# IEC 61850

## U N I V E R S I T Y

Digital Substation, Consulting,
Integration, and Testing Services

# LEARN HOW TO BUILD DIGITAL SUBSTATIONS, USING IEC 61850 EDITION 2!

## Learn about the Latest Edition of the IEC 61850 Standard and Other Supporting Standards

- We have updated our training curriculum with the latest details from edition 2/2.1, which incorporates comprehensive hands-on components that allow participants to gain experience specifying, configuring, and testing IEC 61850 systems.
- It is easily one of the most up to date, accurate and practical IEC 61850 Ed.2 training courses in the world!

## IEC 61850 Made Easy

- Training is interactive and takes an iterative approach, with each Tier building upon the previous one. It is IEC 61850 Made Easy!
- We remove the complexity of IEC 61850 and present the information in an intuitive manner from a user, asset owner and system integrator's perspective, which allows the material to be easily comprehended.
- Utilize visualizations and analogies that help in articulating the concept of IEC 61850, without getting lost in the weeds.

## Accurate & Practical Information that is Vendor Neutral and Focused on the Standard

- We pride ourselves on offering accurate, consistent and practical information on IEC 61850.
- Eliminates the risk of receiving vendor focused training that overly-emphasizes the products, and overlooks the IEC 61850 aspects.
- This is training to educate users, not to sell boxes!

## Qualified Trainers

Trainers are active participants of international working groups and are current on the latest developments within the standards, providing implementation of digital substations:

- Active IEC 61850 Working Group Members.
- Active IEC 61869 Working Group Members.
- Active IEC 62351 Working Group Members.
- Active IEC Smart Energy/Grid System Committee Members.

Trainers play a great role in the development of the standards and own a number of honors and awards:

- International Conveyor of IEC 61850 (WG10).
- Secretary and active member of International IEC 61850 User Task Force.
- IEC 1906 award owner.
- 2015 Canadian IEC Young Professional of the Year.
- Recipient of Canada's National Innovative Initiative Pilot Project (Part of Standards Council of Canada).

## Easily Accessible

- Global roadshow has been confirmed, and we are accepting dates for Tier I, Tier II and Tier III training courses.
- Targeted towards utilities, integrators, EPC firms, consultants, manufacturers, standards development organizations.
- EVERY course is tailored to the specific audience, including the hands-on components.

## CONTACT US FOR PRICING AND AVAILABILITY:

**Tel. :** +1 306 539 8400
**E-mail:** contact.us@61850university.com

# TIER I
## FUNDAMENTALS & PRINCIPLES OF IEC 61850

**3 DAY SESSION**

**100% CLASSROOM BASED**

The objective of this **3-day** classroom session is to provide a fundamental understanding of IEC 61850 so users are comfortable with the concepts of the standard. It provides the underlying frameworks for the other two tiers to be built upon.

## Background Information & Basic Concepts

- History of the standard.
- Business Benefits/Drivers.
- Comparison to other standards.
- Implications to Organizational Structure.
- Core Component and Structure of the Standards.
- Conformance testing process & guidelines on how to interpret test certificates.

## Data Models

- Hierarchical Data Model.
- Semantics of the Standard.

## Communication Services

- MMS (Manufacturing Message Specification).
- GOOSE (Generic Object Oriented Substation Event).
- SV (Sampled Values).
- PTP (Precision Time Protocol).

## IEC 61850 UNIVERSITY IS YOUR SOURCE FOR **CURRENT, ACCURATE,** AND **PRACTICAL** INFORMATION ON IEC 61850, IEC 61869, IEC 62351, AND DNP3.



## Specification, Engineering, and Testing Processes

- System Configuration Language (SCL) Files.
- System Configuration Tools (SCT) vs. IED Configuration Tools (ICT).

## Networking Architecture & Cyber Security

- PRP (Parallel Redundancy Protocol).
- HSR (High-availability Seamless Redundancy).
- RSTP (Rapid Spanning Tree Protocol).
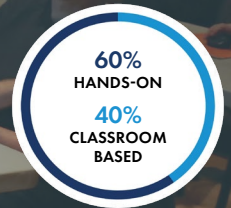- Cyber Security Aspects.

## Testing & Commissioning

- Mode/Behaviour.
- Quality Attributes.
- Simulation Flag.
- Testing Tools.

# TIER 2
## ADVANCED IEC 61850 TRAINING WITH HANDS-ON DIGITAL SUBSTATION WORKSHOP

**HANDS-ON SESSION**

**3 DAY SESSION**

60% HANDS-ON
40% CLASSROOM BASED

The objective of this **3-day** session is to complete the hands-on configuration of IEC 61BS0's key mechanisms, including classroom sessions that cover the advanced aspects. This course covers the configuration of these mechanisms in isolation, and is pre-cursor to Tier Ill training.

## Sampled Values Hands-On Session

- Configuration of a stand-alone merging unit to publish Sampled Values streams (80 and 256 samples/cycle). Using contemporary tools to analyze transmitted streams.
- Subscription of process bus relay to a Sampled Values stream and performance testing.
- Using Sampled Values simulation tools to produce Sampled Values streams, visualization and analysis through vendor-independent tools.

## **G**eneric **O**bject **O**riented **S**ubstation **E**vent **hands-on session**

- Implementation of reverse interlocking scheme utilizing GOOSE communications.
- Testing the performance of process bus relay with GOOSE output utilizing contemporary test sets.
- Implementation of bus transfer scheme utilizing GOOSE communications.

**MOST POPULAR**

## POPULAR **5 DAY** COURSE THAT INCLUDES **TIER 1** + **TIER 2** IS ALSO AVAILABLE!

## REAL-WORLD EXPERIENCE
## DELIVERING IEC 61850 SPECIFICATION, ENGINEERING AND COMMISSIONING RELATED DELIVERABLES

### MMS Reports, Control Models, Setting Groups, and Logging with Hands-On Workshop

- Configuration and application of control models (direct control with normal/enhanced security, SBO with normal/enhanced security).
- Configuration and application of reporting (buffered/unbuffered reporting).
- Configuration and application of logging and file transfer models.
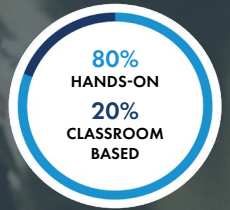- Configuration and application of setting group control model.

# TIER 3

## IEC 61850 PROJECT REALIZATION INCLUDING THE SPECIFICATION, DESIGN, AND TESTING ASPECTS

**HANDS-ON SESSION**

**3 DAY SESSION**

**80% HANDS-ON**
**20% CLASSROOM BASED**

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## OPPORTUNITY TO INTEGRATE **A FULL END-TO-END** IEC 61850 SYSTEM USING TOP-DOWN PROCESSES WITH SYSTEM SPECIFICATION TOOLS AND SYSTEM CONFIGURATION TOOLS.

The objective of this **3-day** session is to complete the full specification, design, configuration, and testing of a demo IEC 61850 project, which allows users to gain an insight into every aspect of an IEC 61850 implementation:

- Specification Process using Helink STS system configuration tool.
- Design & Configuration Process, including configuration of communication network using Helinks STS and various IED configuration tools.
- Testing & Commissioning Process using contemporary IEC 61850 tools.

During the course participants gain experience in studying IEC 61850 technical specifications on IEDs (PICS, MICS, TICS, PIXIT) to understand limits, which could be imposed in real applications. They implement specific protection and control functions (breaker-failure, reverse interlocking, bus transfer scheme, switchgear interlocking, etc.) and integrate IEDs in process control system using IEC 61850 services.

Now you are qualified to implement digital substations!

# IEC 61850 MADE EASY!

## EVERY WORKSHOP COMES WITH A STEP-BY-STEP MANUAL TO CONFIGURE EACH OF THE IEDs

IEC 61850 University offers an iterative approach to understanding IEC 61850 with each Tier building upon the previous one. In the result engineers get the understanding of IEC 61850 application areas, possible benefits and ways to achieve them.

They become capable of analyzing product offerings independent of the specific vendor and are ready for the end-to-end implementations of digital substations with a practical experience in doing this. Depending on where you're at with your IEC 61850 journey, choose the Tier(s) that suit best!

### Tier I.
### IEC 61850 Fundamentals

Participants understand IEC 61850 basic concepts of SCL, data model and communication services. They understand IEC 61850 application areas, possible benefits and ways to achieve them.

**5 DAY** COURSE INCLUDING **T1 + T2** IS AVAILABLE!

### Tier II.
### Advanced training with workshop

Participants understand pros and cons of IEC 61850 communication models and SCL files. They can configure GOOSE, Sampled Values and MMS communications by themselves.

### Tier III.
### IEC 61850 project implementation

Participants are ready to participate in the end-to-end implementations of digital substations (specification, design and configuration, commissioning, testing).

# IEC 61850
# UNIVERSITY FACULTY

## DUSTIN TESSIER

Dustin Tessier has graduated from the University of Saskatchewan (Canada) with a Bachelor of science in Electrical Engineering degree in 2004. He is Canadian Chair of IEC Smart Energy Systems Technical Committee, member of IEC Technical Committee Working Groups 10 (responsible for IEC 61850) and 15 (responsible for Cyber Security), member of Technical Committee 38, and Working Group 37 (responsible for Digital Instrument Transformers). He is also a Secretary of International IEC 61850 Process Bus User Task Force. Currently holds position of Managing Director in Tesco Automation Ltd.

## GRANT GILCHRIST

Grant Gilchrist, P. Eng., is a Systems Engineer specializing in grid modernization for Tesco Electric Ltd. He is a member of several utility data communications standards groups including the IEC working groups for SCADA, substation automation, protocol security, and interoperability. He is a founding member of the Technical Committee for the Distributed Network Protocol (DNP3). He has helped several major utilities develop technical requirements for their Advanced Metering Infrastructures and other grid modernization programs. He was editor of the IEC 62351-5 standard for security of the IEC 60870-5 and DNP3 protocols, and the award-winning IEEE 1815.1 standard for gateways between IEC 61850 and DNP3. He specializes in visualizations of the Smart Grid and developed the NIST Smart Grid Framework "cloud" diagrams.

## MICHAEL RITCHIE

Michael Ritchie holds a Bachelor of Engineering (Electrical and Electronic) from the University of Adelaide (Australia). His practical expertise with IEC 61850 stems from applying IEC 61850 technologies in a wide array of applications, including transmission and distribution substations both greenfield and brownfield, generation and cogeneration, mining and industrial installations, and remote oil and gas plants. He is particularly focused on the specification, design, testing and commissioning aspects of IEC 61850 projects.

## GREG BELTRAN

Greg has over 20 years experience working as a IEC 61850 Testing Technologist and Strategic Advisor to SCE on their substation architectures. Greg is a technical expert on SCE's PLC implementation, and has gained substantial experience completing the functional acceptance testing using the Doble and Omicron test sets. Greg has been instrumental in supporting SCE's Substation Automation Laboratory and has been involved in the testing and evaluation of station bus and process bus solutions.

# PAST CUSTOMERS

# IEC 61850
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