

CURRICULUM VITAE

Nelson G. Bingel III

Subject Matter Expert

Expert Witness

NESC Code Expert

Electric & Telecom Overhead Lines

Utility structures

Wood, Steel, Concrete, Fiberglass

Original Structure Strength

Wood Decay and Steel Deterioration

Inspection Techniques

Remaining Strength Analysis

Structure Loading Analysis

Clearance Analysis

Third Party Attachments

Industry Best Practices

February 2022



Marital Status: Happily Married

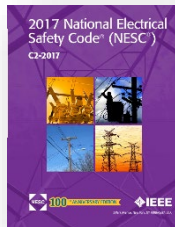
Date of Birth: 9/13/1951

Place of Birth: Buffalo, NY

Business: Near Atlanta, GA

Nelson Research, LLC
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Senoia, GA 30276
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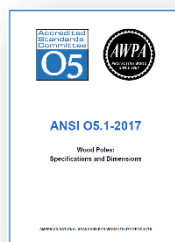
nbingel@nelsonresearch.net



Chairman

National Electrical Safety Code

The premier safety standard for overhead and underground electric and telecom lines



Vice Chairman

Accredited Standards Committee O5

Publishing standards for the manufacture of wood poles and crossarms

Other Technical Society Participation

IEEE – *Institute of Electrical and Electronics Engineers*

ASCE – *American Society of Civil Engineers*

AWPA – *American Wood Protection Association*

Education

Purdue University
BS Mechanical Engineering

(1969-1973)

Work History

Nelson Research, LLC

(2017- Present)

President

Consultant/Expert Witness – Overhead Electric & Telecom Lines

Osmose Utilities Services, Inc.

(1987 – 2017)

Osmose is the largest provider of utility structure inspection, maintenance, and restore/repair services in North America, including the acquisition of Provincial Pole in Canada. Nelson had a 30-year career researching, developing, and testing instruments, products and methods for inspection, analysis, maintenance and repair or restoration of wood, steel, concrete and fiberglass utility structures. He received five US Patents; two for wood pole inspection and three for unique designs of restoration systems.

Lincoln Electric Company

(1973 – 1985)

Lincoln Electric is the world leader in arc welding equipment and consumable products. After completing a 9-month sales engineering training program and becoming a certified welder through the Lincoln Welding School, Nelson spent 10 years in the sales organization working to find better solutions for the design and manufacturing process of customer's products.

Some of the applications were at seven US Steel plants, a Bethlehem Shipyard, Port of Oakland Loading/Unloading structures, skyscraper erection in San Francisco with companies like Kiewit, Fluor, Bechtel and others, and large oil and fuel storage tank fabrication with Chicago Bridge and Iron.

Patents obtained while with Osmose

June 27, 2000

US Patent 6,079,165: Apparatus and method for bracing vertical structures

April 29, 2008

US Patent 7,363,752 B2: Pole Reinforcement Truss

August 26, 2008

US Patent 7,415,808 B2: Pole Reinforcement Truss

January 16, 2018

US Patent 9,869,622: Automated profiling of the hardness of wood

March 3, 2020

US Patent 10,578,532: Automated profiling of the hardness of wood

Products developed while with Osmose

1987

Re-design of existing **Osmo-C-Truss** wood pole restoration system. Steel truss design was optimized for efficiency in correlating with the requirements of the National Electrical Safety Code.

1999/2010

O-Calc[®]/O-Calc Pro[™]- Comprehensive Pole Loading Software

Software used by Osmose and companies across the country to model in-service utility poles and evaluate loading per the National Electrical Safety Code or GO 95 in California.

2000

C2-Truss[™] - Wood Pole Restoration System – 3 Patents Awarded

This unique, computer-aided design enabled using very high strength steel to produce steel trusses for restoring wood poles that are lighter, stronger and lower in cost.

2005

StrengthCalc[®] - Electronic Wood Pole Strength Calculator

This software tool provides greatly enhanced precision for determining the remaining strength of in-service wood poles that have some level of deterioration in the zones just below and above the groundline. StrengthCalc is utilized during inspection of millions of wood poles annually and helps insure proper classification of their condition for optimum asset management.

2006

LoadCalc[®] - Electronic Pole Loading Estimating Tool

This software tool enables users to estimate the loading of in-service poles as a low-cost screening tool that can be incorporated with regular pole inspection programs. This can save a majority of poles from requiring a comprehensive pole loading analysis which incurs a significantly higher cost.

Industry Association Activities

National Electrical Safety Code (NESC) – the standard that establishes safety requirements for the construction, operation and maintenance of overhead and underground electrical and communication lines.

NESC Main Committee

Chairman: Aug 2016 forward

NESC Strength & Loading Subcommittee

Chairman: 2009 – 2016

Member: 1990 – 2016

NESC Main Committee

Member: 2009 – present

NESC Executive Subcommittee

Member: 2013 – present

American Standards Committee O5 (ASC O5) – this committee publishes standards for the manufacturing of wood poles and crossarms.

Vice Chairman: 2021 - present

Chairman: 2006 – 2021

Member: 1990 - present

ASC O5 Fiber Strength Subcommittee

Chairman: 1998 – 2015

Member: 1990 - present

American Society of Civil Engineers (ASCE)

Member: 1996 - present

Co-Author ASCE Manual No. 141, Recommended Practice for the Design and Use of Wood Pole Structures for Electrical Transmission Lines (Published 2019)

Co-author of ASCE Manual No. 111, Reliability-based Design of Utility Pole Structures published by Structural Engineering Institute of ASCE (Published 2006)

Co-author of ASCE Manual No. 104, Fiber-Reinforced Polymer Products for Overhead Utility Line Structures; the Structural Engineering Institute of ASCE (Published 2003)

Institute of Electrical and Electronics Engineers (IEEE)

Overhead Lines Working Group on the NESC

Vice-Chair: 2017 – present; Chairman: 1996 – 2017; Member: 1988 – present

Overhead Lines Joint Use Working Group

Vice-Chair: 2020 – present

Co-Author – IEEE Joint Use Guide for Wireless Facilities – will publish in 2022

American Wood Protection Association (AWPA) – publishes standards for preservative treatment of all wood groups, including wood poles.

Member: 1988 - present

Articles, Manuals, Publications

1994 Electric Perspectives Magazine – Nov/Dec – Edison Electric Institute
“Restore, Don’t Replace”

1998 Wood Design Focus

- A Journal of Contemporary Wood Engineering; Forest Products Society
“Computer-Aided Design of Fiber Composite Wraps for Wood Pole Restoration”

2003 – *Manual of Recommended Practice for Fiber-Reinforced Polymer Products for Overhead Line Structures*; Edited by Jim Davidson; ASCE MOP-104

2006 – *Manual of Practice for Reliability-Based Design of Utility Pole Structures*; Edited by Habib Dagher; ASCE MOP-111
2007 – *Transmission and Distribution World Magazine*
“Extreme Winds Test Wood Pole Strength”

2016 – *Electric Energy Online*
“Guest Editorial | 2017 Revisions and Review Underway to the National Electrical Safety Code (NESC)”

2016- *Energy Central*
“Highlights, Changes and New User Elements of the 2017 National Electrical Safety Code

2017 – *Power Grid International*
“The Pole Express
– Road to System Resiliency Varies, but all Benefit from Taking a Closer Look”

2017 – *Natural Gas & Electricity*
“Wood Pole Strength & Loading - Key to Resiliency, Require Programs”

Conference Presentations

1999 Utility Pole Structures Conference – Reno, NV –
Northwest Public Power Association (NWPPA), Western Electric Power Institute (WEPI)
Utility Structure Conference
“Proposed Code Changes: American Standards Committee O5/National Electrical Safety Code”

2000 Northeast Utility Pole Conference – October 17-18, Binghamton, NY
“Product Design in the new Electric Utility Environment”

2000 American Society of Civil Engineers (ASCE) Structures Congress – Philadelphia, PA
“Code Issues and Applications for Fiber Reinforced Composite Utility Poles”

2000 International Conference on Utility Line Structures – March 20-22, Ft. Collins, CO
“Product Design in the New Electric Utility Environment”

2000 Southern Pressure Treaters Association (SPTA) Winter Conference – January, 23-25, Key Largo, FL
“Update on ANSI O5.1 New Wood Pole Standard”

2000 Geospatial Information and Technology Association (GITA) Conference
“Utility Pole GIS Data Systems”

2001 Power Transmission & Distribution Asset Management Conference – Oct 27-28, Atlanta, GA
“Building a Data Strategy to Improve Reliability Planning”

2001 Institute of Electrical and Electronics Engineers (IEEE) Transmission and Distribution Conference – October 28-November 1, Atlanta, GA
“2002 National Electrical Safety Code (NESC) Update”

2001 National Joint Use Educational Conference – October 22-23, Phoenix, AZ
“2002 National Electrical Safety Code (NESC) Update”

2001 Southeast Electrical Exchange (SEE) Joint Use Committee Meeting – March 4-6, Orlando, FL
“Utility Pole Strength and Loading for Joint Use Applications”

2001 Edison Electric Institute (EEI) Transmission Committee Meeting – October 7-10
“2002 National Electrical Safety Code (NESC) Update”

2001 Western Energy Institute (WEI) Overhead Electric Distribution Workshop –Sep 10-12
“2002 National Electrical Safety Code (NESC) Update”

2002 Southeast Electrical Exchange (SEE) Joint Use Committee Meeting – May 19-21, Atlanta, GA
“Options for Overloaded Poles”

2002 Northeast Utility Structure Conference – October 22-23, Binghamton, NY
“Update on ANSI O5.1 – New Wood Pole Specification”

2002 SBC/Ameritech Technical Training Symposium - Chicago, IL
“Utility Pole Loading and Clearances”

2003 Southeastern Electric Exchange (SEE) Annual Conference – June 11-13
“Transmission Structure Asset Management”

2003 Northwest Public Power Association (NWPPA) Utility Structure Conference - Reno
“ANSI O5.1-2002 – The Inside Story”, “2002 NESC Update”

2005 Western Electric Institute (WEI) Utility Pole Conference, October 26-27, Reno, NV
“Code Update: ANSI O5.1-2005, Upcoming NESC 2007”

2005 Institute of Electrical and Electronics Engineers (IEEE) Winter Power Meeting – Jan 23-25, Albuquerque, NM
“NESC and ANSI O5 Overview”

2006 International Conference on Overhead Lines – March 27-31, Ft. Collins, CO
“Code Update: NESC and ANSI O5”

2006 Edison Electric Institute (EEI) Transmission, Distribution & Metering Conference – April 2-5, Houston, TX
“Code Update: NESC and ANSI O5”

2006 American Wood Preservers’ Association (AWPA) 102nd Annual Meeting – April 9-12, Austin, TX
“Code Update: NESC and ANSI O5”

2006 Florida Public Service Commission Workshop – April 17, Tallahassee, FL
“Wood Pole Strength & Loading”

2006 Municipal Electric Authority of Georgia (MEAG) – October 6, Cordele, GA
“Breakthroughs in Steel Restoration Truss Design”

2006 Northeast Utility Pole Conference – October 24-25, Binghamton, NY
“Code Update: NESC and ANSI O5”

2007 Institute of Electrical and Electronics Engineers (IEEE) Towers, Poles and Conductors
Panel Session – Orlando, FL, January 9
“Significant Rejected Change Proposals to the 2007 NESC”

2007 Southeastern Utility Pole Conference – February 11-13, Tunica, MS
“ANSI & NESC – What’s New for Your Poles”

2007 Florida Electric Cooperatives Association (FECA) Engineers Conference – May 30-
June 1, Clearwater, FL
“New Technology – Managing Wood Pole Strength and Load”

2007 Western Electric Institute (WEI) Utility Pole Conference – Oct 10-11, Vancouver, WA
“ANSI & NESC Update”

2008 International Conference on Overhead Lines – March 31-April 3, Ft. Collins, CO
“Code Updates – ANSI O5 & NESC”

2008 Northeast Utility Pole Conference – October 22-23, Binghamton, NY
“Steel and Concrete Utility Structure Corrosion”

2010 Utility Reliability Conference – February 10, Columbus, OH
“Reliability from the Ground Up”

2010 International Overhead Utility Conference, March 29-April 1, Ft. Collins, CO
“Code Update – ANSI O5.1 & NESC Safety”

2011 Eastern Utility Pole Conference – October 18-19, Baltimore, MD
“ASC O5 Committee – Wood Poles, Crossarms, Laminated Poles” – “NESC Update”

2012 International Overhead Utility Conference, March 28-April1, Ft. Collins, CO
“NESC Update”

2012 Spring Heartland Joint Use Conference – May 9-10, Pittsburgh, PA
“ANSI / NESC Code Review”

2012 Fall Heartland Joint Use Conference – October 24-25, Dayton, OH
“ANSI/NESC Code Review”

2016 National Electrical Safety Code (NESC) Workshop: Changes for the Future - October
18-19, 2016, San Antonio, TX
Workshop Host and Presenter

2017 National Association of Regulatory Utility Commissioners (NARUC)
Summer Policy Meeting – July 16-19, 2017, San Diego, CA
“Technology Developments & Challenges for Building 5G Small Cell Networks”
“Distributed Solar: Jurisdiction between NESC and NEC”

2018 National Association of Regulatory Utility Commissioners (NARUC)
Winter Policy Summit – February 11-14, 2018, Washington, D.C.
“Utility Distribution Poles and Lines – How Strong is Strong Enough?”

2018 National Electrical Safety Code (NESC) Change Proposal Development Workshop –
April 10-11, 2018, Savannah, GA
Host and Presenter

2019 National Electrical Safety Code (NESC) Change Proposal Comment Period-
October 2-3, 2019, Kansas City, MO

2020 EUCI Webinar – The Impacts of 5G on Overhead Lines - presenter

2021 EUCI Webinar Series – presenter
5G Deployments – What You Need to Know
Fiber Optic Cables
Wood Pole Loading

2022 EUCI Webinar – Pole Attachment Best Practices - presenter

Training

2017 EUCI Seminar – Atlanta, GA
“Best Practices for Wood Utility Poles”
Presented: “ANSI O5.1 and National Electrical Safety Code Review and Updates”

2017 EUCI Symposium – Santa Clara, CA
“Best Practices for Wood Utility Pole Strength and Loading”
Created and Presented: The full day and a half symposium
“Wood Pole Management”
“Wood Pole Manufacturing and Strength”
“Pole Loading Basics”
“NESC Loading & Strength Requirements”
“California GO 95 Loading & Strength Requirements”
“Wood Pole Decay & Strength Loss”
“NESC / GO 95 Strength & Loading Comparisons”
“Clearance Basics”
“Pole Loading Examples”
“Third Party Attachment Processes”
“Adding Attachments to Existing Poles”

2018 EUCI Symposium – Chicago, IL
“Best Practices for Wood Utility Pole Strength and Loading”
Updated Presentations: The full day and a half symposium

- “Wood Pole Management”
- “Wood Pole Manufacturing and Strength”
- “Pole Loading Basics”
- “NESC Loading & Strength Requirements”
- “California GO 95 Loading & Strength Requirements”
- “Wood Pole Decay & Strength Loss”
- “NESC / GO 95 Strength & Loading Comparisons”
- “Clearance Basics”
- “Pole Loading Examples”
- “Third Party Attachment Processes”
- “Adding Attachments to Existing Poles”

2019 EUCI Conference – Newport Beach, CA

“Wireless Pole Attachments Best Practices Conference”
Presented: Pole Loading Aspects of Wireless Antenna Attachment

2019 EUCI Symposium – Denver, CO

“Best Practices for Wood Utility Pole Strength and Loading”

Updated Presentations: The full day and a half symposium

- “Wood Pole Management”
- “Wood Pole Manufacturing and Strength”
- “Pole Loading Basics”
- “NESC Loading & Strength Requirements”
- “California GO 95 Loading & Strength Requirements”
- “Wood Pole Decay & Strength Loss”
- “NESC / GO 95 Strength & Loading Comparisons”
- “Clearance Basics”
- “Pole Loading Examples”
- “Third Party Attachment Processes”
- “Adding Attachments to Existing Poles”

2020 EUCI Symposium VIRTUAL

“Best Practices for Wood Utility Pole Strength and Loading”

Updated Presentations: The full day and a half symposium

- “Wood Pole Management”
- “Wood Pole Manufacturing and Strength”
- “Pole Loading Basics”
- “NESC Loading & Strength Requirements”
- “Wood Pole Decay & Strength Loss”
- “NESC / GO 95 Strength & Loading Comparisons”
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