



Circuit Breaker Seminar

Test & Maintenance Training

October 1-5, 2018 | Jackson, Mississippi USA

AGENDA*

**subject to change*

Sunday, October 1, 2018

12:00 PM - 5:00 PM **Registration & Information Desk**
Jackson Convention Complex; Main Lobby

Monday, October 1, 2018

7:00 AM – 6:00 PM **Registration & Information Desk**
Jackson Convention Complex; Main Lobby

7:00 AM – 8:30 AM **Breakfast**
Jackson Convention Complex; Main Lobby

8:30 AM – 8:40 AM **Welcome & Opening Remarks**
Doble Engineering Company

8:40 AM – 9:30 AM **Circuit Breaker Fundamentals – An Introduction**
Steve Skinner, Solutions Implementation Engineer
Doble Engineering Company

A brief review of four basic requirements that need to be met for a circuit breaker to perform its primary function: To maintain "zero impedance" in the conductor path while in the closed position and "infinite impedance" in the conductor path while in the open position, the ability to change between these conditions at a specified rate, and to act as an insulator phase-to-phase and phase-to-ground regardless of state) and circuit breaker fundamentals.

Steve Skinner is currently Solutions Implementation Engineer with Doble Engineering Company. Formerly he was Idaho Power's Maintenance Manager. Mr. Skinner brings decades of experience in best practices, SF6 equipment, radiography, resource utilization and maintenance to his current position of Solutions Implementation Engineer.

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9:30 AM – 10:00 AM **Morning Break**

10:00 AM – 11:15 AM **Contact Design & Materials**
Jozef Levi, Application Engineer
Doble Engineering Company

Jozef Levi is an Application Engineer for circuit breaker testing and TDR test instruments at Doble Engineering Company. He earned a diploma in electrical engineering from the Electro-technical Faculty of the University of Sarajevo in 1973. A designer of SF6 circuit breakers and high voltage disconnects switches, Mr. Levi's career spans more than 30 years. Before joining Doble in 1999, he worked with the Energoinvest Electrical Institute in Sarajevo; Energomex in Mexico City; and E Manufacturing in Mentor, Ohio. Mr. Levi has special interests in the fields of electrical contacts for high voltage circuit breakers and disconnecting switches. He is the holder of a US disconnecting switch patent and teaches courses in the mechanical testing of circuit breakers.

11:15 AM – 12:00 PM **Circuit Breaker Installation & Commissioning**
Mike Wolf, Senior Engineer
Doble Engineering Company

New substation equipment is being installed and placed into service across the industry at an impressive rate when compared to the recent past. To ensure safe and reliable service for the equipment's life, commissioning tests should be performed to verify the functionality of new equipment. Throughout this systematic process, documentation is vital to establishing expectations, monitoring progress, and capturing results.

This session reviews the commissioning process for a newly installed 230kV ring-bus, focusing closely on the gas circuit breakers and their associated equipment. The process starts with planning the commissioning activities, then moves into performing the required equipment tests, thoroughly reviewing results, functional testing control schemes, and finally performing in-service testing and post-energization follow-ups.

Michael Wolf, PE has a BSEE from Clarkson University, a MEPSE from Worcester Polytechnic Institute, and is a licensed electrical engineer. He has been in the power industry since 2008, working on the design, operations and maintenance, and commissioning of power substations and substation equipment. He worked as an Engineer IV in FirstEnergy's Transmission and Substation Services department in Greensburg PA prior to joining Doble Engineering Company in 2017.

12:00 PM - 1:00 PM **Lunch**

1:00 PM – 3:30 PM **Introduction to Circuit Breaker Mechanisms**



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A series of "Mechanism" presentations allow circuit breaker manufacturers to provide brief practical overviews of some common operating mechanisms, including tips for field personnel related to operation and maintenance.

GE Grid Solutions — FK3-1 Spring/Spring Operating Mechanism Technology

GE's FK3 series Spring/Spring Operating Mechanism Technology. Review of FK3 series of mechanisms as the companion presentation for to the Thursday hands-on demonstration of the FK3-1 operating mechanism.

Todd Irwin, Business Development Manager

Todd Irwin is Senior Product Sales Specialist for High Voltage Circuit Breakers and has been employed at GE Grid Solutions since 2008. He has worked for over 23 years in the high voltage circuit breaker industry including positions in field service, test engineering, inside sales, commercial management and business development. Mr. Irwin studied electrical engineering at Grove City College and received his AAS in Electrical Engineering Technology from DeVry University. He is an IEEE Senior Member and currently serves as Chair of IEEE PES Switchgear Committee.

MEPPI — BM-2 Mechanism: A Display of Power, Efficiency and Dependability

Frank Borino, Jim Altenhof, Justin Cooper

MEPPI will be presenting a demonstration of the operation and function of the Torsion Springs that drive the BM-2 Mechanism. Included in this demonstration will be a discussion on how the Motor Assembly and Limit Switches work in conjunction with the Mechanism to charge the Springs and what is done to prevent overcharging of the Close Spring. Also discussed will be the Trip and Close Coil Assemblies and how they interact with the Mechanism, the importance of setting and maintaining the proper gaps for optimal Breaker operation, and the Shock Absorber which is responsible for helping to protect the Mechanism and in particular, the Interrupter(s) it drives. In addition to this will be a discussion and demonstration of a fully functional BH-1H Mechanism, which is driven by 2 Helical Springs.

Siemens — FA series Spring-Spring Mechanism Functional Mechanics

Jon Rogers, Engineering Technical Manager

This presentation will include 'how it works', life expectancy and a discussion on maintenance issues.

Parts Super Center — GE ML-13 Mechanism

Paul Wasacz, Program Manager - GE Philadelphia Circuit Breaker & Switchgear

The design and operation of the General Electric ML-13 circuit breaker operating mechanism will be reviewed. Emphasis will be placed on the major revisions to this mechanism since its



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introduction in 1963. We will review the Service Advisory Letters issued for this mechanism and how they impact reliability. This presentation is an excellent foundation for Thursdays hands on course on Understanding and Troubleshooting the GE ML-13 Mechanism.

***Paul Wasacz** is the Program Manager responsible for GE's Magneblast Circuit Breaker & Switchgear product line. He has more than 30 years' experience in the design, installation & maintenance of switchgear & circuit breakers. Mr. Wasacz started his career as a Substation Engineer in the utility sector. He includes the late Mr. Edward. J Dugan, GE's Chief Switchgear Design Engineer, as one of his mentors. Mr. Wasacz is a balloting member of the IEEE C37 switchgear committee. He has published and presented various papers and training sessions on industry topics. He holds a BS degree in Electrical Engineering.*

ABB — MSD Mechanism

Randy Opsitnick, International Sales Manager

This presentation will cover the new ABB MSD motor charged spring operating mechanism and its design to ensure a high degree of total reliability for a changing power transmission network and minimal need for maintenance over its lifetime. The MSD is simpler to operate than historical designs, there have been some installation and commissioning issues in the field with the MSD that have resulted in damage to the mechanism. In this session, we will cover overcharging, manual cranking, test and timing, share the correct measures and proper setup to avoid issues, as well as have a demo unit on hand to demonstrate.

***Randy Opsitnick** is Dead Tank Breaker Training Manager with ABB Inc. located in Greensburg, PA. worked at ABB for 30 years in the DTB manufacturing facility. During the 30 Years, he worked as a Field Service Engineer for 12 Years and held various other positions as Customer Order Engineer, Dead Tank breaker regional sales and marketing manager for the West Coast Region and Regional Marketing Manager for HV Service Northeast US and International. Holds BS in marketing management and Associate Degree in Electrical Engineering Technology. and currently residing as Training Manager in ABB Greensburg PA DTB Training Facility.*

3:30 PM – 4:00 PM **Afternoon Break**

4:00 PM – 5:00 PM **Load Tap Changer Fundamentals**
David Geibel, Technical Director
ABB Inc.

A brief history of on-load-tap-changers will be presented which will provide an exposure to the concepts of Reactance- resistance, on-tank, in-tank, vacuum and conventional OLTCs and when they were introduced.



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David Geibel graduated Magna Cum Laude from the University of Pittsburgh with a BSEE. David started his career in the high voltage laboratory at the General Electric large transformer plant. He soon moved to the design engineering department and became a transformer components engineer. He was subsequently sold to Westinghouse who sold him to ABB. He was the Engineering Manager for a decade at the ABB Alamo components factory before taking on his current role as Technical Director. Mr. Geibel holds six transformer components patents.

5:00 PM – 5:30 PM **Condition Monitoring of Disconnect Switches and their Integration to the Smart Grid**
Philippe Corriveau, President and CEO
Mind Core Technologies

Disconnect switches (DS) are necessary part of an electric grid network. Used primarily to isolate other more important substation equipment such as transformers and circuit breakers. The disconnect switch (DC) provides a visible break in an electric circuit so that technicians can safely work in the substation environment. They are also used to route power both within the substation and on transmission lines. Little change has been made to the DS for the past 50 years. Today the majority of DC controls fail to provide real position information of the switch. This paper will discuss advancements made from the development of an electronic control system that will provide the electric utility with valuable information on the status of the DS. The paper will discuss how this control system will provide the electric utility the ability to monitor the operation of the DS in real time. Integration of the DS into the smart grid by way of control, monitoring and scheduled maintenance using SCADA or other communication protocols will also be addressed. Lastly we will show how grid reliability will be increased when using this solution and by presenting case studies that have occurred at various utilities.

Philippe Corriveau is Founder of MindCore Technologies Inc. He has applied his efforts to making products that improve the utilities' ability to be innovative, reliable and sustainable for their future. From metering to protection and control design and now in high voltage equipment manufacturing, Mr. Corriveau has developed several areas of expertise in the Power Industry. He graduated as an Electrical Engineer from the University of Quebec in Trois-Rivieres and also completed his MBA at University of Quebec in Montreal. Mr. Corriveau is a registered engineer in the provinces of Quebec and British Columbia in Canada.

6:00 PM – 8:30 PM **Welcome Reception at the Jackson Museum of Art – All are welcome!**
Located adjacent to the Jackson Convention Complex, the Jackson Museum of Art is the state's largest museum. It boasts an impressive art collection and a 1.2-acre "front-yard" which is ours to explore this evening. We'll feast on a



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Southern BBQ from an award-winning chef, sip on local brews and network with friends and colleagues.

Tuesday, October 2, 2018

7:00 AM – 6:00 PM **Registration & Information Desk**
Jackson Convention Complex

7:00 AM – 9:00 AM **Breakfast**
Jackson Convention Complex; Main Lobby

9:00 AM – 3:30 PM **Day at Siemens' High-Voltage Product Manufacturing Facility**

For more than 100 years, Siemens has continuously redefined standards and developed products sustaining growth for the world's energy needs. This year, the Siemens Jackson operation celebrates 45 years of high-voltage product development, manufacturing, and service. Founded in 1973 (originally Allis Chalmers), the facility is located just southeast of Jackson in Richland, MS. The plant has 280,000 total square feet, a production area of 145,000 square feet, and manufactures high-voltage products such as circuit breakers, voltage regulators, surge arresters and distribution transformers.

The day will include an in-depth guided Jackson facility tour, equipment demonstrations and hands-on product demonstrations, breakout sessions, lunch, and live entertainment. Our high-tech and interactive semi-truck and trailer will also be on-site to provide the ultimate technology experience with Siemens innovative solutions to tomorrow's energy challenges...today.

Note: The tour is available only to seminar students and pre-registration is required. Final attendance is subject to approval by tour host. Personal protective equipment (goggles and hard hats) will be provided at the factory. For safety reasons, shorts, high-heels and open-toed shoes are not allowed for this tour and photography and filming are prohibited.

6:00 PM – 9:00 PM **Iron Horse Grill Social Event**
Join us for a fun event at the nearby Iron Horse Grill. Visit the music museum, feast on delicious BBQ and network with colleagues at this local landmark, reserved exclusively for Circuit Breaker Seminar guests. Shuttle transportation will be provided.

Wednesday, October 3, 2018

7:00 AM – 6:00 PM **Registration & Information Desk**
Jackson Convention Complex; Main Lobby

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7:00 AM – 8:00 AM

Breakfast

Jackson Convention Complex; Main Lobby

8:00 AM – 8:45 AM

Circuit Breaker Testing Fundamentals

Joe Brown, Technical Application Engineer
Doble Engineering Company

Joseph Brown, P.E., has been employed at Doble Engineering since 2001, and he currently works as a Technical Application Engineer in the Marketing Department. During his employment at Doble he has worked primarily the area of client support, providing on-site training and remote technical support for Doble's clients. Prior to joining Doble, Joseph held positions at Kaiser Aluminum where he worked as a Plant Engineer, at A.K. Steel where he was a Power Department Supervisor, and Cooper Power Systems where he was a Core-Form Transformer Design Engineer. He served as an enlisted man in the U.S. Army Reserve and as an officer the Pennsylvania and Ohio Army National Guards. Joseph attended college at Ohio University, Athens, Ohio, where he earned a Bachelor of Science Degree in Electrical and Computer Engineering in 1989, and a Master of Science Degree in Electrical Engineering in 1992.

8:45 AM – 9:30 AM

Special Testing Methods – Dynamic Resistance

Jozef Levi, Application Engineer
Doble Engineering Company

Performing timing tests on high voltage circuit breakers will provide information about contact synchronization in relationship to opening and closing times for the breaker under test and in certain cases some insight as to the quality of that breakers arcing contacts. But, for a more detailed indication of a circuit breakers arcing contact erosion we can also employ the 'dynamic' resistance measurement method also known as DRM. The advantage of injecting high DC current and measuring the voltage drop during the circuit breakers full speed motion can provide a detailed picture of the arcing contacts condition. Knowledge of circuit breaker arcing contact system design is necessary for best test results analysis. This presentation will address how, when, and why this advanced diagnostic measurement method should be used in order to extract maximum knowledge of your circuit breakers arcing contact condition.

Jozef Levi is an Application Engineer for circuit breaker testing and TDR test instruments at Doble Engineering Company. He earned a diploma in electrical engineering from the Electro-Technical Faculty of the University of Sarajevo in 1973. A designer of SF6 circuit breakers and high voltage disconnects switches, Mr. Levi's career spans more than 30 years. Before joining Doble in 1999, he worked with the Energoinvest Electrical Institute in Sarajevo; Energomex in Mexico City; and E Manufacturing in Mentor, Ohio. Mr. Levi has special interests in the fields of electrical contacts for high voltage circuit breakers and



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disconnecting switches. He is the holder of a US disconnecting switch patent and teaches courses in the mechanical testing of circuit breakers.

9:30 AM – 10:15 AM **A Case Study Demonstrating the Importance of M4100 Insulation Analysis on Medium Voltage Vacuum Breakers**
Shane Oakley, Testing Supervisor
North American Substation Services

Approximately 20 2000-3000 34.5KV metal clad switchgear vacuum breakers were recently tested as part of a routine maintenance testing program. All breakers were subject to an 80KV pass/fail hi-pot test as well as an insulation test with the M4100. Of the 20 breakers, two breakers had poles that first failed the 80KV hi-pot test, passed the hi-pot test after being opened and closed, but failed the insulation test with substantially high Watts loss measured to ground on individual bushings and across the open vacuum bottle with a UST test. Significantly, the test with the M4100 reliably determined bad/contaminated vacuum bottles on two breakers despite the hi-pot test eventually passing. These results are both interesting in themselves and will be discussed and speculated on, but more importantly they demonstrate the importance of insulation analysis testing as part of routine maintenance of medium voltage vacuum breakers.

***Shane Oakley** has been Testing Supervisor at North American Substation Service (NASS) since 2015. Previously he was a college professor. Interested in the applied side of theory, he switched professions and joined NASS.*

10:15 AM – 10:45 AM **Morning Break & WIKA Mobile Gas Cart**

10:45 AM – 12:00 PM **Maintenance & Repair – Lubrication**
Jack Harley, President
FirstPower Group

Stephen Cabeza, Senior Equipment Specialist
Southern Company

Functional operation of many older circuit breakers may be effected by the condition and type of lubricants used in the mechanism and the method of lubricant application. Options for lubricant selection and factors to be considered for different components and environments will be presented. Selection and application factors are based on field observations, laboratory and simulator tests and best practices.



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Jack Harley is President of First Power Group LLC, which provides services to transmission substations of electric utilities and large industrial users of electric power. Mr. Harley is active in the IEEE Transformers Committee and IEEE Switchgear Committee and is a member of CIGRE.

Stephen Cabeza is a PD Transmission Substation Equipment Testing Substation Specialist Senior with over 35 Years of experience in Transmission/Substation Maintenance. He has held positions of Substation Maintenance Foreman, Substation Maintenance Electrician and Substation Maintenance apprentice. At Alabama Power Company he is tasked with providing support on SF6 equipment, SF6 and Vacuum Breakers, 15 kV to 500 to the company's Substation Maintenance groups, Substation support group, Substation Construction, Safety and Training organizations. Mr. Cabeza is a member of Southern Company Breaker Committee.

12:00 PM – 2:00 PM **Industry Expo & Lunch & WIKA Gas Cart Tours (optional)**
Jackson Convention Complex; Ballroom C-E

2:00 PM – 2:45 PM **Special Testing Methods – Using Infrared Thermography in Assessing Substation Equipment Conditions**
Ed Kochanek, Director of Sales Eastern Region
FLIR

Eric Fell, Supervisor – Substation Operations Westchester North
Rupert Wade, Substation Equipment and Field Engineer
Con Edison

Performing infrared thermography inspections has become an integral part of substation maintenance as a tool for prevention of failures. This presentation will offer a brief overview of infrared thermography as it applies to detecting the common problems in and around substation equipment – specifically disconnect switches, circuit breakers, shunt reactors and in some cases current transformers. The presentation will also highlight the effect of infrared camera resolution in identifying potential issues and the repairs required to correct hotspots.

Ed Kochanek is Director of Sales Eastern Region for FLIR in the Test Division. Mr. Kochanek holds a Level 1 thermography certification through the Infrared Training Center in Nashua NH. He has been with FLIR for over 15 years working with customers in the utility industry helping them to select the best thermal camera for their application and instructing them on how to get the most from their investment.

Eric M. Fell is a Substation Operations Supervisor at Consolidated Edison Company of New York (conEdison). His normal duties are the oversight and execution of operations, maintenance &



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construction activities within 9 transmission and distribution substations (13kV – 345kV) throughout Westchester & Dutchess Counties, just north of New York City. Beyond his normal duties, Eric is considered a subject matter expert (SME) in Low and Medium Voltage circuit breaker maintenance and troubleshooting at conEdison. He brings a wealth of knowledge from his experience as a Substation Supervisor at New York State Electric and Gas (NYSEG) and as Field Engineer for General Electric Industrial Solutions; concentrating on startup, commissioning, and troubleshooting of low and medium voltage (480V – 15kV) power delivery system projects. Eric holds a Bachelor of Science from Roger Williams University, a certificate in Sustainability Management & Policy from Penn State and is currently pursuing a Master's Degree in Renewable Energy & Sustainable Systems from Penn State. He has also earned a Field Engineering Degree from General Electric and an Infrared Thermography Level I & Level II certification from the Infrasppection Institute.

Rupert Wade is currently a Substation Equipment and Field Engineer at Consolidated Edison in New York. His primary responsibilities include providing technical recommendations for routine and emergent maintenance, installation, replacement or decommissioning for all major substation electrical equipment in the borough of Manhattan. Mr. Wade has been involved in a number of emergent equipment issues in which thermography has played an integral role in identifying the issue. Formerly he was a System Manager for the High Voltage Switchyard as well as the Routine and Emergency power systems at Nine Mile Point Nuclear Station in Oswego, NY. He graduated as an Electrical Engineer from Binghamton University.

2:45 PM – 3:30 PM **SF6 – The Alternative Gas**
Billy Lao, General Manager
DILO Company, Inc. & DILO Direct

With the ever growing challenges of federal & local reporting and SF6 emission reduction, a number of alternatives have been presented to the industry in replacement of SF6 gas. However, as the industry continues to review and consider the alternatives, we should not limit our solutions. SF6 continues to be the best alternative to medium and high voltage electrical insulation and arc quenching in GIE. By turning to the existing stockpile of SF6 gas available, we will lower our carbon footprint while meeting the requirements for SF6 gas in new and in-service equipment.

Billy Lao has over 25 years of electrical substation equipment and field service experience. His duties have included new installation, electrical construction, and major & minor maintenance of SF6 gas insulated equipment. Currently the General Manager for DILO Company Inc., Mr. Lao is responsible for DILO's North America operations for the sales and delivery of SF6 gas handling, analyzer and test equipment and the SF6 Field Services organization known as DILO Direct.



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Mr. Lao completed his military service in regular Army and joined the NY National Guard. Upon separation from regular army, he was recruited as a Field Service Technician for GEC ALSTHOM where he eventually became the Director of Service for ALSTOM T&D (now GE Grid) out of Charleroi PA. Prior to working for DILO he was the National Service Manager for SIEMENS Asset Services out of Wendell NC.

3:30 PM – 4:00 PM **Afternoon Break**

4:00 PM – 4:45 PM **Oil Testing of Circuit Breakers**
David Koehler, Technical Manager
Doble Insulating Materials Laboratories

The condition assessment of Bulk Oil Circuit Breakers (OCBs) can be achieved via laboratory insulating liquid testing. OCBs can fail mechanically, electrically, and from overheating issues. Technical information of each recommended laboratory test, along with case studies will be provided.

***David Koehler** received his Bachelor's Degree in Chemistry from Indiana University and obtained his M.B.A. He is the New Business Development and Technical Manager for the Doble Engineering Company Insulating Materials Laboratories. He has 19 years of experience in the testing of insulating liquids and management of analytical laboratories. Mr. Koehler has provided numerous technical presentations and published technical articles within the power industry. He is a member of the ASTM D-27 Technical Committee on Electrical Insulating Liquids and Gases. In 2011, he was an Executive Committee Member of the Indiana American Chemical Society. In 2016, David was elected by the IEEE Region 4 voting members to the position of Region 4 Director-Elect. In 2017-2018 David serves as the Region 4 Director-Elect, chairing the IEEE Region 4 Strategic Planning Committee. In 2019-2020 Mr. Koehler will serve as the IEEE Region 4 Director, while also serving on the Board of Directors for IEEE.*

4:45 PM – 5:15 PM **Metalclad Switchgear Maintenance**
Hall Sigmon, Engineering Manager
Siemens Industry

This presentation will review switchgear maintenance and testing procedures for basic mechanical and electrical components, including racking apparatus, mechanically operated contacts (MOCs), truck operated contacts (TOCs), primary and secondary contacts, isolation shutters, and bus bar assemblies.

***Hall Sigmon** currently holds the position of Engineering Manager at Siemens for Medium- and Low-voltage Replacement Circuit Breaker Solutions, which includes add-on switchgear units. Hall is a licensed Professional Engineer and has a degree in mechanical engineering from North Carolina State University. Over his 10+ years at Siemens, Hall has held positions that involved design and testing, as well as production support and quality control for replacement circuit breakers and add-on switchgear units. He*



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has also worked closely with Siemens Field Service Engineers with respect to the installation and testing of switchgear and replacement circuit breakers.

5:15 PM – 6:00 PM **Scrapping Breakers**
Stephen Cabeza, Senior Equipment Specialist
Southern Company

Safety considerations and best practices for scrapping circuit breakers are addressed in this session.

Stephen Cabeza is a PD Transmission Substation Equipment Testing Substation Specialist Senior with over 35 Years of experience in Transmission/Substation Maintenance. He has held positions of Substation Maintenance Foreman, Substation Maintenance Electrician and Substation Maintenance apprentice. At Alabama Power Company he is tasked with providing support on SF6 equipment, SF6 and Vacuum Breakers, 15 kV to 500 to the company's Substation Maintenance groups, Substation support group, Substation Construction, Safety and Training organizations. Mr. Cabeza is a member of Southern Company Breaker Committee

6:00 PM – 8:00 PM **Industry Expo & Reception**
Jackson Convention Complex; Ballroom C-E

8:00 PM – 10:30 PM **Casino Night – Hosted by DILO Company & DILO Direct**
Jackson Convention Complex; Main Lobby

Thursday, October 4, 2018

7:00 AM – 6:00 PM **Registration & Information Desk**
Jackson Convention Complex; Main Lobby

7:00 AM – 9:00 AM **Breakfast**
Jackson Convention Complex; Main Lobby

9:00 AM – 5:00 PM **How Things Work – Day of Hands-On Learning & Demonstration**

Major circuit breaker manufacturers walk attendees through how major apparatuses work, common problems and best practices. You can view the apparatuses up close, discuss the most common technical call issues and ask the experts questions in small, rotating groups throughout the day. Participating manufactures include:



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ABB — Preferred Methodology for Commissioning ABB Dead Tank Breakers, including SF6 gas sampling and MSD mechanism operations

Jeff Pindro, Product Manager

This training is going to tackle the most common issues brought to us by circuit breaker operations and maintenance crews; SF6 gas sampling and mechanism operation. Attendees to our hands-on demonstration will learn the importance of correct gas sampling procedure, the best practice for taking gas samples and the consequences of inconsistent or inaccurate moisture readings. In addition, proper handling, operations and adjustments of the MSD mechanism will be covered. Our expert trainers will have the tools, parts and instructions available to demo so that attendees can easily put the process into practice in the field and likely avoid any future issues.

GE — Demonstration of GE Grid Solutions FK3-1 spring/spring operating mechanism

Justin Rebovich

Built on a legacy of spring/spring mechanism technology started in 1934, the FK3 series was introduced in the 1990's and today represents one of the most common mechanisms used for high voltage circuit breaker operation. Participants will learn how the mechanism works on a full-sized functional model with full range of motion. Maintenance techniques will be demonstrated including replacement of trip/close coils, charging motor and auxiliary contacts. This is an invaluable session for any current or future users of FK3 mechanisms in dead tank circuit breakers, circuit switchers, generator circuit breakers, live tank circuit breakers and GIS.

MEPPI — BM-2 Mechanism Main Features

Frank Borino, Justin Cooper and Jim Altenhof

MEPPI will be highlighting the main features of the BM-2 Mechanism such as the Trip and Close Coil assemblies, the Motor assembly and the Limit Switch. Included in this discussion will be a hands-on demonstration where coil gap measurements can be taken, as well as a demonstration of where (and how) to manually charge the Close Spring. Also included will be a hands-on demonstration of an operable BH-1H Mechanism, including coil gap measurements and the locations for Shock Absorber inspection, slow-close operation and erosion verification of the internal Vacuum Interrupter contacts.

Parts Super Center — Understanding & Trouble Shooting the GE ML-13 Mechanism

Paul Wasacz, Program Manager - GE Philadelphia Circuit Breaker & Switchgear

This hands-on session will cover troubleshooting the ML-13 mechanism and implementing the service advisory letters that have been issued for enhanced reliability. We will bring two complete ML-13 mechanisms and split the class in half to allow each group to work on troubleshooting and adjustments.

Siemens — Major Maintenance on High-Voltage SPS2 Circuit Breakers

Shannon Thortis, Customer Service Manager - HV Breaker/Voltage Regulator Spare Parts

Stephen Bosak, Field Service Manager - HV Circuit Breakers



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As the supplier of OEM parts for BZO, 3AT, LPO, TCP, SP, SPS, and SPS2 circuit breakers, Siemens is committed to supporting customers with qualified parts and factory trained field service support throughout a breaker's life cycle. To extend the life of all power equipment, periodic maintenance needs to be performed. In this session you will learn when and how to perform major maintenance, or pole inspection, on SPS2 high-voltage circuit breakers. This up-close, hands-on learning opportunity will cover major maintenance involving an internal inspection of the circuit breaker. We'll also demonstrate how to replace an operating mechanism's motor, trip coil and MS switch. The training will point out known areas to watch out for, identifying risks and troubleshooting, and get you familiar with the proper tools, equipment and components needed for major maintenance.

Southern States — Installation and Adjustment of Two-Phase Disconnect Switch & Mobile Innovations

Scott White, Southern States Mobile Solutions Manger

Shelly Thompson, Southern States Customer Care Territory Manager

A hands-on demonstration showing proper operation and adjustment of a single-phase disconnect switch on display. Southern States representatives will demonstrate the basic installation and adjustments of a single-phase horizontal upright mounted disconnect switch. This switch will include a MACI® (Magnetically Actuated Closed Indicator) and an LLS® Interrupter installed. The switch will be controlled by an electric motor so attendees can see the devices in operation. Informational presentation and discussion of Southern States' Mobile Innovations. Southern States representatives will discuss the growing market for custom engineered mobile solutions as well as the extensive capabilities we offer to suit a variety of applications. There will be a 3D model of a Mobile Breaker trailer on display.

Important Note: These demonstrations are not intended to replace, constitute or suffice as official manufacturer training. Attendance at manufacturer demo sessions by representatives of competing manufacturers may be limited.

*12:00 PM – 2:00 PM **Industry Expo & Lunch**
Jackson Convention Complex; Ballroom C-E*

*5:00 PM – 7:30 PM **The Power of Pizza**
Jackson Convention Complex; Main Lobby
We've found that following the How Thing Work – Day of Hands-On Learning & Demonstrations, folks just want to talk about the day and what they saw and what they learned. With that in mind, we'll gather at the JCC for a casual evening of pizza, beer and good discussion. Nothing fancy – just a bunch of folks talking "shop."*

Friday, October 5, 2018

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7:00 AM – 12:00 PM **Registration & Information Desk**
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7:00 AM – 8:00 AM **Breakfast**
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PICK YOUR PERFECT PROGRAM
Choose the option that's right for you.

Option #1

8:00 AM – 9:30 AM **Special Safety Presentation - The Safety Journey of an Arc Flash Survivor**
Rodney Walker
Walk Safely Training Group

Rodney Walker tells his detailed testimony of High Voltage Arc Flash including discussion of his injuries, treatment and recovery. During his thought provoking introspective, he will identify incident pre-cursors and address the importance of remaining diligent against complacency and strengthening the safety culture in the workplace.

Rodney Walker is a 25-year employee of one of the largest utilities in the country and an arc flash survivor. In 1996 he was severely injured in an electric flash, suffering 1st, 2nd, and 3rd degree burns to his head, face, neck and arm and sustaining internal injuries. His accident and journey to recovery is a compelling story shared to inspire, educate and empower his audience to understand human performance, recognize hazards and strive to create a safe, injury-free work environment.

9:30 AM – 10:00 AM **Effective Methods of Mitigating Arc Flash Risk**
Ray Urbanic, Vice President Engineering
Southwest Electric

An arc flash event poses tremendous risk toward safety of personnel, damage of property, and extended loss of productivity. Agencies like NFPA and OSHA have instituted means to raise awareness of these risks to personnel, but quite often the means to overcome or mitigate these risks remain unaddressed. As a result, the higher the potential arc flash energies remain, the greater repeated investment of personal protective equipment (PPE), safety procedures and training, and backup system procedures and infrastructure are required. The purpose of this paper is to highlight strategies and methods that help reduce the potential arc flash energy levels, and thereby reduce the amount of PPE and long-term infrastructure investment, as well as reduce further risk to loss of production time. These strategies and methods may require one-time investments in equipment modifications, but yield continual benefits



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year-over-year. 1) Recognize the potential dangers and risks of arc flash 2) Understand the basic approach for lessening incident energy levels 3) Review three primary methods for mitigating arc flash This presentation would benefit all with responsibility for safety and welfare of any personnel with direct or indirect access to electrical equipment within the workplace (50 volts and above), as well as those with responsibility over the maintenance and productivity of electrical equipment.

Ray Urbanic, P.E., is the VP of Engineering for Southwest Electric Corporation, and holds a Bachelor of Science in Electrical Engineering from Rose-Hulman Institute of Technology. Ray has 28 years of power industry experience, primarily with switchgear application and design for both Eaton and Southwest Electric. His past 4 years have focused on custom switchgear application with respects to arc flash mitigation, visiting several customer sites and analyzing their arc flash studies in order to provide solutions for mitigating dangerous-level incident energy values.

10:00 AM – 10:15 AM **Break**

10:15 AM – 12:00 PM **Special Session: How Hot is Hot, and How to Use a SF6 Infrared Camera in a Substation**
Ed Kochanek, Director of Sales Key Account Manager
FLIR Systems, Inc.

This popular presentation addresses two main issues in a substation: Obtaining an accurate temperature measurement; and how to use a FLIR GF306 camera to detect SF6 gas. We will look at what the effects of emissivity, reflectivity and distance have on temperature measurement; the typical applications in a substation and what to look for that would indicate a problem; and how to use a thermal camera to detect SF6 leak and how to get the most out of that camera.

Ed Kochanek is Director of Sales Key Account Manager for FLIR in the Test Division. Mr. Kochanek holds a Level 1 thermography certification through the Infrared Training Center in Nashua NH. He has been with FLIR for over 15 years working with customers in the utility industry helping them to select the best thermal camera for their application and instructing them on how to get the most from their investment.

Option #2 — On-Line Breaker Monitoring #201 (limited availability)

8:00 AM – 12:00 PM **On-Line Breaker Monitoring #201**
John Eastman, Manager of Regional Sales, Grid Solutions
Franklin Electric

If you are interested in knowing more about on-line breaker monitoring, this is for you! And if you think you know all there is to know about breaker monitoring, think again! Beginners and more advanced attendees will appreciate this special extended hands-on presentation. This session assumes you have



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begin installing OPTIMIZER on-line monitors to legacy breakers or they are being installed by your breaker OEM on new breakers. With no bias toward any specific brand or type of circuit breaker, the following areas will be covered:

1. Find relevant circuit nodes on breaker control diagram for connecting monitor signal inputs
2. Finding needed information on nameplates
3. Methods of plumbing the SF6 density sensor, alternatives
4. Reading bushing CT nameplate, identifying CT ratio circuits in the control cabinet
5. PC local connection to OPTIMIZER3, Navigating the web pages
6. Completing monitor setup for timing, contact duty, and SF6 parameters
7. Consideration of alarm parameters
8. Communications and DNP points; How to do it.

Note: Due to the hands-on nature of this class, participation is limited.

John Eastman, Global Sales Manager, Franklin Grid Solutions has over 25 years' experience in the Power Industry. He is a specialist in continuous monitoring of high voltage circuit breakers and is co-inventor of two patented product technologies. John is a Senior Member in the IEEE and contributes to the C37 Standards Committee as Secretary of the C37.10 working group. He is involved in product development including sensors and adaptive devices. Eastman has been with Franklin for fourteen years. He also worked at Doble Engineering Company in Boston for six years in field applications of test equipment used on protective relays and circuit breakers. John also worked with Hawker Siddeley Switchgear (UK) as a product manager for reclosers. Eastman earned a BSEE from the University of Maine in 1986 and MS in Teaching. For four years, John taught middle school and High School mathematics including Algebra, Geometry, and Trigonometry. John volunteers time with church activities and support of mission trips and church planting. He is a certified Boy Scout Merit Badge Counselor and assistant troop leader. John's hobby interests include vacuum-tube sound equipment and organic gardening.