

Value-Added Services: Customization Techniques Serving Wire Harness Manufacturers and OEMs

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A customer once called our company requesting to purchase UL 1007 18 AWG lead wire. As the phone conversation progressed between himself and the salesperson, the customer mentioned problems he was encountering twisting the wire with a drill back in his warehouse. He complained that the wire was picking up dirt from the warehouse floor during the twisting process. Additionally, the process was costing him money because he needed two people involved in the actual twisting.

As shown in the twisting dilemma, wire and cable does not generally come with all the modifications you may need for a specific application. For example, your application could call for wire with ink jet printing for clear marking and easy identification during installation and usage. Similarly, you may like your wires dyed various colors for prompt circuit identification. This is where value-added manufacturers take over and personalize wire.

Several manufacturers supply distributors, wire harness manufacturers and OEMs with value-added services on wire and cable products. A value-added service indicates a customization service on an order that goes beyond a basic or core service. In other words, it benefits the end user by "adding value" to the standard service offered. In the electrical wire and cable industry, value-added services include those such as braiding, cut and strip, printing, bar-coding, dyeing, custom put ups and striping.

Do you have an understanding of what your supplier is doing to your product when they say they are twisting or braiding? This article examines various value-added services and the processes that each entails. We'll offer a glimpse of the striping, dyeing, ink jet printing, hot stamping, braiding, twisting and cut and strip processes as well as special reel sizes and special packaging.

With the right equipment, the processes can be fairly simple and extremely beneficial to those receiving the final product by helping meet wire requirements, cutting installation time and allowing for easy identification, among other advantages. With their unique abilities, value-added services conveniently customize, while offering solutions for precise wire and cable specifications. As an additional advantage, purchasing wire and cable from a value-added manufacturer proves to be cost-effective because everything you need can be completed in a single location.

Striping and Dyeing

Manufacturers and distributors of electrical wire and cable often process wire and cable by adding stripes or dyeing a base wire another color. The processes are multifunctional as they add value to the product, differentiate the wire for circuit identification and help control inventory volumes of stocked material.

In order to dye a wire, a specially built machine feeds the wire product through a system of pulleys. First, the wire passes through a "wiper," a foam circle that encompasses the entire cable. The jacket of the wire absorbs a formulated dye that is present in the foam. After passing through the wiper, the wire goes into a heat tower to cure and dry.

Striping, which many manufacturers offer for extruded wire, is performed in the same machine as dyeing. However, for striping, the wire does not pass through a foam wiper. Instead, the wire passes through a striper head that spins around the wire before it goes into the dryer tower.

The produced stripes are either longitudinal or spiral. Post production striping usually generates a spiral stripe, like that on a candy cane. Longitudinal stripes, which run along the side of a wire, are also available post production, but are not as

common as the spiral type. Contrasting stripes are generally used when more than ten circuits have to be identified.

Almost all insulations are able to be striped including PVC, rubber, silicone, and PTFE. Similar to striping, most PVC compounds can be dyed to individual specifications without encountering any problems. However, some compounds that are CV cured or irradiated are not able to be dyed because they were originally designed to repel both petroleum and alkaline based chemicals. The color will not soak into the insulation and is prone to flake off.

Printing

In addition to common striping and dyeing methods, there are other ways of marking wire for identification. Many OEM's and harness manufacturers prefer using printed wire in their assembled products. Printed wire not only helps in the assembly of products, but also benefits installers and users of the finished product.

One way of marking wire is with ink jet printing. Using a dot matrix printer, a series of "dots" create characters on a wire. For example, in the automotive industry, a harness may be manufactured for turn signals. In this case, the specific wire would be ink jet printed "left front turn signal" or "right rear turn signal" along with "tail lights" etc. Each wire would be color coded in the harness and ink jet printed, making it user friendly and easily identifiable.

Another way of marking wire is hot stamping, which entails a process similar to that of a type writer (for younger readers, that's something we used before computers!). A series of characters are available where a "head" strikes a colored tape creating the chosen character(s) to appear on the wire.

Twisting

Many OEM's need paired wire in the manufacturing process. Grouping single or multi-conductor cables into various configurations cuts installation time dramatically because it allows wires to lay together well, which in turn makes working with them easier. In order to create paired wire, a process known as twisting must occur. Twisting entwines multiple wires and arranges them tightly

next to each other. Two, three, and even up to eight wires can be twisted together.

The process of putting wire ends into a drill and then twisting the wire is one home-spun twisting method still practiced on the production floor. The method will get the job done to some extent, but it will not remove the natural twist in each wire. This means that if the wire is cut into small lengths, it will not stay twisted together. Another problem with the method is the wire acquires dirt and grit on the production floor. The dirt could transfer to the finished product, which could then pose major problems. Twisting using a dedicated wire twisting machine is the only way to get a good lay to the wires.

Braiding

One process that helps add protection against abrasion in harsh environments is braiding. Braiding is a process in which small strands are woven together on top of a wire or cable for added protection. At the start of the process, numerous spools, also called "Bobbins," of very small gauge wire (32-36 AWG) are inserted into a wire braiding machine. The bobbins are each placed in a precise location within the machine and the ends of each bobbin are pulled to the top of the braiding machine. Next, the bobbins are subjected to a spinning or circular weaving motion, while a wire or cable is pulled up through the center of the bobbins. As the synchronized process commences, a weave or braid is manufactured over the cable. Finally, the finished product is drawn out of the braid machine onto a larger spool or payoff.

Cut & Strip

Having your wire cut and striped saves time and money and prevents excessive waste. Say you need 1000 four-inch pieces of your wire to install in printers that you manufacture. For each piece, you need .5 inches of the wire exposed on the ends. Instead of having your factory workers manually cut each piece off the reel and then remove the insulation from the ends, you could have your value-added manufacturer complete the process for you.

The cut and strip process starts at one end of a cut and strip machine where a reel is held in what is called a payoff. The machine operator enters

the overall length and desired cut and strip measurements for the pieces. Next, the wire is fed through a set of pressure sensitive wheels that hold the wire tautly. Then the wire is passed through a pair of blades that strip off the insulation, as it can sense where the bare wire begins. The wire is then pulled to the end to make the length cut. Finally, it is pulled backward slightly in order to make the final 'strip' cut. The pieces of insulation cut for the strip can be left on the end of the wire to prevent the strands from fraying. This detached piece of insulation is called the slug. The final cut and stripped wire is dropped into a bin and the machine will finish this process for the total amount of wire length the machine operator entered at the beginning of the process.



Special Packaging/Reel Sizes

Wire is heavy, consumes space and is hard to keep in inventory. In addition, OEM's often worry about the costs in set-up and handling of pre-processed and post-processed wire. Many OEM's that regularly use wire have gone the route of special reels or spools for their wire in order to efficiently use storage area, maintain an accurate inventory, and keep costs to a minimum.

Distributors in the wire and cable business that cater to OEM's and harness houses have developed unique ways to store wire. One such way is to use large bulk Drum "reels". Drums are commonly constructed of cardboard or pressed paper (with a center core of the same material) and metal rings around both the top and bottom. When wire is ready to be stored, it is laid into the Drum using a circular motion that allows for easy removal later on. Storage capacity in any given Drum can be thousands of feet depending on the gauge of the wire. The downside? If the Drum is rolled or damaged, the wire may become almost impossible to remove.

Reels and spools come in many different sizes and configurations for use with varying wire types. For example, large 6 to 8 foot tall wooden slatted reels hold large gauge power cable. Many wire manufacturers stick with the standard of 2,500 ft to 5,000 ft spools for hook up wire. Small gauge wire may be spooled on a 10 inch plastic spool that has a center core length of 5 to 6 inches and holds up to 10,000 ft.

Certain factors determine the spool size you will need. One important factor is how the wire will be used in the manufacturing process. If the manufacturer usually cuts their wire by automated machine, the spool size or Drum size may be critical. For example, using an automated machine, a large Drum of wire can be gone in as little as 30 minutes depending on the length of the cut. Cost is another factor. As an added benefit for a large reel size or Drum Packs, many distributors offer discounts on bulk reels.

Conclusion

Electrical wire and cable distributors have the tools to prepare wire for the buyer's convenience. Whether the service is stripping, dyeing, printing, braiding, twisting, cut and strip, special packaging or special reel sizes, the distributor offers the ability to custom order inventory to fit individual process and storage needs. This translates into better usage of time and space, and that further translates into profit.

To obtain any of the above-mentioned services, look for a wire and cable company listed as a "value-added manufacturer" or contact Allied Wire & Cable for more information.