FORUM DAY ONE PROGRAM – 17TH JUNE 2014**

<table>
<thead>
<tr>
<th>8.00am</th>
<th>Registration</th>
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<tbody>
<tr>
<td>8.15am</td>
<td>Opening Address</td>
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<tr>
<td>8.30am</td>
<td>Short circuit currents and arc interruption</td>
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<tr>
<td>Presented by: John Piperides (Author: Viv Cohen)</td>
<td>A fundamental basis to the topics of motors, drives and switchgear is provided with the first session addressing the important subject of short circuit currents, their characteristics and structure, and the types of short circuit faults that could occur in practice. It introduces the relationships for the calculation of short circuit currents whilst dealing with both symmetrical and asymmetrical currents. The impact of the short circuit power factor together with its influence on circuit breaking is examined, along with the influence of rotating machines on short circuit currents. The session concludes with an introduction into the breaking of electrical arcs in various insulation media including air, oil, vacuum and SF6.</td>
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<tr>
<td>Morning Tea – 10.00am</td>
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<tr>
<td>10.30am</td>
<td>Electrical measurements on adjustable speed drives: ten measurements that tell you a lot</td>
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<tr>
<td>Ganesh Ganeshkumar – National Product Manager, Fluke Australia</td>
<td>Most experienced motor technicians are well prepared to deal with traditional three-phase motor failures that result from the effects of water, dust, grease, failed bearings, misaligned motor shafts, or just plain old age. However, modern electronically controlled motors, more commonly referred to as adjustable speed drives, present a unique set of problems that can vex the most seasoned experts. In this presentation we will discuss the live electrical measurements you need to make during the installation and commissioning of a drive, as well as when diagnosing bad components and other conditions that may lead to premature motor failure in adjustable speed drives (ASDs). In addition, we will also look at the electrical safety aspects of the live electrical measurement tools as per IEC 61010 and making accurate measurements in an electrically noisy industrial environment.</td>
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<tr>
<td>Lunch – 12.00pm</td>
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<tr>
<td>1.00pm</td>
<td>Isolation verification of electrical drives</td>
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<tr>
<td>Chris Devine – Engineering Director, Industrial Control &amp; Electrical Pty Ltd</td>
<td>This presentation discusses methods for verifying the isolated state of electrical switches prior to conducting mechanical maintenance. The current methods for verification of electrical isolation are presented. Common methods used by plant operators and maintenance personnel include Test for Dead, Attempt Start, Visible Break Isolators and Mains Voltage Indicator Lamps. Safety hazards and limitations associated with these verification methods are then discussed. Attendees may be surprised when they learn the inadequacies of regulator mandated approaches to isolation verification. In addition, they will be able to avoid known safety issues should they be tasked with developing an isolation verification system.</td>
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<tr>
<td>1.45pm</td>
<td>The selection of AC converters for variable speed drive applications</td>
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</table>
| Roger Royai – Dip EE (C&G) Grad.Dip Rob., Senior Engineer | Here you will learn how to correctly select, install, operate and troubleshoot your variable speed drives. Topics include:  
• Basic selection procedure  
• Loadability of converter fed induction motors  
• Operation in the constant power region  
• The nature of the machine load  
• Starting and stopping VSDs  
• How to calculate acceleration times and times  
• How to select the correct motor and converter for pump, fan and constant torque loads |
| Afternoon Tea – 2.30pm |
| 3.00pm | Installation and fault finding techniques for variable speed drives | Session 6 |
| John Piperides | Here you will learn about the installation, operation and troubleshooting of variable speed drives, including practical applications. Topics include:  
• General installation and environmental requirements  
• Power supply connections and earthing  
• Where to install the contactors in the power circuit  
• Installing AC converters into metal enclosures |
| 3.45pm | Protection of AC motors | Session 7 |
| John Piperides | This session will offer you a thorough understanding of electrical motors’ working, maintenance and failure modes, and will give you the tools to maintain, protect and troubleshoot your electrical motors. Topics include:  
• Protective devices/protection settings  
• Thermal overload/over current  
• Under/over voltage  
• Under frequency  
• Current unbalance or negative phase sequence  
• Earth fault protection  
• Pole slip/out of step  
• Loss of excitation  
• Inadvertent energisation  
• Over fluxing  
• Stall protection/acceleration time/start up supervision  
• Voltage controlled or restrained over current |
| Closing - 5.30pm |

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**NETWORKING SESSION: 4.30pm to 5.30pm**

An hour dedicated for all attendees to meet and socialise with experts and industry peers at the Motors, Drives & Switchgear Forum Cocktail Hour.

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**REGISTER NOW:**

**Fax:** 1300 138 533  
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**E-mail:** idc@idc-online.com  
**Web Site:** www.idc-online.com
FORUM DAY TWO – 18TH JUNE 2014

8.30am

Session 8

Switchgear rating and specification
Roger Royal – Dip EE (C&G) Grad Dip Rob., Senior Engineer
After this presentation you will be able to select the appropriate type and rating of switchgear, draw up purchase specifications and have a clear understanding of the different switchgear components available. Topics include:
- Switchgear rating - highest system and impulse withstand voltages, load and short circuit currents
- Simple and complex protection systems
- Switchgear ancillaries, measurement CTs, VTs, relays
- Cable terminations
- Indoor and outdoor operation
- Substation and switch room layouts and design

Morning Tea – 10.00am

10.30am

Session 9

Motor Revolution: synchronous reluctance motor technology
Csaba Szabo – Product Manager, High Voltage Machines, ABB Australia
This presentation will explore the next evolutionary step for electric motors in the small-medium power range, specifically synchronous reluctance motors. Only recently has it become possible to utilise this motor technology in an industrial scale with the aid of frequency converters. This session will explain the advancements in this motor technology and show how these developments can offer significant benefits such as cost, space and energy savings when compared to traditional induction motors.

11.15am

Session 10

How to correctly install variable speed drives on MEN and IT mains supplies when using RCDs for earth leakage protection
Eduardo Gie – Pacific Technical Manager, Danfoss (Australia) Pty Ltd
The application of variable speed drives (VSDs)/variable frequency drives (VFDs) are well-known for their benefits for energy efficiency and flexible control of process and machinery using standard AC or PM motors. However, their correct electrical installation in accordance with Australian Standards plays an important role in the event that an earth fault occurs. This presentation describes leakage currents and residual currents associated with the RFI filter, VSD and motor combination on MEN and IT Mains supplies. If an earth fault occurs within the drive either on the output or supply cables, one needs to ensure the resulting earth fault current (which typically include high frequencies) does not compromise any of the safety protection functions of the drive or the installation. The presentation will also provide practical guidelines on how to apply residual current device (RCD) to avoid nuisance tripping without compromising safety.

Lunch – 12.00pm

1.00pm

Session 11

Switchgear diagnostics, testing and maintenance
Roger Royal – Dip EE (C&G) Grad Dip Rob., Senior Engineer
This session will cover asset management of switchgear and protective relays including safe maintenance policies. Topics include:
- Asset records
- Condition Based Maintenance (CBM)
- Reliability Centred Maintenance (RCM)
- Switchgear inspection methodologies
- Insulation deterioration
- Diagnostic techniques: Partial discharge measurement and survey
- Partial discharge – Transient Earth Voltage (TEV) monitoring, Partial discharge by acoustic methods, Timing tests, Thermovision, Tan delta testing
- Principles of circuit breaker maintenance
- Contact maintenance and contact wipe
- Oil testing
- Maintenance of vacuum circuit breakers and SF6
- Switchgear defects and defect control
- Switchgear installations

Afternoon Tea – 2.30pm

3.00pm

Session 12

Variable speed drives, harmonics phenomenon and mitigation techniques: discussing commonly used standards and industrial practice
Fuad Mehmmedovic – Drives Technical Support Manager, ABB Australia
It is well known that non-linear loads, including frequency converters (variable speed drives), generate harmonics that could create harmful effects within the surrounding circuits and neighbouring networks. As with anything else, harmonics are contemplated by Australian standards. However, unlike the AS 3000, which is commonly used around the country, non-Australian standards are very much used as a reference by the industry (IEC and IES19 in the first place). Very often, electrical specifications misinterpret the standards, introducing very low distortion limits - current, voltage or even both. This is due to fear of unknown phenomenon called harmonics and peer pressure. This presentation will highlight the author’s experience with variable speed drives and harmonics phenomenon in relation to standards used by the industry, as well as available mitigation possibilities. The discussion is based on principles, correct interpretation of standards and good industrial practice.

3.45pm

Session 13

Switchboard installation, inspection and commissioning
Roger Royal – Dip EE (C&G) Grad Dip Rob., Senior Engineer
The overall focus here will be on the effective inspection, testing and commissioning of electrical switchgear and circuit breakers with the aim to identify problems early, correct them and avoid downtimes. Topics will include:
- Inspection
- Routine, type, acceptance and pre-commissions tests
- High voltage equipment test techniques
- Commissioning procedures

4.30pm

Session 14

Discussion Panel
This session will provide delegates with the opportunity to ask our speakers questions, discuss an area in greater detail or get some feedback from fellow delegates on a particular topic or issue.

Closing – 5.00pm

FOR FURTHER INFORMATION:
Phone: 1300 138 522

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Representing your business at the Motors, Drives and Switchgear Forum will provide you the opportunity to reach key decision makers from a multitude of industries. For more information on sponsorship and exhibition opportunities please contact IDC Technologies via email conferences@idc-online.com.

All forum papers are reviewed and selected for their high quality and technical value by our panel of specialists experienced in the theory and practice of Motors, Drives and Switchgear.
John is a professional electrical engineer with over 25 years' experience in industrial maintenance, production, management, sales and improvement. He has held management positions in several manufacturing and sales companies. His diverse responsibilities have included contract negotiation, authoring and responsibility of departmental budgets, daily management of over 20 reports, practice of cGMP, auditing in a pharmaceutical plant, and system administration and programming of diverse IT and embedded systems. He has been directly involved with industries including building management, pest control, mining, power utilities, food, pharmaceutical, steel, building products, sugar, paper and pulp, rail and airports. John has completed many years of further education including developing, writing and delivering many work based courses and seminars. He has spent 10 years as a part time teacher at TAFE in electrical engineering, and 15 years delivering structured courses in thermography, power quality, instrument safety, motor drive theory, PLC, SCADA, and pest inspection.

Roger has built up a solid 40 years of hard won experience in the electrical power industry and this is apparent in his instructing. He has a passion for teaching and has achieved outstanding results over the past ten years with his courses on circuit breakers and switchgear, earthing, bonding, lightning, surge protection, power systems protection and transformers throughout the world. Roger will ensure you walk away with skills you can immediately apply to your work. He commenced his career in the design and construction of transformers, power cables and switchgear with Alstom (GE); this work included a significant degree of R&D. Roger has since worked for numerous blue chip companies in the classical design of power systems, transformers and switchgear. More recently, he has spent considerable time in maintenance operations of electrical engineering assets.