

Illinois Bell Solves Fiber Optic Installation Problems with Special Designs

Illinois Bell has discovered how to manage fiber optic cable installation problems with planning and equipment designs that save time and money for the company and its customers.

Illinois Bell is one of the leaders in fiber optics and installed the first fiber optics in the country, in the Chicago area, says Bob Bolte, a Peoria-based area manager for the company. Bolte is responsible for the installation of all telephone plant, both fiber optic and copper, from the central office to each subscriber's house, within a 1,400 square mile area of northwestern Illinois. He also oversees the maintenance of all fiber optic cable in this area.

In early 1984, as part of the preparation for fiber optic installations in his area, Bolte met with Illinois Bell engineers, top management of the company, the manager of the company's Chicago group, crawler operators, and a crawler manufacturer to discuss the problems associated with installing fiber optic cable cross-country. Several meetings produced criteria that Illinois Bell believed were essential for successful and cost-effective installation of fiber optic cable.

After requesting bids for a machine that met the criteria, the company purchased a specially equipped John Deere 850 crawler with an Ateco cable plow. So far, the machine has put in roughly 450 to 500 miles of fiber optic cable. Illinois Bell has rented a John Deere 850B plow tractor, equipped with the same designs as its own machine, and two Deere pull tractors, as well as a Cat D7 plow tractor and a Komatsu unit to handle the increased work load.

Installation Requirements

Illinois Bell decided that plowing the cable would be the most cost-effective installation method as long as certain requirements were met.

"The cable had to be monitored constantly so that it would never have more than 600 lb. of pressure applied lengthwise on a pull. So, we had to somehow build a monitoring system on the plow crawler so we could monitor the cable coming off the reel in front, over the top and down through the chutes into the ground," says Bolte.

The crawler engineers designed a system that met this requirement and more. The current monitoring system is tied into the hydrostatic transmission on the Deere



Above: Two John Deere hydrostatic crawlers team up on a fiber optic installation in Illinois. Below: Illinois Bell's John Deere 850 is equipped with hydraulically controlled reel carrier, cable-tension monitoring system and capstan drive.



crawler so if the line pull on the cable starts to exceed the 600 lb. limit, the transmission automatically shifts to neutral and the crawler stops.

A tape graph that starts at zero and goes to 1,200 lb. charts the pull on the cable as it is installed. After each reel of fiber optic cable is installed, the corresponding tape is identified and filed.

"When the job's all done and we have a problem with the cable, we can go back and identify right to almost the foot where the problem's at," says Bolte.

The plow tractor also was required to handle a variety of reel sizes ranging from 4 feet to 7 feet in diameter and maintain pressure on the reel so it did not freewheel.

Martin Equipment Company of Illinois, a John Deere dealer, designed and built a hydraulic assembly to fit over the dozer blade, that could pick up the smallest to the largest reel and maintain tension on the reel at all times, so it didn't freewheel.

Illinois Bell intends to make a little modification to the design that will reduce the time required to prepare the blade for clearing and grading work, but the design works well for its primary purpose, handling the cable reel and applying a little tension, according to Bolte.

With slight tension on the cable, a hydraulically driven capstan was needed to feed the cable uniformly off the reel and into the ground.

The last requirement was that the cable be buried four feet deep, regardless of obstructions. Illinois Bell wanted the cable to be below the frost line and deep enough so that people wouldn't be digging it up. The Ateco plow met the standard and could be adjusted hydraulically to ensure proper cable depth in uneven terrain.

Later, it was decided that a talk system should be included with the installation of the fiber optic cable, so maintenance personnel could communicate with one another as they can with copper cable. Illinois Bell's solution to this problem was Fiber-trace, a bright-colored talk and warning



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cable that is buried about three feet deep during the installation of the fiber optic cable. As an extra precaution, an orange warning ribbon is placed about one foot below the surface at the same time.

Plowing Vs. Trenching

Illinois Bell could have chosen trenching instead of plowing as the preferred method of installation and eliminated at least one of the problems it had to solve, since there is little possibility of stressing the cable by placing it in a narrow trench. Still, Bolte believes plowing is the better installation

method for cross country jobs, because it saves time and money.

"I can plow 200 miles in probably 25 percent of the time it takes to trench it," Bolte says.

"Fiber is unique. Everytime you have to cut it you lose transmission quality. So, you try to eliminate the splices," says Bolte. On a recent job, most of the cable was in 15,000-foot to 19,000-foot reels. "You're talking three to four miles you have to go without whacking it. It takes a lot of planning." 

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