

Grounding and Bonding Solutions for Instrumentation and Control Systems

LEARNING OUTCOMES

Proper and adequate grounding and bonding is extremely important for personnel and equipment safety, operation of the electrical and controls systems, and operating cost reductions. Over 80% of electrical faults/problems and hazards are related to improper grounding and bonding. Clear understanding of the grounding/bonding fundamentals, best practices, applicable standards and codes, and most common problems is essential for the design, implementation, and maintenance of effective grounding systems. This course will provide participants with the following knowledge and skills:

- Help you understand why things are done in a particular way
- Illustrating a number of common grounding and bonding problems in Sensitive Electronic Equipment (SEC)
- Provide practical and proven solutions for the common problems rising from improper grounding and bonding in SEC
- Help you establish good engineering practices for design, implementation & maintenance of grounding systems in SEC
- Provides a list of applicable codes, standards, and design methodologies.
- Provides recommendations on general requirements for upgrading your facility electrical systems.
- Familiarize you with the latest standards and good practices for the installation of grounding systems in SEC
- Help you upgrade your maintenance procedures and processes to comply with current standards and codes.

COURSE OUTLINE - 1 DAY

Instrumentation and Control Systems Grounding (Sensitive Electronic Equipment)

- Overview
- Basics of Grounding
- Sensitive Electronic Equipment
- Objectives of Grounding Design
- Grounding Types for Sensitive Electronic Equipment
- Neutral Point
- Noise Definition
- Clean Ground Versus Dirty Ground
- Zero Reference
- Minimizing Noise Impacts
- Signal Reference Ground
- Grounding Methods

1. Isolated Ground

2. Isolated Signal Reference Ground / Electrodes
3. Single-Point Grounding System
4. Multi-Point Grounding System

- Isolation Transformers
- Ground Loop
- Main and Remote Subsystems
- Optical Coupling
- Normal Mode Noise Versus Common Mode Noise
- EMI and RFI
- Stray / Induced Currents
- Transient Voltages
- Power Quality
- Skin Effect
- Electrostatic Sources, Protection Facts and Grounding
- Grounding Mat
- Temperature, Corrosion, and Moisture Impacts
- Inductive and Capacitive Couplings (Shielding Solutions)
- Shielding concept
- EMI shielding
- Electrostatic shielding
- Coaxial Cables
- Shielding Techniques for Low Frequency Circuits Versus High Frequency Circuits
- Master Ground Bar
- Common Design / Construction Problems
- Other Symptoms of Common Design/Construction Problems
- Case Studies and Sample Design

INSTRUCTOR

Mark Moosaei, B.A.Sc., M.A.Sc., PMP, P.Eng. – Principal, Rastin Engineers Inc.

Mark Moosaei graduated with B.A.Sc. in electrical engineering from the Isfahan University of Technology in 1993, and obtained M.A.Sc. Degree from the Concordia University, Montreal, in 2003. Mark is a principal engineer with Rastin Engineers, and has over 25 years of experience working for major EPCM consulting engineering firms in Canada and Internationally.

Mark's areas of expertise includes designing, commissioning, and managing electrical, instrumentation, and control systems for Port and Terminal, Mining, Water and Wastewater, Oil and Gas, Utility, Pulp and Paper, and Metal Refining. His expertise also includes practical experience with industrial power distribution systems, emergency systems, analysis software, motor controls, VFDs, PLCs, and HMIs. Mark has a thorough knowledge of the Canadian Electrical Code, industry standards and safety codes.

Mark is a Project Management Professional (PMP) and registered electrical engineer (P.Eng.) in British Columbia and Alberta. He has published academic papers on the topic of control systems with the Institute of Electrical and Electronics Engineers (IEEE).

WHO SHOULD ATTEND

The course is intended for professional engineers, engineers-in-training, electrical managers, project managers, designers, electricians, construction contractors, maintenance supervisors and any other personnel who have basic knowledge and understanding of power distributions for electrical, instrumentation, controls, and communication systems.

WHEN & WHERE

TBD

REGISTRATION FEES

CAD \$399 + GST includes hardcopies of the course presentation materials, and refreshments and lunch.

Get \$50 off the price for new university/college graduates and students. The \$50 amount will be refunded after the successful completion of the course.

For companies, register 3 persons and get the 4th person registration free of cost.