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**Dr. ROBERT A DURHAM, PhD, FIEEE**

Resume  
Specialization  
Honors & Awards  
Publications

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## **Dr ROBERT A DURHAM, PhD, FIEEE**

Robert A Durham is the Principal of D<sup>2</sup> Tech Solutions, a technology related firm concentrating on Mechanical and Electrical systems and energy conversions. He also serves as a Principal Scientist of THEWAY LABs, Tulsa, OK, an engineering and energy consulting firm that provides design and failure analysis of facilities and system installations.

Dr. Durham's work experience is broad and encompasses all areas of the energy industry. Dr. Durham spent 11 years with AEP/CSW, at the time the country's largest utility, in electrical engineering positions in the power generation and transmission planning departments. He then accepted a position as Manager of Electric Infrastructure for New Dominion, LLC., a major independent energy producer in Oklahoma. Dr. Durham then moved on to hold the position of Vice President of Engineering and Project Management for EDG Power Group, an Engineering Procurement and Construction company specializing in design and construction of small to medium size power generating facilities. Dr. Durham left EDG Power Group to accept his current positions. Dr. Durham has been accepted as an expert and offered testimony in several jurisdictions.

Dr. Durham's extensive client list includes the development of a broad spectrum of forensic, electrical and facilities projects for many companies. He has also taught University offered courses in electrical engineering review for board licensure. He has published five books, six magazine articles and over 40 other technical papers and articles. Dr. Durham's extensive work on standards and electrical systems has resulted in his elevation to Fellow of the IEEE, the highest grade of recognition in the electrical technology industry.

Dr. Durham received the B.S. in electrical engineering from the University of Tulsa in 1992 and the M.E. in Technology Management from The University of Tulsa in 1997. Tulsa, OK. In 2004, Dr. Durham received a PhD in Engineering Management from Kennedy Western University.

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## **Degrees Earned**

BSEE, with Honors, The University of Tulsa  
Master of Engineering, The University of Tulsa  
PhD , Kennedy Western University

## **Area of Specialization**

lightning & grounding  
failure analysis & forensic engineering  
electrical power systems & safety  
power generation  
utility industry competition  
economics & management  
petroleum & chemical industry  
electrical / mechanical energy conversion

## **Registration**

Professional Engineer - Oklahoma  
Professional Engineer – Texas  
Professional Engineer – California  
Professional Engineer – New Hampshire (Inactive)  
Professional Engineer – Kansas  
Professional Engineer – North Carolina (Inactive)  
Professional Engineer – Missouri  
Professional Engineer – Arkansas  
Professional Engineer – Virginia (Inactive)  
Professional Engineer – Illinois (Inactive)  
Electrical Contractor - Oklahoma

## **Work History**

D<sup>2</sup> Tech Solutions, Inc.          2002 - 2022  
Principal

THEWAY Corp.                      2004 - 2022  
Principal Scientist

EDG Power Group, Inc.          2002 - 2004  
Vice President Engineering & Project Management

New Dominion, LLC                      2000 - 2002  
Mgr Electric Infrastructure

Central & Southwest, Inc              1989 - 2000  
Electrical Engineer

### **Professional Memberships**

Fellow	Institute of Electrical and Electronic Engineers
Diplomate	American College of Forensic Examiners, International
Member	National Association of Fire Investigators
Voting Member	National Fire Protection Institute, Electrical Section
Executive Member	Petroleum and Chemical Industry Committee, IEEE
Diplomate,	
Past Board Member	American Board of Forensic Engineering and Technology
Member	IEEE Standards Association
Past Chair	Production Subcommittee, IEEE IAS/PCIC
CFC	American College of Forensic Examiners
Member	International Association of Arson Investigators
CFEI, CVFEI	National Association of Fire Investigators
Past Chair	Tulsa Section IEEE
Chair	IEEE RP1017.1 Working Group
Chair	IEEE RP1017.2 Working Group
Chair	IEEE RP1017.3 Working Group
Chair	IEEE RP1017.4 Working Group
Past Chair	IEEE PCIC Standards Subcommittee
Secretary	IEEE Petroleum and Chemical Industry Committee

### **Honors and Awards**

Fellow of the IEEE

For contributions to submersible electrical equipment analysis and multi-point ground method in hazardous petroleum and chemical environments.

Honor Societies

Tau Beta Pi, national engineering honors  
Eta Kappa Nu, national electrical engineering honors

Dr. Durham's publications have often successfully competed for outstanding paper awards from journals of the Institute of Electrical and Electronic Engineers (PCIC and IAS). This is an

international competitive peer review and evaluation of papers that provide a significant contribution to the advancement and understanding of electrical applications.

IEEE Industry Applications Society, New Orleans, LA: Prize Article for “Data Quality and Grounding: Considerations in a Mixed Use Facility”

PCIC, Cincinnati, OH: Prize Paper for “Grounding and Bonding Conductors: Solid, Stranded, Bare or Insulated”

PCIC, New Orleans, LA: Prize paper for "Industrial Design Application for Power Distribution over Extra-Long Distances"

PCIC, Philadelphia, PA: Prize paper for "Paradigm Shifts and Impact on Engineers and Industry"

Transactions on Industry Applications, Orlando, FL: Prize Paper for "Lightning, Grounding, and Protection for Control Systems”.

PCIC, Denver, CO: Prize Paper for “Grounding System Design for Isolated Locations and Plant Systems”

PCIC, St. Louis, MO: First place for "Lightning, Grounding, and Protection for Distributed Control and Communications Systems: A Retrofit".

## **Publications**

Electrical Engineering in a Nutshell, Dr. Robert A Durham, Dr. Marcus O. Durham, ISBN 978-1466236795, 2011

Electrical Failure Analysis for Fire and Incident Investigations, Marcus O. Durham, Robert A. Durham, Rosemary Durham, Jason Coffin, ISBN 978-1463773472, 2011

Leadership and Success in Relationships and Communication, Marcus O. Durham and Robert A Durham, ISBN 978-1463758769, 2011

Leadership and Success in Organizations, Culture & Ethics: Group or Horizontal Interactions, Marcus O. Durham and Robert A Durham, ISBN 978-1466250338, 2011

Leadership and Success in Economics, Law & Technology: Society or External Influence, Marcus O. Durham and Robert A Durham, OK, ISBN 978-1466250461, 2011

How Should Generating Asset Acquisitions by Regulated, Vertically Integrated Utilities be Overseen in Today's Quasi-Regulated Electric Utility Environment? A Dissertation Presented to the Faculty of the School of Engineering Kennedy-Western University, KWU Press, Thousand Oaks, CA, 2004

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 3 Alternative Systems," *2022 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Denver, CO 2021.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 2 Standards Requirements," *2021 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, San Antonio, TX, 2021.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Petrochemical Facility Lightning Protection Primer: Part 1: History and Basic Science," in *IEEE Industry Applications Magazine*, vol. 27, no. 2, pp. 47-56, March-April 2021, doi: 10.1109/MIAS.2020.3024492.

R. A. Durham, S. J. Szczecinski and M. O. Durham, "Factors Impacting Selection of Grounding and Bonding Conductors," in *IEEE Transactions on Industry Applications*, vol. 56, no. 5, pp. 4652-4661, Sept.-Oct. 2020, doi: 10.1109/TIA.2020.3005637.

R. A. Durham, M. O. Durham and T. W. Gillaspie, "Lightning Protection at Petrochemical Facilities - Part 1 History and Background Science," *2019 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Vancouver, BC, Canada, 2019, pp. 205-214, doi: 10.1109/PCIC30934.2019.9074531.

R. A. Durham, S. J. Szczecinski and M. O. Durham, "Grounding and Bonding Conductors: Solid, Stranded, Bare or Insulated?: Copyright Material IEEE, Paper No. PCIC-2018-03," *2018 IEEE Petroleum and Chemical Industry Technical Conference (PCIC)*, Cincinnati, OH, USA, 2018, pp. 19-28, doi: 10.1109/PCIC31437.2018.9080442.

F. P. Feletto, R. Durham, E. Bortoni and J. Costa, "IMPROVENT OF MV CASCADED H BRIDGE INVERTER (CHBI) VFD AVAILABILITY FOR HIGH POWER ESP OIL WELLS," in *IEEE Transactions on Industry Applications*.  
doi: 10.1109/TIA.2018.2866481

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F. Feletto, R. A. Durham, E. da Costa Bortoni and J. G. C. Costa, "Techniques to improve MV cascaded H bridge inverter (CHBI) VFDs availability applied to drive high power esp oil wells," *2017 Petroleum and Chemical Industry Technical Conference (PCIC)*, Calgary, AB, Canada, 2017, pp. 363-370.

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R. A. Durham, M. Azambuja, F. P. Feleto and M. O. Durham, "PD testing of motors for hostile environments," *2015 IEEE Petroleum and Chemical Industry Committee Conference (PCIC)*, Houston, TX, 2015, pp. 1-8.

doi: 10.1109/PCICON.2015.7435106

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Durham, Robert A.; Brinner, Thomas R., "Oilfield electric power distribution," *Petroleum and Chemical Industry Technical Conference (PCIC)*, 2014 IEEE , vol., no., pp.429,442, 8-10 Sept. 2014 doi: 10.1109/PCICon.2014.6961908

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Durham, Robert; Durham, M.O. "What Does Grounding Have To Do with Fire & Injury", *Fire Protection* vol 40 no 2, Fire Protection Association of Southern Africa, June 2014.

Durham, M.O.; Durham, R.A., "Does a Unified Energy Equation Contain the Higgs Field?," *Access*, IEEE , vol.1, no., pp.505,508, 2013

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Durham, R.A.; Durham, M.O.; , "Does Corrugated Tubing +Lightning =Catastrophic Failure?," *Industry Applications, IEEE Transactions on* , vol.48, no.4, pp.1243-1250, July-Aug. 2012

doi: 10.1109/TIA.2012.2200069

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Durham, R.A.; Durham, M.O.; , "Lightning, grounding, and protection for control and communications systems: Re-evaluated," *Petroleum and Chemical Industry Conference Europe Conference Proceedings (PCIC EUROPE)*, 2011 , vol., no., pp.1-11, 7-9 June 2011

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Brinner, T.R.; Durham, R.A.; , "Transient voltage aspects of grounding," *Petroleum and Chemical Industry Technical Conference, 2008. PCIC 2008. 55th IEEE* , vol., no., pp.1-9, 22-24

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Durham, M.O.; Durham, R.A.; , "Data quality and grounding considerations in a mixed-use facility," *Petroleum and Chemical Industry Technical Conference, 2004. Fifty-First Annual Conference 2004* , vol., no., pp. 1- 7, 13-15 Sept. 2004

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Durham, M.O.; Durham, R.A.; Anderson, D.; , "What are standardized equations for acceptance of hi-pot tests and for voltage drop?," *Petroleum and Chemical Industry Conference, 1998. Industry Applications Society 45th Annual* , vol., no., pp.281-287, 28-30 Sep 1998  
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Durham, M.O.; Durham, R.A.; , "Grounding system design for isolated locations and plant systems ," *Industry Applications, IEEE Transactions on* , vol.33, no.2, pp.374-382, Mar/Apr 1997  
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Durham, M.O.; Durham, R.A.; , "Paradigm shifts and impact on industry and technology [R&D management]," *Petroleum and Chemical Industry Conference, 1996, Record of Conference Papers. The Institute of Electrical and Electronics Engineers Incorporated Industry Applications Society 43rd Annual* , vol., no., pp.27-35, 23-25 Sep 1996  
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Durham, M.O.; Durham, R.A.; , "Lighting, grounding, and protection for distributed control and communications systems: a retrofit," *Petroleum and Chemical Industry Conference, 1993, Record of Conference Papers. The Institute of Electrical and Electronics Engineers*

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“Generalized Electrical Failures”, Durham, R.A., Durham, M.O., Coffin, J.A. *Proceedings of 46<sup>th</sup> Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2013.

“Common Ways your Electrical Installation does you Harm”, Durham, R.A., Durham, M.O., Coffin, J.A. *Proceedings of 44<sup>th</sup> Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2011.

“Ignition or Shock, is Grounding the Culprit?”, Marcus O Durham, Robert A Durham, Rosemary Durham, Jason A. Coffin, *Proceedings of 43<sup>rd</sup> Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2010.

“Unraveling the Myths of Low Energy Ignition”, Marcus O Durham, Robert A Durham, Curtis L. Ozment, Jason A. Coffin, *Proceedings of 42<sup>nd</sup> Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2009.

“Lightning, Transient & High Frequency Impact on Material Such As Corrugated Tubing”, Marcus O. Durham & Robert Durham, *Proceedings of 41st Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2008.

“Lightning Damage an Act of God, or Act of Negligence?”, Marcus O. Durham, Robert Durham, Randall Overton, Curtis Ozment, *Proceedings of 40<sup>th</sup> Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2007.

“The Flat Earth Society Perception of Grounding”, Marcus O. Durham & Robert Durham, *Proceedings of 39th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2006.

"The IEEE Standards Process, A Case Study", Marcus O. Durham & Robert Durham, *Proceedings of 38th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2005.

"Engineering Management: A Course For Survival", Marcus O. Durham, Robert A. Durham, & Rosemary Durham, *American Society of Engineering Educators*, Pittsburg, KS 2004.

"Eleven Ground Systems and Connections", Marcus O. Durham & Robert Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Engineering Management, An Oxymoron?", Marcus O. Durham, Robert Durham & Rosemary Durham, *Proceedings of 37th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2004.

"Corrosion and Electrical Safety", Marcus O. Durham & Robert Durham, *Proceedings of 36th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2003.

"Applications Engineers Don't Do Hairy Math", Marcus O. Durham, Robert A. Durham, and Karen D. Durham, *Proceedings of 35th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2002.

"Tests and Correlations for TVSS", Marcus O. Durham, Karen Durham, and Robert Durham, *Proceedings of 34th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2001.

"Grounding Systems Interaction," Robert A. Durham and Marcus O. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"A Cost Effective, Numeric Technique for Projecting Quality of Insulation and Impending Failures," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"An Engineering Selection for Size of Long Conductors Considering Factors in Addition to NEC," Marcus O. Durham and Robert A. Durham, *Proceedings of 33rd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 2000.

"Grounding Systems Interaction," Robert A. Durham and Marcus O. Durham, *Proceedings of 32nd Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1999.

"Can Electrical Insulation and Conductor Performance Be Predicted?" Marcus O. Durham and Robert A. Durham, *Proceedings of Production Operations Symposium*, SPE 52161, Oklahoma City, OK, March 1999

"Engineering Paradigms: Change, Opportunity and Benefit," Robert A. Durham and Marcus O. Durham, *Proceedings of 31st Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1998.

"Electric Re-regulation and Impact on Users," Robert A. Durham and Marcus O. Durham, *Proceedings of 30th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1997.

"Remote Transmitter and Distributed Control Grounding and System Protection," Robert A. Durham and Marcus O. Durham, *Proceedings of 27th Annual Frontiers in Power Conference*, OSU, Stillwater, OK, October 1994.