# Earthing Conference UK

**4th & 5th May, 2023**
**Park Regis, Birmingham**
**United Kingdom**

Presented by IDC Technologies

Education Partner EIT Engineering Institute of Technology.

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# Your Keynote Speakers

**Keynote Speaker**
**Dr Jeremy Smallwood**
Electrostatic Solutions Ltd, *Consultant*

- Earthing and electrostatics consultant, trainer and researcher
- Expert advisor for BSI and IEC standards committees
- 2010 ESD Association Industry Pioneer Recognition Award for “advancing awareness of EOS/ESD throughout the world”
- Author of “The ESD Control Program Handbook” published by Wiley in 2020

**International Keynote Speaker**
**Jayson Patrick**
Electrotechnik, *Technical Director*

- Technical Director at Electrotechnik,
- Master’s degree in electrical power engineering
- Electrical power system design and analysis expert
- Two decades of experience in professional software development for power system protection.

# Why Attend This Conference?

- To re-examine the application fundamentals for earthing, bonding, lightning, and surge protection.
- To discover best practice when earthing - to mitigate the impacts of faults and lightning strikes.
- To become familiar with the latest industry standards and procedures for earthing and lightning protection.
- To learn how optimal electrical earthing design can improve safety, production, and reduce costs.
- To gain practical advice on earthing system measurement.
- To receive design tips for earthing systems when conditions are challenging.
- To confront the pitfalls of inappropriate earthing and the hazards caused, and to discover how these can be prevented.
- To hear relevant local case studies from the UK electrical industry.
- To enjoy non-commercial presentations.
- To network with your peers and specialists in the field, and to discuss the issues raised.

## An Overview of the

# Earthing Conference

Few topics generate as much controversy and debate than earthing and the associated topics of bonding, grounding, surge protection, shielding and lightning protection of electrical and electronic systems. Poor earthing practices can be the cause of continual or intermittent difficult-to-diagnose problems in a facility. This conference will explore these issues from a fresh yet practical perspective, with the aim of helping delegates reduce expensive downtime in their plants and/or equipment. The conference will demystify the subject of earthing and present it in a clear, straightforward and - above all - practical and workable manner. Earthing as a subject has been under-represented over the years; this event will attempt to close technical knowledge gaps and improve practices in the industry. The UK and Europe need a unified and pragmatic approach to earthing, one that is commonly understood and widely applied.

If you work in the electrical domain - in the industrial, power, defence, oil & gas, construction, transport, manufacturing, utilities, mining or renewable energy industries - then this conference is for you. The 2023 conference builds on the outstanding success of the 2022 Earthing Conference, also held in Birmingham, which created a comprehensive and animated groundswell of discussion and learning.

# Who Should Attend?

- Electrical engineers, technologists and technicians
- Instrumentation and control engineers, technologists and technicians
- Substation, generation and transmission engineers
- Maintenance engineers and asset managers
- Engineering managers and electrical consultants
- Electronic engineers, technologists and technicians
- Plant, project and design engineers
- Engineering and safety managers
- Plant Operations staff
- Lightning protection professionals
- Renewable energy specialists
- Government safety regulators/inspectors
- Network, protection and distribution engineers and technicians
- Maintenance specialists and all other (electrical) engineering professionals who have an interest in earthing and electrical safety.

Conference Program

# Day One | Thursday 4th May, 2023

**8:00am** **Registration Opens**

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**8:25am** **Welcome Address**

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**8:30am** **Session One | International Keynote**

### Earthing System Modelling **Hands-On Workshop**

**Jayson Patrick:** Technical Director, *Electrotechnik*

Accurately predicting earthing system performance, due to electrical fault currents, is necessary for ensuring a safe and economical design.

This hands-on workshop involves software modelling of various typical earthing installation types including: a small (pad mount) substation, a large AIS substation, a GIS substation, a wind farm, and a solar farm to IEEE Std 2270-202. Actual field measurements will be analysed to devise an optimal soil resistivity model. We will calculate touch, and step voltage limits in accordance with British and international safety standards. This workshop will focus on the applications of the software to typical challenges with earthing in a hands-on manner and is emphatically not intended to promote a particular brand or vendor. A software license will be sent to each delegate, input files, and notes to be used during the workshop shall be provided.

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**12:15pm** **Lunch**

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**1:15pm** **Session Two | Case Study**

### Going Underground: Earthing of Tunnel Systems for HS2

**Ross Falconer:** Power System Studies Team Leader, *Aurora Power Consulting*

New train tunnels are being bored underneath London for HS2, the largest infrastructure project in Europe. During construction, the tunnel passages are supplied by HV cables to power tunnel boring machines (TBMs) and associated services. Safe earthing of the tunnel system is crucial to ensure personnel working underground are not exposed to dangerous voltages. This presentation will explore some of the practical challenges associated with earthing machinery which is moving over several kilometers, techniques for modelling underground earthing systems in earthing design software, how to apply BS 6164, and how earth potential rise varies as construction progresses along a tunnel.

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**2:00pm** **Session Three**

### Earthing Design and Safety

**Sachin Dandare:** Senior Design Project Manager, *Electrical Design Services*

Designing a proper substation earthing system is quite complicated and challenging; many parameters affect its design. In order to design a safe earthing system, it needs to provide a way to carry the electric currents into the earth under faulted conditions to limit the earth potential rise (EPR). This provides the assurance that a person and/or facility in the vicinity are not endangered. The earthing portion of a substation design will be explored in order to properly plan and design an earthing system. Background information and guidelines will be provided. A case study – including mitigation strategies will be presented to prove whether the design is safe.

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**2:45pm** **Afternoon Tea**

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## 3:15pm Session Four

### Measuring the Resistivity of Crushed Rock in Existing HV Substations

**Ken Atkinson & Jamie Forsyth:** Senior Earthing Specialists, *System Protection and Earthing Section, Network Assets, ESB Networks*

This presentation will demonstrate an experimental method of directly measuring the resistivity of an in-situ layer of crushed rock in a HV substation using a portable generator, test leads, digital multi-meters and metallic foot probes. Interpretation of the results will include calculation of location-specific touch voltage safety limits which can then be directly evaluated against measured touch voltages. The presentation will also include discussion of issues that were encountered during assembly of a prototype test meter and during field trials of the prototype, and suggestions for further work and research in this area.

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## 4:15pm Session Five

### Distribution Substation HV-LV Earthing Interconnection

**Matthew Taylor:** Managing Director, *MJT Earthing and Lightning Consultants*

Distribution (11kV/415V) transformers require both HV and LV earthing systems. These can be combined and connected to a single earth electrode or segregated; connected to separate HV and LV earth electrodes. There are pros and cons to both arrangements and the decision to combine or segregate should consider the transfer of HV earth potential rise onto the LV system. Guidance provided in the industry standards changed in 2012 but there is still some misunderstanding and confusion over the decision-making process. Where segregation is required, standards and policy documents provide recommended separation distances between HV and LV electrodes to maintain safety. This paper presents the results of CDEGS simulations examining the impact of HV earth faults on typical LV networks in uniform and multilayer soils, to test whether the safety distances quoted are satisfactory.

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## 5:00pm Day One Closing

# Day Two | Friday 5th May, 2023

## 8:30am Session Six | Keynote Presentation

### Earthing, Grounding and Bonding in Static Electricity and Electrostatic Discharge (ESD) Avoidance

**Dr Jeremy Smallwood:** Consultant, *Electrostatic Solutions Ltd*

Earthing (grounding) and bonding are widely used techniques in many technology and industry areas, but the practices used in electrostatic discharge (ESD) avoidance can seem rather unusual or difficult to understand. Using a minimum of theory, Dr Jeremy Smallwood explains the principles, and sometimes surprising similarities and differences in earthing and bonding practices from an ESD control view. He gives some simple examples of how an action or a change in circumstance that seems inconsequential, can lead to real problems or accidents.

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## 10:15am Morning Tea

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## 10:45am Session Seven

### Earthing Applications for Lightning Protection

**Sean Passant:** Technical Manager, *DEHN UK*

This presentation will address the different approaches to touch and step potential in BSEN 62305 (Lightning Protection) suite of standards compared with the BSEN 50522 standard (Earthing of Power Installations). Using a sample project to show the three different earthing applications in BSEN 62305 and the relationship with assumed touch and step risks, it will be compared to the modellable risks using 3D software such as XGS lab.

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## 11:30am Session Eight

### The Importance of Earthing Processing Equipment Situated in Flammable and Combustible Atmospheres

**Jonathan Rowe:** *Newson Gale Ltd*

Earthing drains static charges away as they are produced, removing excess charge by transferring the electrostatic charge from the object to earth. This presentation will discuss case studies and analysis of incidents resulting from the ignition of flammable atmospheres due to discharges of static electricity. It will outline the importance of bonding metal dispensing and receiving containers together during transfer operations. It will look at novel ways of earthing multiple components at risk of electrostatic charge accumulation. It will correlate these measures with the guidance stipulated in IEC 60079-32-1: “Explosive atmospheres - Part 32-1: Electrostatic hazards - Guidance”.

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## 12:15pm Lunch

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## 1:15pm Session Nine

### Rolling Sphere Analysis for Large and Complex Structures

**Hugh Wren:** Design Manager, *Greymatters Global*

While rolling sphere analysis has been applied for quite a number of years, it is often poorly understood and incorrectly applied. Many users fall into the common trap of trying to apply a 3D analysis in 2D CAD, while others use tools that don’t reliably work for complex and large structures.

The presentation will show how 3D Rolling Sphere Analysis tools can be used to develop complex lightning protection systems with two main focusses – very tall structures, and structures with explosive atmospheres. The DSEAR regulations require that all risks of ignition, including lightning, must be addressed, and therefore designing an LPS that keeps lightning energy away from hazardous areas is critical.

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## 2:30pm Session Ten

### Earthing Design and Modelling Guide for Renewable Energy Projects

**Jayson Patrick:** Technical Director, *Electrotechnik*

Recently there has been an unprecedented number of generation projects as the UK targets 100 % renewable energy sources. A key component to the safety of these new facilities is the properly designed earthing systems. The combination of new technologies and the fact these projects cover large areas often over difficult and varying terrain presents challenges. The cost of these earthing systems can reach millions of dollars hence a small percentage of over-design will result in significant extra cost. The same approaches for designing substation earthing systems cannot be applied to renewable projects. The modelling of the earthing systems will usually involve compromises, but accurate results are still achievable. This presentation will provide a guide to the earthing system modelling with references to relevant standards and real-world examples.

## 3:15pm Afternoon Tea

## 3:30pm Session Eleven | Panel Discussion

Panel discussion and Q&A with conference presenters. This is your opportunity to utlise a panel of conference speakers and industry experts to ask questions and find solutions to your specific earthing and grounding issues. Delegates are encouraged to participate in this invaluable and lively session.








## 4:30pm Conference Closing

## 4:30pm - 5:30pm Networking Drinks

An hour dedicated for all attendees to meet and socialise with experts and industry peers.

# About the Keynote Speakers

## Dr Jeremy Smallwood

Dr Jeremy Smallwood is an earthing and electrostatics consultant, trainer and researcher with his company Electrostatic Solutions Ltd, providing services to industry since 1998. He works as an expert with BSI and IEC standards Committees. He was awarded the 2010 ESD Association Industry Pioneer Award, 2017 International Fellow Award at Electrostatics 2017 and the Stig Lundquist Award at the Electrostatics 2022 conference. Jeremy has been publishing, attending and presenting papers for over 30 years in Journal of Electrostatics and at Electrostatics and the EOS/ESD Symposium conferences. He is author of "The ESD Control Program Handbook" published by Wiley in 2020.

## Jayson Patrick

Jayson is the Technical Director at Electrotechnik, a company that develops leading electrical power system design and analysis software. Jayson has extensive experience working on large-scale power systems projects in high voltage design, testing/commissioning, and power system analysis roles along with two decades of experience in professional software development.

Jayson has a master's degree in electrical power engineering, and he leads a multi-disciplinary team of developers, cloud architects, UI designers, electrical power engineers, and Ph.D. researchers. Jayson's role at Electrotechnik involves developing new software and complex algorithms for electrical power systems design, where he is using a combination of technologies, multiple programming languages, and agile development practices.

# General Information

### Confirmation Details

A confirmation email and invoice will be sent to delegates within 3 days of receiving the registration.

### Cancellation Policy

A 20% cancellation fee will apply for cancellations received 7–14 days prior to the start date of the conference. Cancellations received less than 7 days prior to the start date of the conference are not refundable, however substitutes are welcome.

### Venue

Park Regis Birmingham
160 Broad Street, Five Ways
Birmingham B15 1DT
**Telephone:** +44 121 369 5555

### Accommodation

The Park Regis Birmingham is offering all delegates 15% off the best bed & breakfast rate. Please book via their website and use the code 'CORPORATE'.

**Email:** hello@parkregis-birmingham.com
**Telephone:** +44 121 369 5555

### Food and Beverages

All lunches, morning and afternoon refreshments are included in your delegate registration.

### Unable to Attend

If you are unable to attend the full conference program, contact us for details to attend individual sessions or to purchase the Conference Resource Kit.

# Tickets and Registration

## Single Tickets

**Early Bird Price***
**£693 per delegate**
*Save 10% (£77pp) when you book on or before 31st March

**Standard Price**
**£770 per delegate**
When you book after 31st March

## Group Bookings

**Early Bird Price***
**£623 per delegate**
*Save a further 10% (£147pp) when you book for a minimum of 3 delegates on or before 31st March

**Standard Price**
**£693 per delegate**
When you book for a minimum of 3 delegates after 31st March

*NB: Prices shown are inclusive of VAT*

## Additional Delegates?

Corporate packages available upon request. Contact conferences@idc-online.com to book your corporate package.

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## Sponsorship Opportunities

Representing your business at the Earthing Conference UK will provide you the opportunity to reach key decision makers from a multitude of industries.

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