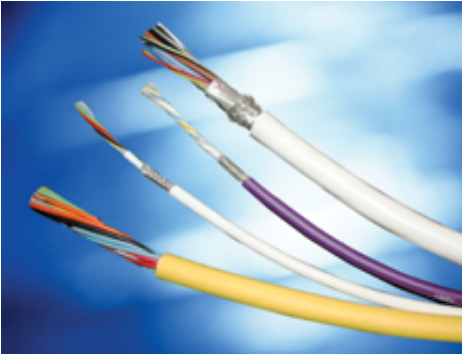


White Paper

4 Challenges Solved by Custom Cables

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With so many standard, out-of-the-box options already available for industrial cables, why would a custom cable ever be necessary?

In many cases, off-the-shelf cables can fulfill the majority of project demands. But sometimes applications call for properties and requirements that extend beyond what a “standard” cable provides. It can take weeks of reading, researching, and contacting manufacturers to find an existing cable that might work. But, in most situations, “might work” isn’t good enough.

It’s within these unique applications that custom cables shine. Designed according to your specific specifications, custom cables can be created as an exact match for your project.

Where You’ll Find Custom Cables

Although custom cables are used in almost every environment, they’re found most often in four markets.

1. Government

From military bases and maritime vessels to aircrafts and combat situations, government applications frequently require custom solutions that can tolerate various climates and environmental conditions, protect against interference, and resist crushing.

Because these cables carry critical information and/or power from one place to another, failure—or even just a few seconds of downtime—isn’t an option. Equipment operating at this level of intensity often requires custom solutions to meet exacting performance standards.



2. Healthcare

Tolerating sterilization, extreme temperatures, frequent use, and patient contact: From emergency rooms to field hospitals, the healthcare industry has precise requirements for the cables that sustain critical, life-saving procedures.

Many common medical applications require reliable, custom solutions that won’t fail in emergencies and can also withstand frequent chemical exposure, support quick deployment, protect against noise, minimize weight, and also prevent irritation, damage, or discomfort when coming into contact with patients.

3. Extremely Harsh Industrial Sites

Cables used in extreme industrial environments must be able to perform no matter what they encounter: abrasion, vibration, moisture, or very low or very high temperatures. Although industrial cables

are built to be robust, sometimes extremely harsh surroundings call for cables that can endure even more. A custom solution ensures that cables in these environments continue to perform as intended—even when traditional industrial cables may not.

4. Robotics and Automation

As robotics technology automates repetitive tasks, reduces human error, and decreases injury for workers, it also puts tremendous strain on cables. Robots are always moving—and they require cables that work just as hard as they do by supporting extreme motion requirements, bend radius, voltage levels, and abrasion resistance.

These applications often have a need for cables that offer durability, continuous flexibility, and the ability to survive repetitive movement—something only a custom solution can offer.

How “Customized” Can I Get?

You can tailor nearly any component of a cable to meet your precise circumstances (especially if you don’t need to worry about regulatory requirements, such as ISO or UL).

Your goal—whether it involves minimizing size and weight, reducing installation complexity, running gas through a cable, or improving flex life—will influence your choices on components like:

- Bend radius
- Biocompatibility
- Chemical resistance
- Color
- Diameter
- Flame resistance
- Flexibility
- Insulation
- Jacket material
- Length
- Shielding
- Strand count & configurations
- UV resistance
- Voltage
- Wire configurations

4 Challenges Solved by Custom Cables

Common Cable Customization Requests

Although custom cable can be used across many applications to address a wide variety of challenges, there are four common challenges that are often solved by deploying custom cable.

Problem 1: I need one cable to be able to do what two, three or four standard cables can normally do.

To make installation faster, easier, and more cost effective, a typical request involves combining specific aspects of different cables under one common jacket. Some have gone so far as to heat-shrink cables together to create an assembly, bringing all the performance they need into one cable—but this approach takes lots of valuable time, material, and labor resources.

Instead, custom cables can do the hard work for you. For example, we often field requests to combine Ethernet capabilities with power/ground conductors. Another common customization involves bringing six, eight, or ten pairs together under a common jacket when the application needs more than what a standard Ethernet cable delivers.

Problem 2: I need a more flexible cable that doesn't fail after a certain number of flex cycles.

It happens all too often: A cable is selected for its electrical properties (or, in some cases, price) and installed in an application that involves lots of flexing. While it may hold up for a while, repeated flexing prematurely destroys the cable, leads to failure, and requires frequent replacement as a result.

In this case, you can maintain the electrical properties of a cable while changing the conductor strand count to increase flexibility. This leads to improved bend radius so the cable can continue to perform despite repeated flexing.

Depending on the application, it's also common to customize cables so they can maintain high tension in extreme temperatures or stay bent for longer periods of time without damage.

Problem 3: People will see and/or touch this cable; it needs to look and feel nice.

While most cables remain behind the scenes (inside equipment, above ceilings, behind walls, or in conduit, for example), others are out in the open.

In medical settings, for example, patient- and clinician-facing cables are found on medical equipment and handheld assemblies or devices. The cables may be draping across a patient, visible in the

room, or pulled across a bed. They're also manipulated by clinicians who are wearing gloves. All of this can impact how a cable looks, feels, and responds to movement.

For this reason, cables are often customized to make sure the look and feel aligns with patient and clinician expectations. A cable that looks and feels like a quality cable can also positively influence opinions about the quality of medical equipment and services.

Problem 4: My application involves very specific environmental conditions that extend beyond the capabilities of off-the-shelf cables.

The final challenge custom cables often help overcome is the need to maintain performance despite very specific environmental conditions. For instance, a cable may need to withstand high levels of shock, extremely wide temperature swings, or large amounts of water.

Cables can be modified to meet precise environmental specifications that traditional industrial cables aren't built to tolerate. Once the design is finalized, the cables can also be tested to those particular parameters to ensure performance.



Are Custom Cables Right for Me?

Custom cables are meant to overcome performance obstacles associated with off-the-shelf, readily available cables; they're not needed for every application. If a standard cable will work for your project, going that route is your best bet in terms of cost effectiveness and lead time. Most manufacturers can point out alternatives to meet your needs without causing you to overbuy.

But sometimes you can't avoid using custom cables. If you answer "yes" to any of these questions, then cable customization might be the best way to achieve your goals:

- Are standard cables repeatedly failing in a certain application?
- Is your application extremely demanding in terms of flexibility, environmental conditions, etc.?
- Does your team spend too much time struggling to make standard cables fit or work?
- Does deployment take too long because you have to install several individual cables to achieve needed performance?
- Do you need certain jacket colors or print legends for a project?
- Does your project involve working with or around existing ancillary components (grips, connectors, grommets, etc.)?

Conclusion

When a standard, off-the-shelf cable can't satisfy the demands of an application, custom cables offer a way to get exactly what you need. Designed according to your specific specifications to overcome performance obstacles, custom cables can be created as an exact match for your project. They'll save you time, money, and frustration over the long term.

Partnering with Alpha Wire for Custom Cables

Alpha Wire is known for its highly engineered custom cable capabilities. We take a collaborative approach to every customization project, to understand your application's needs, unique challenges,

and the modifications needed to meet your objectives. We don't just manufacture a cable according to your technical specifications; we want to understand where and how your cable will be used to make sure we get it right.

Our wide range of material, configuration, and gauge options means you can customize nearly every component of your cable. In-house testing and responsive prototyping/development ensure that our engineering staff's creations will work for your exact project. Their knowledge and expertise span all industries, including medical applications that call for biocompatibility and mass sterilization.

We streamline ordering for custom cables as well, offering minimums as low as 500 feet and blanket order releases so you can

maintain consistent supply chains. For example, if you want 100,000 feet of cable in monthly increments, we can make it happen.

Each of Alpha Wire's custom cable creations belongs to the company we create it for. Once the design and manufacturing are complete, we provide you with intellectual property (IP) protection to safeguard your business and your ideas: You own the IP for your custom cable.

To learn more about what we can do for you, visit www.alphawire.com/custom.

Mike Cother is a Senior Product Development Engineer at Alpha Wire. He has more than 12 years of experience in the custom wire and cable industry.



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