

Understanding the True Cost of Cable “Cuts”

This paper examines the various direct and indirect costs incurred by cable manufacturers and distributors when a length of Outside Plant cable is cut at the request of a customer.

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Overview

Many buyers of Outside Plant (OSP) copper and fiber cable products are surprised by what they perceive to be a high price for the simple task of cutting a piece of cable. Certainly, (the logic goes) the act of unwinding a predetermined length of cable and cutting it into two pieces is a straightforward job that could not justify the additional \$100+ fee often charged by distributors and manufacturers.

This paper examines all of the costs that are incurred by the manufacturer or a stocking distributor when a length of cable is cut for the purpose of selling a short length and holding the rest of the reel for a future customer. What will surprise many OSP cable buyers is that the total cost (to the manufacturer or distributor) of cutting a cable piece is usually higher than the fee (the "cut charge") to the customer.

Background

When a buyer of OSP cable requests that a piece of cable be cut from a longer cable length, the manufacturer (or distributor) will incur two direct costs prior to shipping the cut length. A labor cost will be incurred from loading the inventory cable onto a re-spooling machine, paying off the length of cable onto a second reel, cutting the cable to the appropriate length, and re-spooling the remaining portion of the first reel of cable onto an appropriately sized reel and returning it back to inventory. The cost of the reel used for the cut length of cable represents the second direct cost.

Cable scrap cost is one of the indirect costs incurred when a cable is cut to a specified length. Cable manufacturing, in contrast to most other manufacturing businesses, is inherently focused on long length production. Any length of cable that is too short for a customer's application ends up as scrap. For cables designed for indoor use, relatively short lengths are entirely usable. For example, cables used to make wire assemblies, patch cords, HDMI cables, and virtually all consumer cable products are usable in lengths less than 100 feet. In contrast, OSP cable products are typically used for applications requiring longer lengths, and these cable types are often determined to be scrap in lengths less than 500 feet. And for some cable designs a length of 1,500 feet is categorized as scrap.

"Short-length discounting" and inventory holding cost represent the second type of indirect cost associated with cable cutting. When a master reel of cable is cut the remaining length will generally fall into one of three groupings:

- Long enough for most customer applications
- Short enough to be classified as scrap
- Shorter than most customers want, but applicable for special applications

This third grouping of cable remnants ends up as inventory that ties-up working capital for a long period of time. These remnant lengths are often discounted significantly, because very few customers are willing to purchase lengths that cannot be used for most project distances. However in many cases, these cables are never sold and are scrapped.

Labor Costs of Cutting

The labor cost associated with cutting and re-spooling a piece of OSP cable varies with the length of the requested cut, size of the cable, number of cuts from a payoff reel, and whether the balance has to be re-spooled onto a smaller reel or returned to inventory on the same reel.

The actual cable cutting takes very little time. However, in order to make the cut, a series of activities occur:

1. Locate the cable to be cut, bring it to the cut line, secure the reel in the payoff, untie the cable end, and thread the cable through the cut line.
2. Locate the correct size/empty cut reel, bring it to the cut line, secure it in the take-up, thread the cable through the start hole, and secure the end of the cable to the outside flange of the reel.
3. Re-spool the cable until the location to be cut is accessible.
4. Cut the cable to the desired length.
5. Run the last few feet on to the take-up reel, secure the end of the cable, remove the take-up reel from the take-up.
6. If there is another cut from the pay-off reel, repeat steps 2 through 5 for the second cut.
7. If there is no other cut from the pay-off reel, pull the last few feet back onto the payoff reel, secure the cable end, and remove the reel from the take-up.
8. Move the payoff reel back to inventory.
9. Move the cut length to the shipping dock for loading.
10. Complete all paperwork.

On average, the direct labor cost per cut for OSP copper cable is \$48. OSP fiber cable tends to have much longer cut lengths than OSP copper cable, and customers expect a perfect wind. Consequently, much more time is spent re-spooling an OSP fiber cable reel, and this leads to a higher average direct labor cost per cut of \$65.

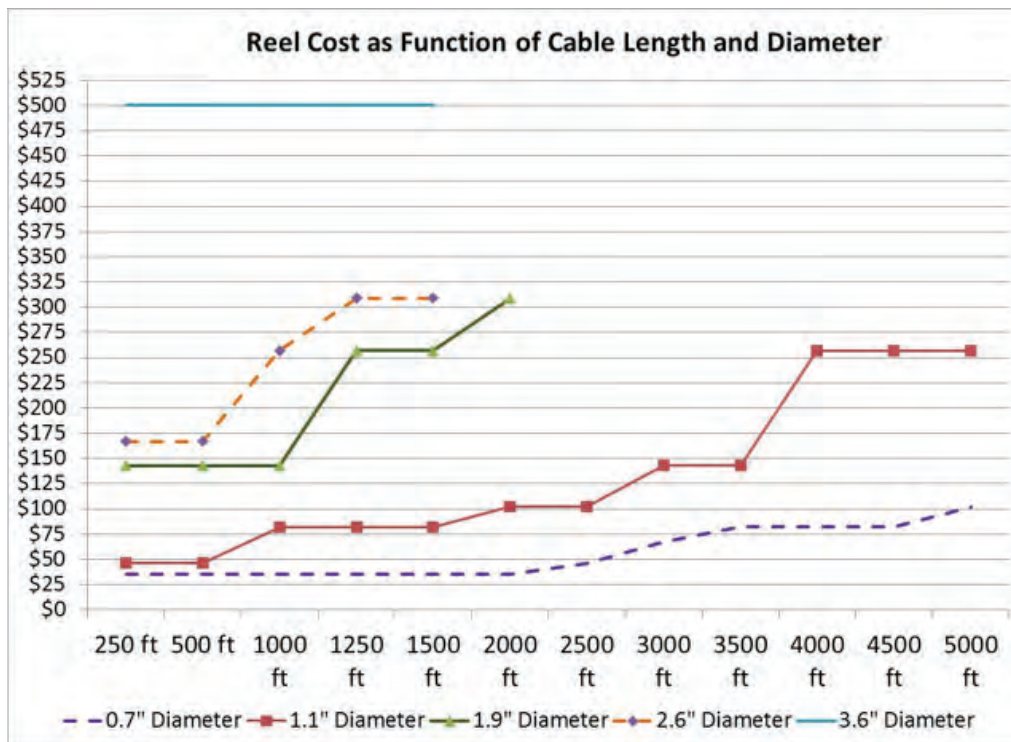


Picture of cable being re-spooled from large reel to smaller reel

Reel Costs

With very few exceptions, a cut cable length is required to be re-spooled onto a new reel. For OSP cable products, the reel cost ranges from \$35 to \$500. For small diameter cables (less than 2") the cost of the reel is relatively low for short lengths and increases proportionally as the cut length increases. However, for large diameter cables, the drum size of the reel typically needs to be large to accommodate a large bending radius. Consequently, large diameter cables usually require an expensive reel even if the length of cable being ordered or shipped is relatively short.

Graph #1 shows the cost of wooden reels for five (5) different cable sizes, as a function of cable length.



Graph #1

Scrap Costs

Once a master length of cable is cut for a customer order, it is likely that it will be cut from again for a subsequent cut-to-length order. At some point, perhaps even after the first cut is made, the remaining length of cable will be categorized as scrap, and the cable will be recycled (copper cable) or disposed of (fiber cable). On average, about 60% of the production cost of OSP copper cable is recoverable due to the high content of copper and other metals. That is, the amount of money lost for a scrapped OSP copper cable is about 40% of the cost of making the cable.

For fiber cables, the loss of scrap is 100%. There is no cost recovery obtained scrapping a length of fiber cable even though the plastics and steel used to make the cable are sometimes recyclable. That is, the manufacturer or distributor will not typically receive any compensation for sending a fiber cable to a recycler.

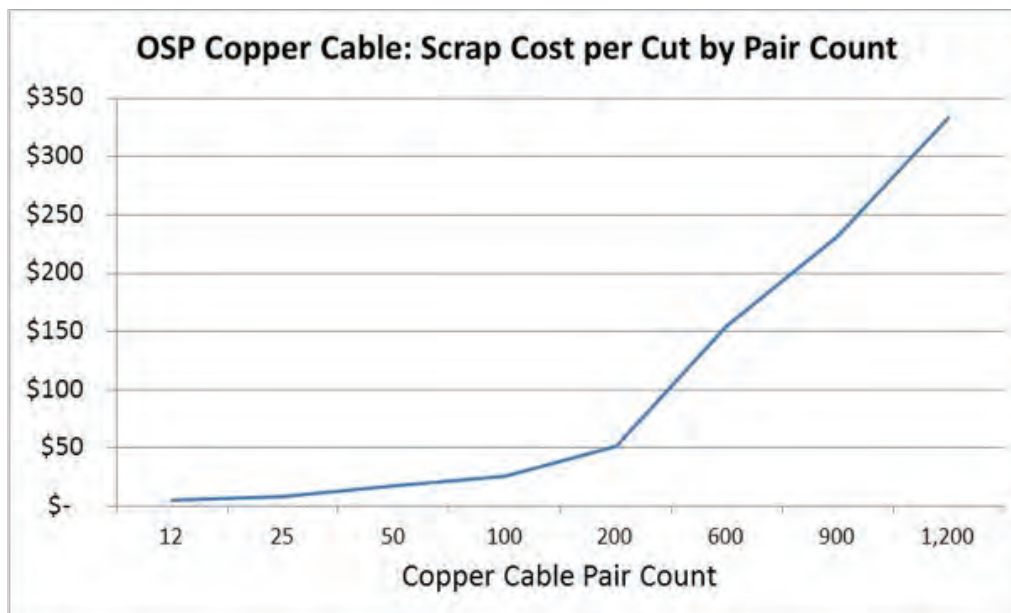
To understand the cost of scrap due to cut-to-length orders, we will examine OSP copper and OSP fiber cable separately.

In the case of OSP copper cable, manufacturers usually produce master lengths ranging between 1,000 and 10,000 feet, depending on the cable type. A cable shorter than 300 feet would normally be categorized as scrap. The length of the final remnant piece depends on the lengths of all of the previous cut lengths and it follows a normal distribution curve. Consequently, the average length of a scrap remnant is assumed to be the midpoint of 300 feet and 0 feet, or 150 feet for this analysis. Assuming 60% cost recovery from recycling the average 150 feet remnant, the cost of the scrap would be equivalent to the production cost of 60 feet of cable. For a small 50-pair cable, the scrap cost to the manufacturer would typically be about \$50. For a large 1200-pair cable, the scrap cost to the manufacturer would typically be about \$1,000. These costs would be higher for a distributor as the cable cost additionally includes the cost markup from the manufacturer.

From experience at Superior Essex, a master length of cable will be cut an average of 3 times (for cut-to-length orders) before the remaining length is categorized as potential scrap. To arrive at a scrap cost per cut length, the average number of cuts should be divided into the average cost of scrap per master length.

- Using the above example of a 50-pair copper cable, the average cost of scrap per cut is $\$50/3 = \17
- Using the above example of a 1200-pair copper cable, the average cost of scrap per cut is $\$1,000/3 = \333

Graph #2 shows a Superior Essex estimate of net scrap cost to the manufacturer, as a function of OSP copper pair count, with the assumption of an average remnant length of 150 feet.



Graph #2

OSP fiber cable is generally smaller in diameter than OSP copper cable. As a result, longer lengths of OSP fiber cable can fit onto large reels. Consequently, the lengths of fiber cable categorized as scrap usually represent a smaller percentage of the original master length than with OSP copper. However, the scrap recovery for OSP fiber cable is usually zero, negating the advantage of longer master cable lengths.

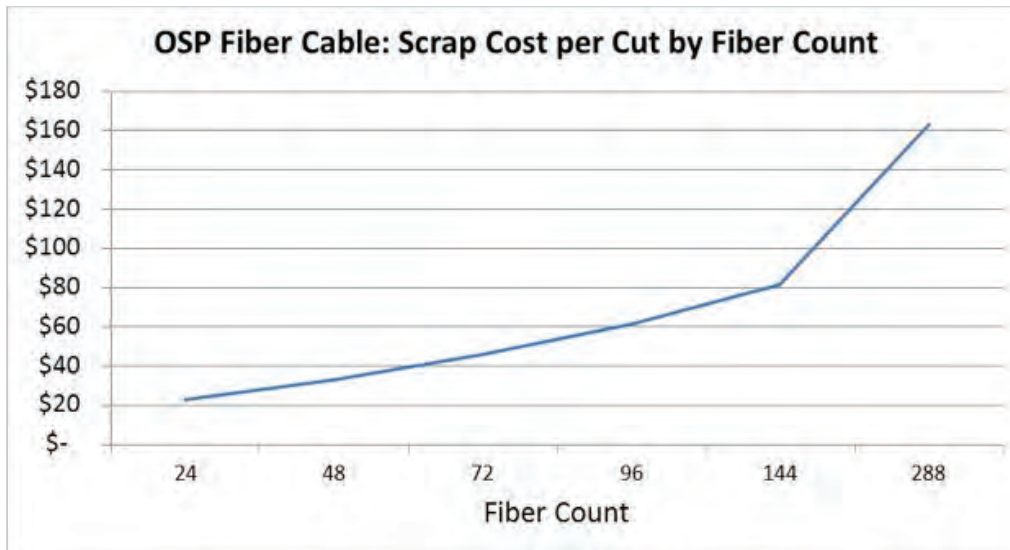
OSP fiber cable in short lengths also has less commercial value than OSP copper cable in equivalent short lengths. This is because OSP fiber cable tends to be used in longer distances than OSP copper cable.

OSP fiber cable lengths shorter than 1,000 feet are generally categorized as scrap. As is the case for OSP copper, the length of the final remnant OSP fiber cable piece depends on the lengths of all of the previous cut lengths and it follows a normal distribution curve. Consequently, the average length of a scrap remnant is assumed to be the midpoint of 1,000 feet and 0 feet, or 500 feet for this analysis. Because there is rarely any scrap recovery, the act of scrapping 500 feet remnants is equivalent to the total manufacturing cost of the cable. For singlemode 24-fiber cable, the scrap cost of 500 feet of cable would typically be about \$90. For a singlemode 288-fiber cable, the scrap cost of 500 feet of cable would typically be about \$650. These costs would be higher for a distributor as the cable cost additionally includes the cost markup from the manufacturer.

From Superior Essex’s experience, a master length of OSP fiber cable will be cut an average of 4 times (for cut-to-length orders) before the remaining length is categorized as scrap. To arrive at a scrap cost per cut length, the average number of cuts should be divided into the average cost of scrap per master length.

- Using the above example of a 24-fiber cable, the average cost of scrap per cut is $\$90/4 = \23
- Using the above example of a 288-fiber cable, the average cost of scrap per cut is $\$650/4 = \163

Graph #3 shows a Superior Essex estimate of net scrap cost to the manufacturer, as a function of OSP fiber count, with the assumption of an average remnant length of 500 feet.



Graph #3

Short Length Discounting

Sometimes the cable remaining on the master reel is long enough to avoid being categorized as definitively scrap, but is too short to be sold without being discounted. These types of cable remnants are called “shorts” within the industry. Discounting a good cable, simply because it is shorter than the typical length, is not ideal for the manufacturer. However, this outcome is much preferred over the scenario in which the remnant piece is scrapped. Therefore, for the purpose of this analysis, we will

assume short-length discounting prevents the cost of scrapping the remnant and we will not count a price discount as a cost. "Shorts," however, do tend to take a long time to sell. Therefore, we will count the inventory holding cost of creating shorts due to cut-to-length orders in this analysis and we will use an average annual turnover of 2 for these sellable "shorts."

From Superior Essex experience, when a master reel of cable has been used to fulfill cut-to-length customer orders, the final remnant length can eventually be sold to a customer 40% of the time. Consequently, 60% of the time (on average) the final remnant length will be scrapped. This has two implications.

1. The average cost of scrap per cut (calculated previously in the "Scrap Costs" section) should be reduced by 40%. This is because the final remnant will not end up as scrap 40% of the time. The scrap costs calculated in the "Scrap Costs" section of this paper will be reduced by 40% for the final cost calculations (see the "Total Cost Calculations" section).
2. The inventory holding cost for sellable "shorts" is equal to the cost of capital for the manufacturer times the value of the shorts held in inventory. Using the same copper cable examples from above (50-pair cable and 1200-pair cable) assuming an annual cost of capital of 10%, and assuming an average of 6 months longer to sell the cable than normal, the inventory holding costs per cable cut for these two examples are:
 - 150 feet of 50-pair copper cable: $\$125 \times 10\% \times \frac{1}{2} \text{ year} / 3 \text{ cuts} = \2.08
 - 150 feet of 1,200-pair copper cable: $\$2,500 \times 10\% \times \frac{1}{2} \text{ year} / 3 \text{ cuts} = \41.67

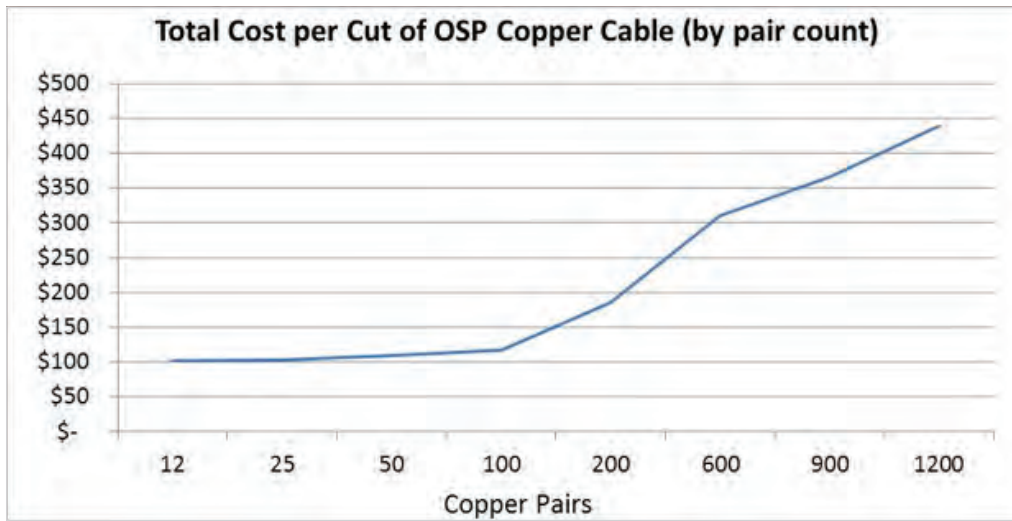
Similarly, we can calculate the inventory holding costs for OSP fiber cable remnants. Using the previously detailed costs for 2 fiber cable types (24-fiber and 288-fiber), using an annual cost of capital of 10%, and assuming an average of 6 months longer to sell the cable than normal, the inventory holding costs per cable cut for these two examples are:

- 500 feet of 24-fiber OSP cable: $\$90 \times 10\% \times \frac{1}{2} \text{ year} / 4 \text{ cuts} = \1.13
- 500 feet of 288-fiber OSP cable: $\$650 \times 10\% \times \frac{1}{2} \text{ year} / 4 \text{ cuts} = \8.13

Total Cost Calculations

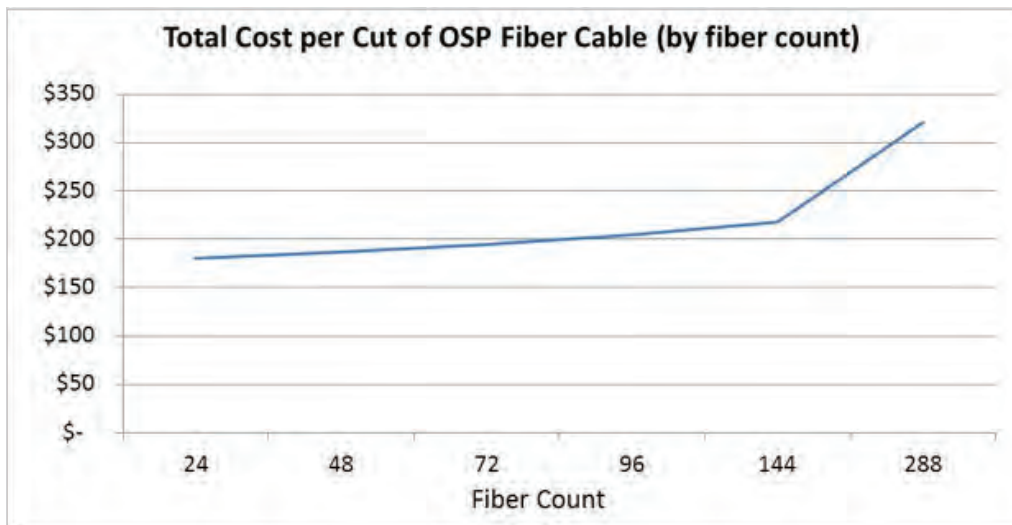
The total cost of a cable "cut" is the sum of the costs from labor, additional wooden reel, net scrap cost (properly adjusted for sales of "shorts"), and inventory holding cost of a remnant which is not scrapped, with shared costs properly allocated to the total number of cuts from a master length. The cost per cut is a function of cable size, cable cut length, and cable type. It is apparent from the individual cost breakdowns detailed in this paper that cable size is the most important determinant of true cutting cost, but that copper cables and fiber cables need to be considered separately. Cut lengths less than 1500 feet are the most common, and this summary cost analysis assumes cut lengths of 1,000 feet to simplify the dimensions of the cost analysis.

Graph #4 shows the total cost to the manufacturer of making a cut from a master reel, as a function of the cable size for OSP copper cable. Total costs to the distributor would be higher due to the cost markup of the cable from the manufacturer to the distributor.



Graph #4

Graph #5 shows the total cost to the manufacturer of making a cut from a master reel, as a function of the cable size for OSP fiber cable. Total costs to the distributor would be higher due to the cost markup of the cable from the manufacturer to the distributor.



Graph #5

Summary

This analysis shows that the average cost to the manufacturer of cutting a customer-specified length of cable from a master reel ranges from \$102 to \$439 (for typical OSP copper cable cut lengths) and ranges from \$180 to \$321 (for typical OSP fiber cable cut lengths). Costs for distributors would be higher. For both copper and fiber cable types the average cost of a cut is correlated to the diameter and unit cost of the cable.