

Informa Connect

Academy



Safe Earthing & Bonding in Rail

2-Day Training Course: Learn the Fundamentals of Rail Earthing & Electrical Risk Management

A must-attend course that will benefit all those in the rail industry who have had only a little exposure to earthing & bonding – build your confidence & appreciation of the safety, due diligence & system requirements, design parameters & operational realities.

FACE TO FACE TRAINING | 26 - 27 September 2024 • Sydney | 15 - 16 October 2024 • Brisbane | 7 - 8 November 2024 • Melbourne



Attend In-Person

REGISTER NOW

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Course Information

Key Learning Objectives

- Illuminate the mislabelled 'Black Art' of earthing
- Discover the science and craft required to make wise decisions regarding earthing system requirements
- Discuss matters relevant to safety and earthing systems in organisations
- Appreciate the complex problems of inductive and conductive interrelationships between substation and power line earthing systems and other conductive assets such as tracks, cabling and fencing
- Recognise a coordinated approach to the design and management of power earthing systems, lightning protection systems and other rail systems
- Understand inspection and testing as imperative tools in earthing system management
- Investigate techniques for solving problems found in earthing system design, using both empirical and analytical computer based techniques

Who Will Benefit

Course pre-requisite: Some understanding of electrical systems is required.

This course will benefit:

- Those requiring an introduction to or an understanding of earthing systems in a rail environment.
- Non-technical people will attain a proper awareness of the issues while electrical engineers and experienced technicians will further benefit from methods for first pass planning and review.

Meet Your Course Directors



Lachlan McKerrow

Lachlan McKerrow received his BE (Elec) from the University of Newcastle, Australia in 1993. Following graduation he worked in heavy industry where he gained experience in the design, installation and commissioning of power and control systems associated with large bulk material handling plants.

Lachlan joined Ausgrid (formerly Energy Australia) in 1999 and gained experience in all aspects of earthing systems, both within Ausgrid and through external consulting work. His primary focus was the Major Substation Earthing review program which assessed all of the major substations in the Ausgrid franchise in a 15 year period. Externally he worked on projects ranging from mining, aluminium smelters and the instrumentation earthing for the replacement reactor at ANSTO in Sydney.

Lachlan is now a senior engineer with Safearth and has significant experience presenting the Safearth earthing design training courses. His primary area of interest is lightning and the design of lightning protection systems for substations. Outside of engineering he has interests in beer brewing and spending time with his family.



Joshua Bowman

BEng, Consulting Engineer, **Safearth**

Josh completed his BEng (Elec) from the University of Newcastle in 2016. He joined Safearth in 2017 and has specialised in the discipline of earthing. Josh has provided consulting expertise to a range of infrastructure projects across many industries, including utilities, renewables rail and mining.

He is responsible for earthing projects from initial design, through to commissioning and ongoing maintenance assessment. Josh has been involved in both the design and testing of earthing and bonding systems for a number of large rail and road projects such as Sydney Metro. Josh's current role with Safearth as a consulting engineer continues to provide opportunities for him to work across industries, and develop and assess earthing and bonding systems for many applications. Josh has experience presenting the Safearth earthing system design training courses.

Course Information

About the Course

This course provides participants with a sound basis in science and practical examples for understanding and problem solving with earthing systems in the rail environment.

The course begins with an introduction to the physics of earthing including the areas of circuit fundamentals, conductive effects, proximity, mutual earth resistance and inductive coupling.

It will then cover soil resistivity fundamentals, field testing and model assessment and derivation before moving on to empirical and analytical voltage design methods and analysis issues for typical applications.

The course includes interactive practical sessions where we will 'see' how specific changes and errors affect outcomes which is invaluable in turning information into understanding.

Over the course, participants will be invited to present real life issues and examples they have wrestled with, which will then be analysed using the understanding and skills developed during the program.



"Communicated the course information clearly and made it interesting."

Signal Electrician, ARA Security

"Thorough knowledge and experiences presented well and enthusiastically. Always open to any questions."

Graduate Overhead Engineer, KBR

Course Outline

INTRODUCTION AND CONTEXT

- What are earthing systems?
- Functions of an earthing system
- Why earthing system interest is increasing
- The importance of getting earthing systems right

OVERVIEW OF RAILWAY EARTHING SYSTEMS

- Utility power supply
- Substations and distribution
- Traction power earthing requirements
- Bonding versus earthing
- Key hazards with the earthed infrastructure of the railway network
- Key design conflicts and challenges

SAFETY, HUMAN FACTORS AND ZERO RISK

- Risk assessment and risk management
- Applicable and background safety criteria sources
- Conditions for risk
- The physiological effects and risks, AC and DC
- Human electrical models and voltage criteria
- Review of changes to earthing standards and how they'll affect rail

SOIL AS PART OF THE CIRCUIT

- Key soil electrical characteristics
- Soil electrical resistivity
- Information sources on soil
- Resistivity test methods
- Analysis techniques and model determination

RAILWAY EARTHING SYSTEM INTERACTIONS

- Signalling
- Communications
- Low-voltage supplies
- The importance of correct coordination

EARTH GRIDS

- Key grid components and what they do
- Conductor ratings
- Earth grid resistance
- Determining earth grid performance
- Step, touch and transfer voltages
- Empirical versus analytical analysis techniques
- Strategies in earth grid design
- Common pitfalls

EARTHING SYSTEMS AND ALTERNATE PATHS

- Transfer of energy
- Conductive current distribution
- Induction mechanisms in current distribution
- Inductive hazard creation including tracks, fences and other metallic paths

DC RAILWAY ELECTRIFICATION

- Key considerations in DC bonding and earthing in a DC traction environment
- Isolated systems and earth clamps for safety and performance

AC RAILWAY ELECTRIFICATION

- Key considerations in AC bonding and earthing in an AC traction environment

- Key considerations of booster transformers and auto-transformer systems

EARTHING STRATEGIES AND ISSUES

- Separation and isolation in earthing systems
- Interconnected and common bonded systems
- Rail return systems
- Drainage and transient bonding
- Unearthed and floating systems
- Effects of various systems on touch potentials

CORROSION MECHANISMS AND MINIMISATION

- How stray current causes steel corrosion
- Procedures to control stray current

LIGHTNING PROTECTION

- Introduction to lightning mechanisms and risks
- Approaches to lightning risk management

EARTHING SYSTEM COMMISSIONING AND TESTING

- Benefits and risks associated
- Recommended strategies
- Test methods and equipment
- Common traps and sources of errors

Demonstration, practical examples and class participation throughout

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Easy Ways to Register



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Course Code	Location/ Format	Course Dates	Early Bird price valid until		Standard price valid after	
			SY - 6 Sep 24 BR - 27 Sep 24 ME02 - 18 Oct 24		SY - 6 Sep 24 BR - 27 Sep 24 ME02 - 18 Oct 24	
P24GT04SY02	Sydney	26 - 27 September 2024	\$3,195.00 + \$319.50 GST	\$3,514.50	\$3,495 + \$349.50 GST	\$3,844.50
P24GT04BR	Brisbane	15 - 16 October 2024	\$3,195.00 + \$319.50 GST	\$3,514.50	\$3,495 + \$349.50 GST	\$3,844.50
P24GT04ME02	Melbourne	7 - 8 November 2024	\$3,195.00 + \$319.50 GST	\$3,514.50	\$3,495 + \$349.50 GST	\$3,844.50

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ABOUT INFORMA CONNECT ACADEMY

Informa Connect

Academy

Informa Connect Academy is a premier provider of global education and training solutions that caters to a diverse range of professionals, industries, and educational partners. We are dedicated to promoting lifelong learning and are committed to offering learners expert guidance, training, and resources to help them stay competitive in a rapidly changing world.

Our comprehensive range of courses and programmes are tailored to meet the needs of all professionals, from aspiring specialists to seasoned experts. We partner with elite academic organisations and industry leaders with unmatched expertise in their respective fields to deliver an exceptional learning experience.

ON-SITE & CUSTOMISED TRAINING

Informa Connect Academy has a long-standing track record of delivering very successful customised learning solutions achieving real and measurable value for our clients through our senior training consultants. If you have 8+ interested people, an on-site course can be the ideal solution – giving you the opportunity to customise our course content to your specific training needs, as well as attracting significant savings compared to public course costs.

WHY CHOOSE ON-SITE WITH INFORMA CONNECT ACADEMY?

- 1. Custom design** – Together, we will identify the best blended learning solution for your culture, your people and your training objectives.
- 2. Quality assured** – We design market-leading training programs, concepts and methodologies, with a 400+ course portfolio. Our rigorously selected 900+ instructor faculty are recognised experts in their field. Quality of their content and delivery methods is assured through continuous monitoring and evolution.
- 3. On-site training** is a cost effective way to train your people and achieve your defined outcomes.

Speak with **Sushil Kunwar** on **+61 (2) 9080 4370** to discuss your customised learning solution, or email inhouse@informa.com.au

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