



Southern Alberta Section
IAS-PES Chapter



Introduction to Industrial and Distribution Systems Transients and Applications of EMTP/ATP

Presented by:

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Industrial and medium voltage distribution systems encounter transients and abnormal conditions during their operating life cycle. While steady state analysis is an essential tool for system sizing and initial design and operation, awareness of system transients and abnormal conditions is paramount during both the design and operation of such systems. The Electro-Magnetic Transients Program (EMTP) is a powerful time-domain-analysis tool that can be utilized by engineers involved with industrial and distribution systems encounter. Due to prudent design of equipment, diverse system configurations and increasing awareness of the necessities of safe system operations, it is important for industrial and distribution electrical systems engineers to investigate voltage and other system transients and abnormalities.

This tutorial includes an introduction to industrial and distribution system transients topics such as:

- Transient Recovery Voltage (TRV),
- Capacitor Switching,
- Large Motor Capacitance/Reactance Starting,
- Ferroresonance in Potential Transformer (PT) and distribution transformers,
- Induction in fences and pipelines parallel to a long run of overhead line,
- Harmonics in Distribution Systems, and
- Other relevant applications.

The tutorial will introduce the EMTP/ATP the associated ATPDraw preprocessor. Development of ATP began in 1984 as an alternative to the impending commercialization of EMTP by BPA and its partners (DCG and EPRI). Participants will benefit from the hands-on portion of the tutorial to familiarize attendees with the software by developing examples using these tools.

Please note: The official process for licencing of the royalty-free version of the software is found at the following website: <http://eeug-test.hostingkunde.de/index.php/how-to/be-licenced> . Participants are advised the licencing process can take a few weeks and is only available to those qualified under the licensing agreement.

Course Outline:

Day 1

1. Introduction to EMTP/ATP and ATPDraw
 - a. Steady State Phasor Solution
 - b. Solution of a simple transient problem
 - c. License and installation requirements for EMTP/ATP and ATPDraw
 - d. References and Resources

2. Introductions to Transients in Industrial and Power Distribution Systems
 - a. Voltage Transients:
 - i. Switching
 - ii. Lightning
 - iii. Induced voltages (grounding systems and fences)
 - b. Ferro-resonance in distribution systems
 - c. Motor starting
 - d. Harmonics and power electronic devices

3. Equipment Modeling in EMTP/ATP and ATPDraw
 - a. Introduction
 - b. Sources and overall system components
 - c. Transformers
 - d. Motors and generators
 - e. Lines and cables
 - f. Loads
 - g. Capacitors and motor starters
 - h. Circuit breakers and switching devices
 - i. Motor drives and power electronic devices
 - j. Wind farm transients and modeling

Day 2

1. Case Studies: Part 1:
 - a. Switching and transient recovery voltage
 - b. Capacitor switching
 - c. Transformer saturation
 - d. Potential and distribution transformer Ferro-resonance

2. Case Studies: Part 2:
 - a. Induced voltage in grounding, communication and fences
 - b. Motor starting
 - c. Harmonics in industrial system
 - d. Current limiting scheme

Location: The Carriage House Inn, Windsor A Room
9030 Macleod Trail South, Calgary, Alberta

Date: Monday, April 24, 2017 to Tuesday April 25, 2017

Time: 8:00AM to 5:00PM All times are: Canada/Mountain
Lunch is included.

Cost:	IEEE Members	\$700
	Non Members	\$1050

Full-time IEEE students, sponsored by a professor, may qualify for a reduced fee. Provide a letter to the seminar coordinator, from your supervising professor, indicating your full-time student status. If you qualify for the reduced fee, await instructions from the seminar coordinator on how to register.

Register at: <https://events.vtools.ieee.org/m/42567> Registration closes April 13.

Presenters:



Rasheek Rifaat is an IEEE Fellow – He received a B.Sc. from Cairo University in 1972 and a M.Eng. from McGill University in Montreal in 1979 in Electrical Engineering. In 1975, he worked for Union Carbide Canada Ltd. in Quebec. In 1981, he joined Monenco Consultants Limited in Calgary, Alberta, and Saskmont Engineering Limited in Regina, Saskatchewan. He has been involved in thermal power-generating plant projects with special interest in generator protection systems and power-plant systems. Since 1991, he has been working for Delta Hudson Engineering Ltd. (Now Jacobs Engineering) in Calgary. Mr. Rifaat is a registered professional engineer in three Canadian provinces. Mr. Rifaat has published more than 25 papers on cogeneration plant protection, operation and economics and he is the current Chair of the Protection & Coordination Work Group for the revision of the Buff Book into Standard 3004 Series.



Carl Moller is a Senior IEEE Member – He received his B.Sc. from the University of Alberta in 2004 in Electrical Engineering. He worked for a high voltage EPC company for 11 years prior to founding GroundCAN Ltd. in 2015: a consulting company which specializes in electrical engineering, testing, training, and education in the field of grounding and lightning shielding protection systems. Mr. Moller is a registered professional engineer in the Province of Alberta. Mr. Moller is an active member and contributor on grounding related IEEE substation committee working groups which produce the following IEEE guides: 80, 81, 837 and 998. Mr. Moller has co-delivered two IEEE 81 seminars after the latest publication of the guide. Mr. Moller has published and presented in multiple grounding conference proceedings, has presented a peer-reviewed topic at the EPEC conference and IEEE Southern Alberta PES/IAS Chapter seminar.



Ken Martyn is a senior electrical engineer with 30 years' experience gained in the electrical industry as a power systems engineer, designer and tradesperson. Experience includes front end engineering (Scoping/Project Definition, DBM, EDS and FEED phases of a project) and detail engineering and design for the petrochemical, oil sands, pipeline and power industries. Ken has participated in IEEE presentations in the past, most recently at the 2014 Electrical Power and Energy Conference on protection of short, networked transmission lines and in 2016 at the EIEEA on circuit breaker transient recovery voltage. Ken is the Vice Chair of the IAS/PES Chapter in Southern Alberta.

Please contact Dave Hines [davehines@ieee.org] if you have any problems registering for the seminar, or if you have any questions.