

Spacer Cable Reduces Tree Caused Customer Interruptions

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Trees & Interruptions

- ◆ **The most common power-line construction throughout most of the country is bare wire on crossarms. While proven to be adequately safe and reasonably reliable over the past one hundred and twenty-five years, this configuration is susceptible to outages caused by tree contact.**

Trees & Interruptions

- ◆ **THROUGHOUT** a major portion of the United States, trees contacting power lines are a significant cause of customer interruptions, both momentary and sustained.
- ◆ **At some utilities in the Northeast, tree contacts contribute to more than 25% of all customer interruptions.**

Trees & Interruptions

- ◆ **Trimming trees, by removing branches over, under and around the electric delivery system conductors, has been the typical way utilities have tried to improve their reliability results.**
- ◆ **The general public is becoming more vociferous in their opposition to any removal of trees, or their branches.**

Spacer Cable

- ◆ **Shunned by those utilities that emphasized lowest first cost construction, due to its 20 - 30% higher material cost over an open bare wire configuration, it has proven to be a long term benefit to many smaller municipal electric utilities in New England, where some of them have used this construction almost universally.**

Spacer Cable

- ◆ **Overhead spacer cable construction consists of non-shielded, non-tensioned, insulated conductors, supported in a close triangular configuration by insulating spacers from a high strength messenger/neutral.**

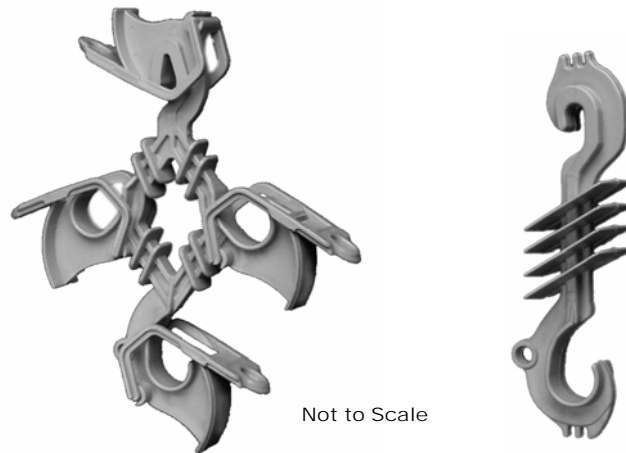
Conductors

- ◆ **Conductors**
 - ◆ **Insulated w/ polyethylene**
 - ◆ **Treated as uninsulated**
 - ◆ **15 kV; 75 mils of natural polyethylene covered by 75 mils of track resistant high density polyethylene**

Spacers

- ◆ **Spacers**
 - ◆ **made of polyethylene, the same material as the insulation on the phase conductors**
 - ◆ **flexible polyethylene “jar rubbers” have been the most commonly used method of holding the conductors to the spacers, spacers can now be obtained with**
 - ◆ **integral locking clamps.**

Three Phase and Single Phase Spacers



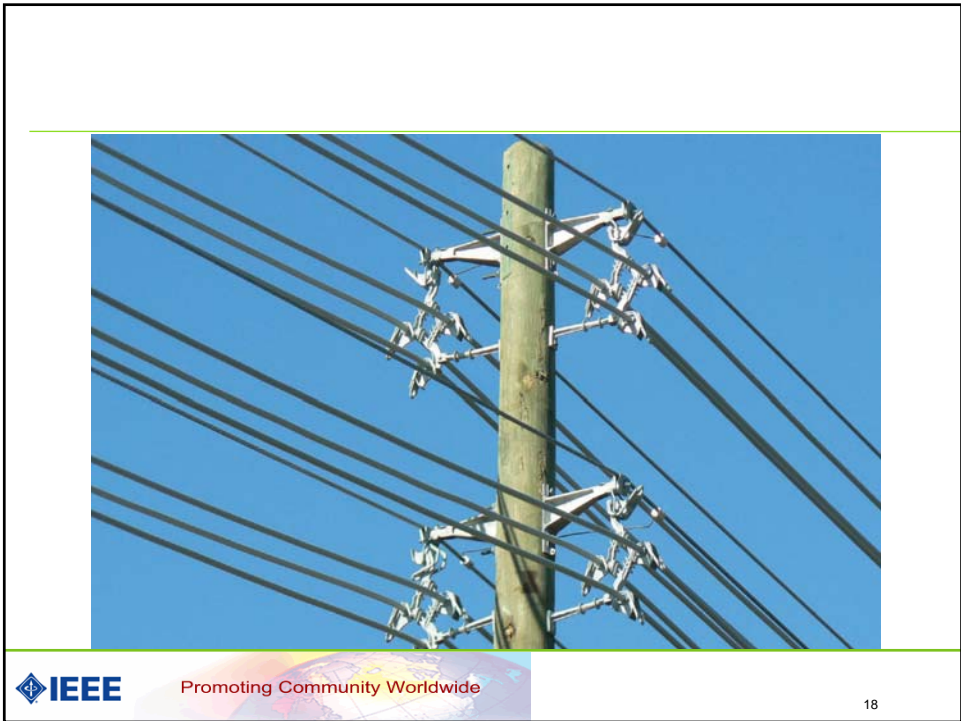
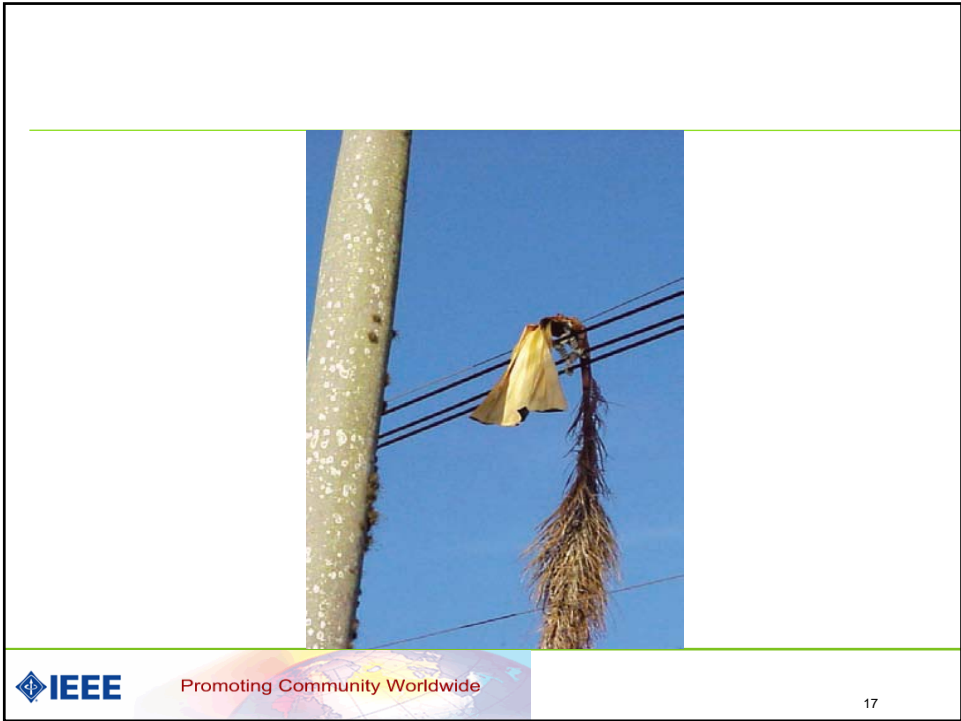
- ◆ **Messenger**
 - ◆ provides the full support of the non-tensioned phase conductors,
 - ◆ is a high-strength alumina-weld/aluminum (AWAC) conductor.
 - ◆ also acting as the system neutral, for a system of non-shielded, insulated conductors, it is required to be well grounded at a more frequent interval than that required for open wire overhead construction by the National Electrical Safety Code.



- ◆ **The use of non-shielded conductors also requires that trees still be trimmed, since their contact with the insulation will create a charge density differential, and cause a charge current flow.**
- ◆ **Some utilities have specified that a 15 mil semi-conducting strand shield be added to minimize the damaging effects of an increased electric field at a tree contact point, thereby extending the life of the conductor even if tree contact is made**







Cost Cutting Efforts

- ◆ **Some utilities have tried to use materials of differing dielectric constants in the construction of spacer cable systems.**
- ◆ **In every case known, these experiments to reduce the overall cost of spacer cable systems have ended in reduced life of the components and increased outages due to material failure.**

Higher First Cost

- ◆ **The cost of spacer cable will be higher than open bare-wire construction, due to the insulation on the conductors, the spacers, the more frequent grounding required and the more specialized hardware.**
- ◆ **A Midwest utility estimated an additional 25% cost over an equivalent bare-wire system**

Cost Savings

- ◆ **O&M costs can be reduced significantly.**
- ◆ **One additional O&M reduction, often overlooked, is the reduction in labor and material costs due to the elimination of outage events.**

Improved Reliability

- ◆ **Utilizing data from one utility, spacer cable reduced tree caused customer interruptions by 90%, compared to bare open-wire construction**
- ◆ **The high strength messenger, along with the spacers located every 30 feet, supporting the insulated phase conductors, allows severe damage to the structure holding the cable system in the air without any loss of service to the customer.**

Summary

◆ **Benefits:** (for utility experiencing a large number of tree caused interruptions)

- ◆ improved reliability results,
- ◆ reduced O&M costs,
- ◆ improved customer satisfaction,
- ◆ reduced customer animosity for veg mngt program,

◆ **Requirements:**

- ◆ Acceptance of higher construction costs,
- ◆ the need for a fully integrated insulation system, and
- ◆ much more frequent grounding

- ◆ Spacer cable construction will provide the utility with a most reliable, lower total cost system than open, bare-wire construction.

