

# Steel Poles Harden Distribution System

Bluebonnet Electric Cooperative crews install steel poles to protect system against extreme environmental conditions.

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**H**urricane-force winds and frequent thunderstorms sometimes topple wood poles in Bluebonnet Electric Cooperative's service territory. When severe storms rage through the region, the environmental conditions often exceed the design specifications of Bluebonnet's electrical distribution system. When this occurs, the probability of poles failing increases significantly. In fact, in some cases, linemen have to replace multiple wood poles that have fallen in succession following a storm.

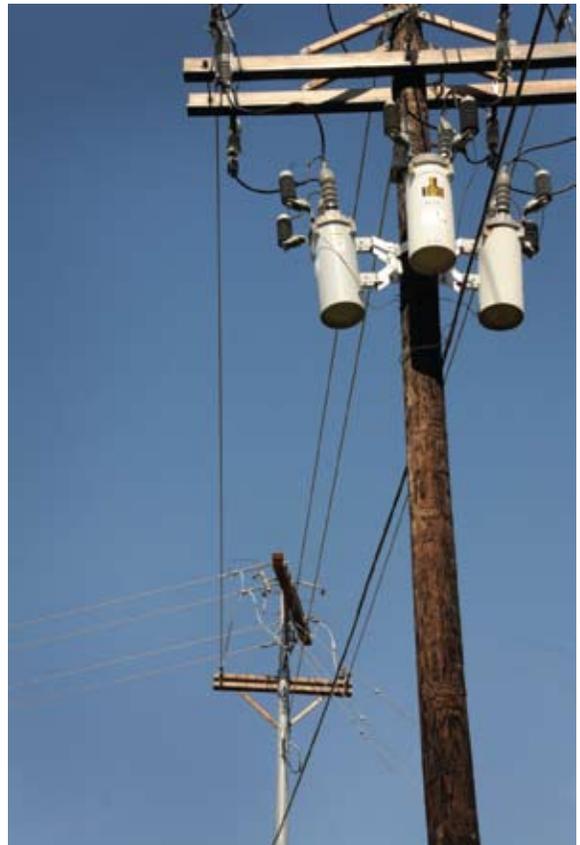
The non-profit rural utility is one of the largest power distribution cooperatives in Texas with more than 11,000 miles of power lines, more than 200,000 poles and 80,000 meters stretched across more than 3,800 sq miles in central and southeastern Texas. For the past 72 years, linemen have predominantly installed wood poles along the utility's vast network. Unfortunately, in areas of heavy woodpecker activity, some of these poles have lasted less than five years.

The utility knew it had to look to alternative pole materials to gain longevity, durability and economic value. A decade ago, the company began using steel poles to address areas where the company was experiencing structural damage due to woodpecker activity. Since that time, the company has expanded the use of steel to include structures that require extensive labor hours to replace such as difficult-to-access areas such as river crossings or primary riser poles.

## Steel Solution

Before installing steel poles, the Bluebonnet Material and Construction Standards Committee performed an extensive steel-versus-wood trade study to evaluate overall lifecycle costs, from longevity to installation costs, to resistance to damage. The committee found the benefits of steel poles are longevity, maneuverability and durability, particularly in difficult-to-access areas.

The cost of installation per pole goes up significantly in remote areas, whether the linemen use wood or steel. However, steel poles last longer than comparable wood poles, and



Linemen usually have to replace wood poles every 30 years, but because of high woodpecker activity, they were replacing them every five years. For that reason, Bluebonnet Electric Cooperative is now installing steel poles in hard-to-access areas and regions with woodpeckers.

they're lighter and more manageable to install. The company is installing a steel pole with the expectation of a structural life that's twice as long as a standard wood structure.

Steel structures tend to work well in remote regions with high woodpecker activity and high winds. In addition, they are able to withstand poletop fires from lightning, and they are not susceptible to the insulator contamination seen with wood poles. One of the main reasons why the utility opted to



The steel poles may cost more upfront, but Bluebonnet has found that these poles are resistant to decay and woodpecker damage, and with proper maintenance, they will significantly outlast a typical wood pole.

go to steel poles, however, is because they have become more economically feasible over the last few years.

In the past, the crews would replace a woodpecker-infested wood pole with a new pole, only to have it ruined a few years later. The steel poles, however, have a life expectancy of 40 to 60 years. While they have a higher upfront cost, they last longer and are easier to maintain. In fact, the Bluebonnet Electric economic study found that the steel poles save the utility 10% to 20% in lifecycle costs when compared with wood poles.

Over the last few years, Bluebonnet has worked with a variety of steel manufacturers, including Valmont Industries and CHM Industries, to reduce outages and improve the reliability of its system.

### On the Job

The utility is using the poles in areas in which it needs them to last a long time with minimal maintenance. Bluebonnet manages and maintains more than 200,000 poles, and 480 of them are now made of steel. As the company is wrapping up a project building new lines along the Texas 130 toll road corridor, however, the utility will double the number of steel poles in its service territory. By the time the project is completed in mid-2011, 1,071 of Bluebonnet's poles will be manufactured from steel.

For the last year, linemen have been installing new structures from Austin to south of Lockhart, Texas. As a result of the toll road construction, the field crews had to relocate all aerial facilities in its path. Rather than constructing the new lines with wood poles, linemen are installing steel alley-arm pole structures from Keystone, a division of CHM Industries.

The planning for this segment of the road began in mid-2008. Bluebonnet worked with the developer of the project, Central Texas Highway Constructors, which oversaw all utility

relocations. Bluebonnet retained Schneider Engineering of Boerne, Texas, as an outside consultant for the staking and survey portion of the job. Overhead work was performed by local contractors, Line-Tech and Dig Tech Inc., of Bastrop, Texas.

The scope of this project was to retire 46,000 ft of single-phase overhead line and 23,000 ft of three-phase overhead line. The company is constructing about 30,000 ft of new single-phase line and 27,000 ft of new three-phase line.

### Making Modifications

To make the steel poles even easier for the field crews to install, Bluebonnet has requested several specific modifications to the steel poles.

For example, Bluebonnet orders steel poles preconfigured with inserts and climbing provisions, which minimizes extra training required by repair crews. The poles are predrilled in the factory for common framing construction, which takes labor costs out of the field. Steel poles also do not need extra conductors and connections for grounding that are necessary with wood poles.

By having the poles predrilled for climbing provisions, the company makes it easier for linemen to scale the poles without relying on bucket trucks in remote regions. Bluebonnet worked with Valmont Industries to provide steps, which can be inserted into pre-threaded holes on the poles. When the linemen climb these poles, then they leave the inserts in them, and then install and remove the steps.

The field personnel discovered minimal difference between steel and wood poles with regard to functionality. As such, the company had to do very little extra training specific to steel poles.

The installation of steel poles, however, had a few key differences. First of all, if the crews had to drill into the poles and modify the steel structures in the field, then they used special drill bits from Klein Tools called 59003T Unibits that work well with steel.

Secondly, the linemen used a lifting sling from Columbus McKinnon Corp. to secure the pole to the lifting equipment such as a digger-derrick/crane during the hoisting process. The linemen normally use metal cable type slings for wood pole installations, but they quickly realized that the metal sling would not properly grip the steel poles and began using nylon-type slings.

Finally, the crews had to use another tool called a cant hook from Columbus McKinnon to rotate the pole after it was set in the hole. The cant hook used on wood poles has a sharp metal hook that is jabbed into the pole, and the handle is then pulled in the direction that the pole needs to be rotated. The new steel pole cant hook is designed with a strap that tightens around the pole instead of the hook.

By installing steel poles, Bluebonnet is able to improve the reliability of its system. Unlike wood poles, which can topple over in thunderstorms, the steel poles will bend instead of break. While a small percentage of the company's steel pole system might realize severe weather, Bluebonnet is confident that should an event occur, steel poles might bend, but they



Bluebonnet Electric Cooperative linemen installed these steel poles in the outskirts of Bastrop, Texas.

will not fail catastrophically and cause widespread outages.

To date, Bluebonnet has about 480 steel poles installed, with no failures and no woodpecker damage. In the future, if the poles in the new highway project stand up to extreme weather conditions, more of the Bluebonnet's poles could change from wood to steel in the future. TDW

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#### Companies mentioned:

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