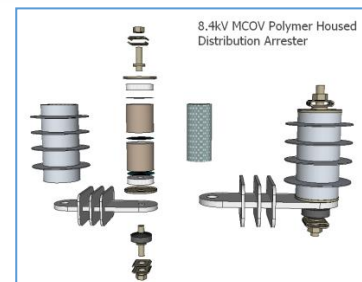
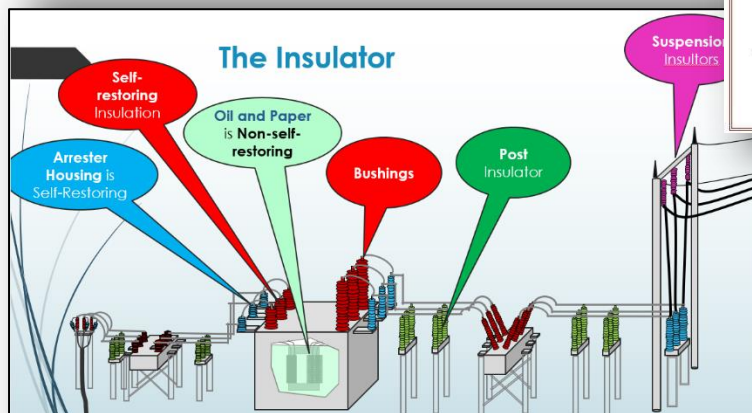
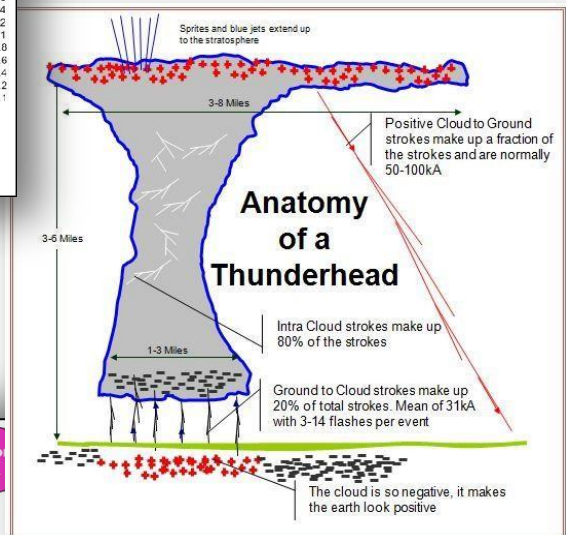
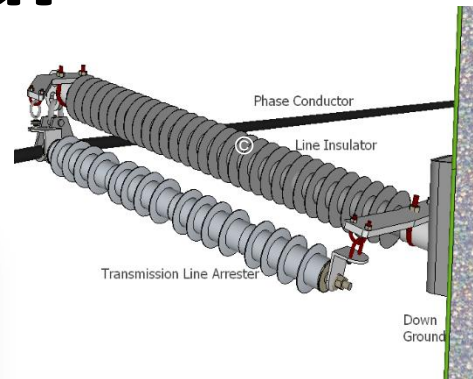
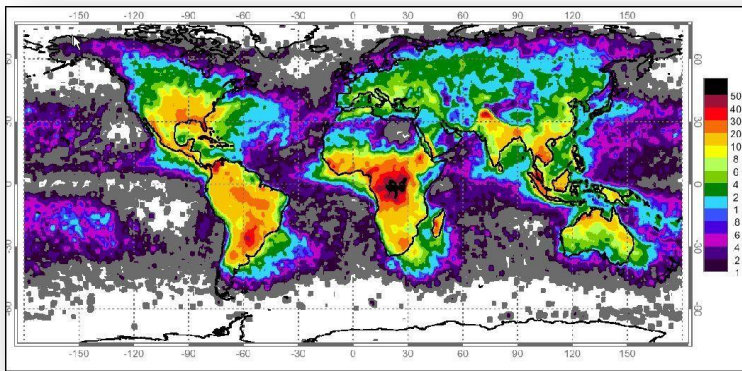


Arresters 101

T&D Surge Protection

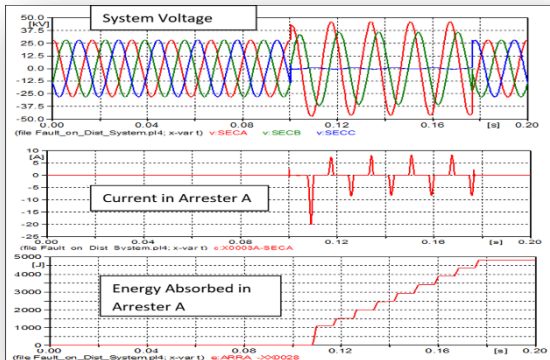
Webinar

2x2 hr sessions over two days (4 PDH)



Webinar Overview

This is a 4 hr webinar about covering the basics of lightning protection of power systems. Lightning is the second or third most significant cause of outages on most power systems. Mitigation of the effect of



lightning is seldom understood and can often be improved. This in-depth course is designed for those responsible for the reliability of substations, distribution systems, and transmission systems. We will cover ways to improve the lightning performance of distribution and transmission lines by using arresters and other means.

What Attendees Will Learn

- **Surge fundamentals:** lightning, switching, faults, ferroresonance, line drops, and others
- **How to select the most appropriate type of lightning protection:** Shielding, lightning rods, arresters, no protection, and possibly underground
- **The difference between arrester types:** Station, transmission line, distribution, secondary, liquid immersed, elbow, riser pole, and more
- **What the ratings of an arrester really mean** and how to compare one manufacturer to another
- **Margin of protection fundamentals** along with insulation coordination fundamentals
- **Separation Distance Fundamentals**
- **Insulation Coordination Fundamentals**
- **How to Calculate the Value of an Arrester**
- And much more.....

Materials

A recording of the webinar will be available to those that would like it.

Logistics

The webinar will be presented over two days for 2 hrs each day. PDH Certificates will be granted to

those completing the homework and additional time will also be granted for homework time.

Who Should Attend?

- Anyone new to the industry who wishes to learn the fundamentals of lightning protection
- Reliability engineers and other reliability personnel responsible for continuous improvement
- Power system operations and maintenance supervisors
- Power engineering personnel who wish to broaden their scope of system understanding
- Linemen interested in learning more about surge protection.

Instructor

Jonathan Woodworth, Consulting Engineer, ArresterWorks, started his career at Fermi National Accelerator Laboratory in Batavia, IL after receiving his Bachelor's degree in Electronic Engineering from The Ohio Institute of Technology in 1972. As an Engineering Physicist at Fermi Lab, he was an integral member of the high energy particle physics team in search of the elusive quark. In 1979 he joined the design engineering team at McGraw Edison (later Cooper Power Systems) in Olean, NY. Returning to school after many years in industry, Jonathan received his MBA from St. Bonaventure University in 1995. Jonathan was employed for 28 years at Cooper Power System where he served as Engineering Manager for 13 years. Additionally, he held the position of Arrester Marketing Manager for 7 years.



In 2007 Jonathan along with business and life partner Deborah Limburg started up Arrester Works a surge protecting Consultantsy that serves the surge protection industry worldwide.

Jonathan is very active in the IEEE and IEC standard associations previously serving as Chair of the Surge Protective Devices Committee of IEEE PES, Chair of the NEMA High Voltage Arrester Section, and currently Co-Convener of the IECTC37 MT4 committee responsible for IEC Arrester Standards and Convener of the IEEE High Voltage Arrester Test Standard Working Group.

Part 1 (Day 1 2 hrs)

What is Surge Protection and Why Do We Need It. (30 Min)

- Insulators and Surges, The Flashover, Dielectric Puncture
- Calculating the Benefit of Surge Protection on Distribution Systems, in Substations and on Transmission Lines

Surge Protection Lingo (10 Min)

- Transient Voltage, Transient Current (Impulse Current), Leakage Current, Power Frequency Current, Fault Current, MCOV, TOV, Margin of Protection

Surge Fundamentals (30 Min)

- The Lightning Flash, The Lightning Surge, direct strikes, indirect strikes
- Switching Surges, how do they happen, traveling wave effect,
- Temporary Overvoltages

Arrester Fundamentals (30 min)

- What is an arrester, how does it work, what types are there, mounting and wildlife protectors?

Homework

For those wishing PDH certificates, homework based on the day's discussion will be required.

Part 2 (Day 2 hrs)

System Fundamentals Relative to Surge Protection (20 min)

- Voltages, Faults, Neutral Configurations

Insulation Coordination Fundamentals (40 min)

- Margin of Protection Concept and Calculation
- Lead Length Concept
- Separation Distance Calculation
- Distribution Overhead Line Protection
- Underground System Protection
- Transmission protection with Shield Wires (OHGW) and with Arrester Protection
- Substation Protection Fundamentals

Selecting the right arrester (40 min)

- Type, MCOV, Margin of Protection, Energy Ratings , Failure Modes

Homework

For those wishing PDH certificates, homework based on the day's discussion will be required.