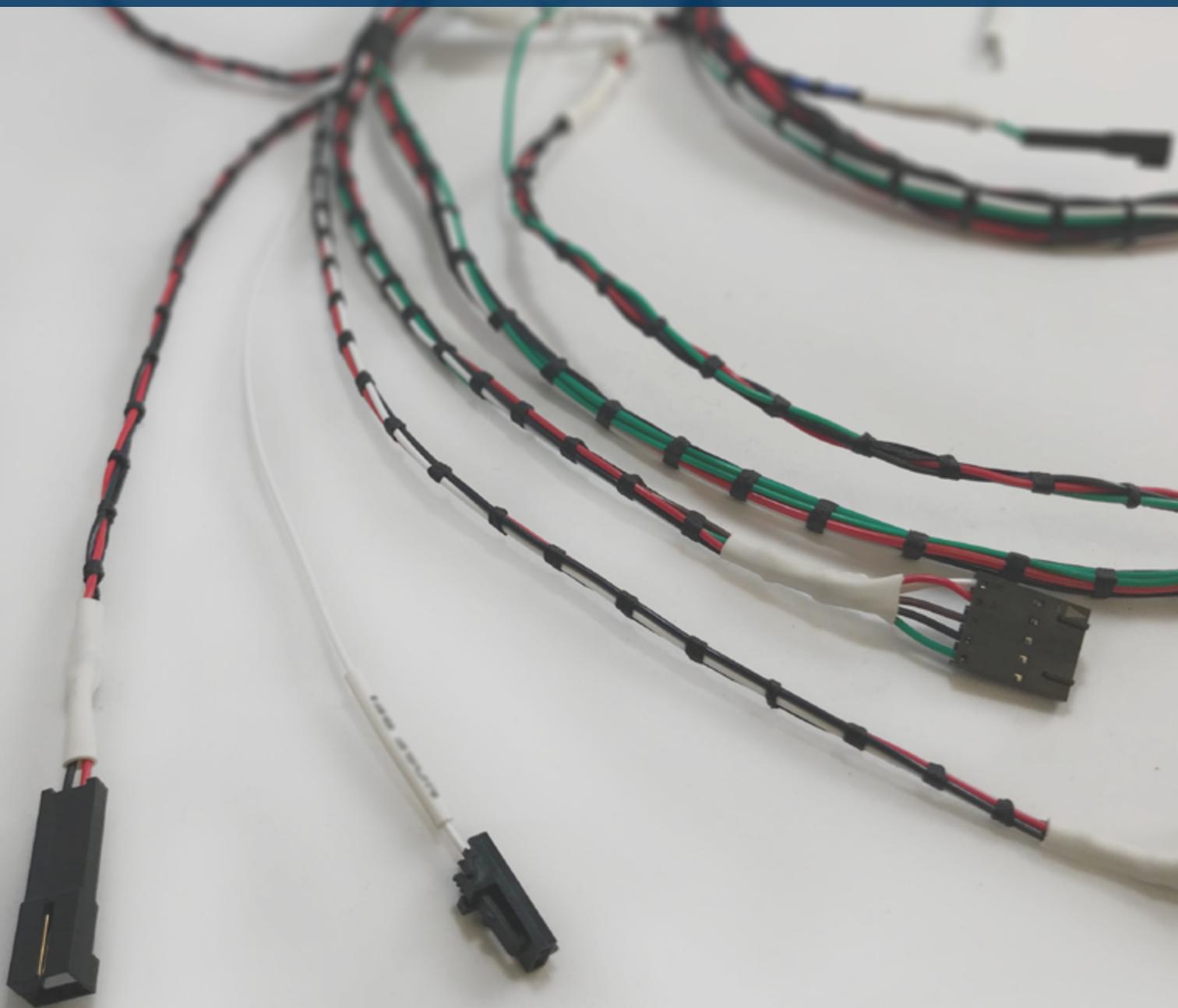
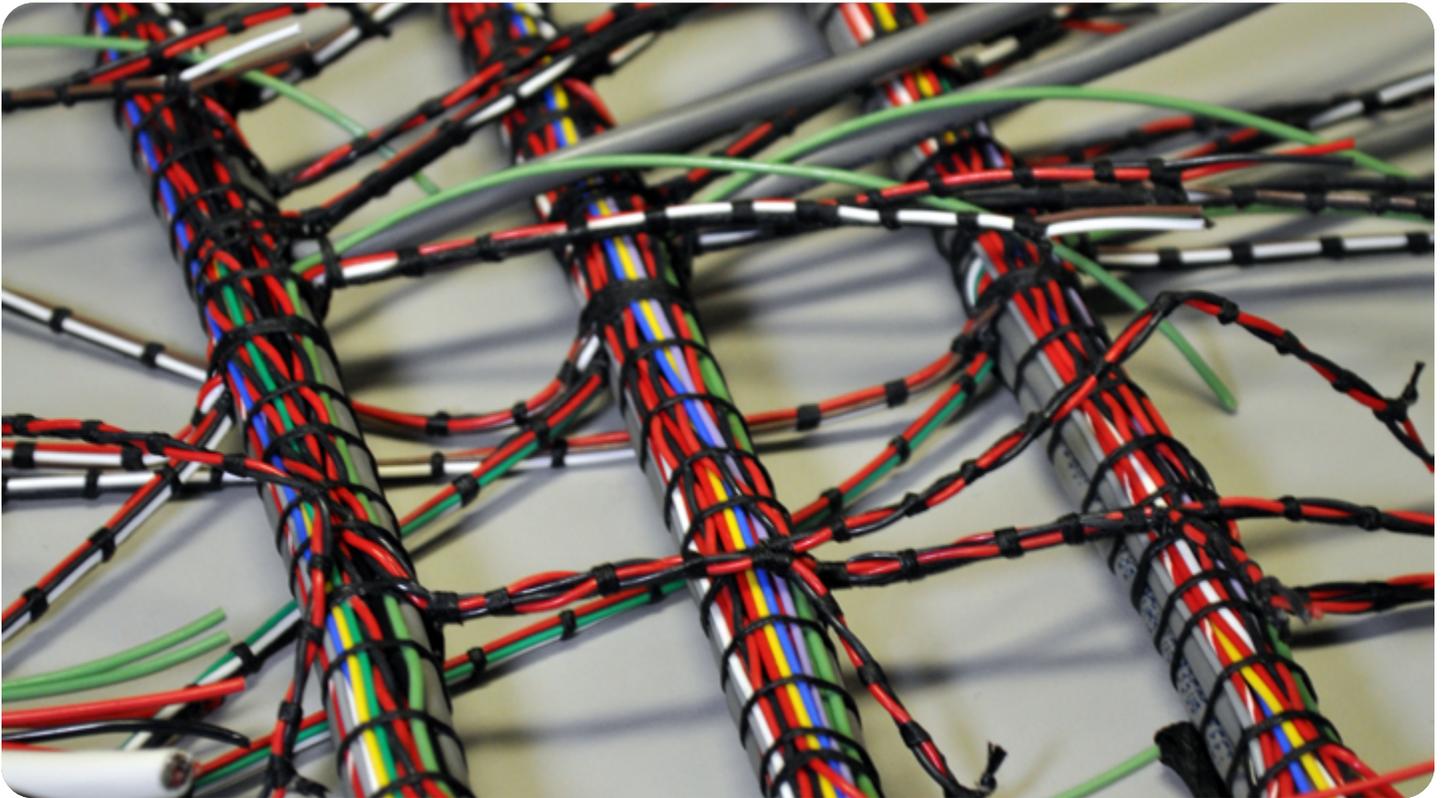


WIRE HARNESSSES: --- A COMPLETE GUIDE



ELECTRO-PREP



Introduction

Wire harnesses are versatile bundles of wires used to transmit electrical power or signals for a wide range of industries and applications.

As demand for complex wire harnesses grows, manufacturers are faced with the challenge of producing high-quality wire harnesses with the utmost speed and efficiency.

In this eBook, we will provide an overview of wire harnesses and their benefits, manufacturing process, and design considerations.

We will also cover the factors you should consider when looking for a wire harness manufacturer for your application.

Overview of Wire Harnesses

A wire harness consists of a collection of wires bundled into an exterior covering. Depending on the application, a variety of sheaths and binding materials are available, including braided cloth material, military lacing, expandable sleeving, spiral wraps, and tie wraps. This wire bundle may include materials such as crimp terminals, connectors, resistors, or many other discrete components.

Wire assemblies are typically used to transmit electrical signals or power in electrical and communication systems. With wires bundled into harnesses, technicians can easily install and organize electrical systems, creating safer and more efficient operation.

By simplifying wire organization in a system, wire harnesses create straightforward, low-cost electrical and communication arrays for a variety of industries, including:

Aerospace

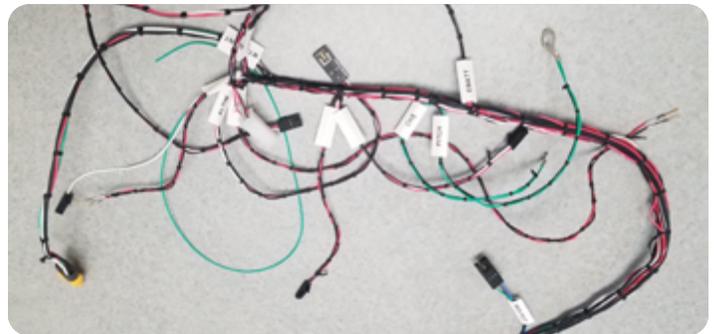
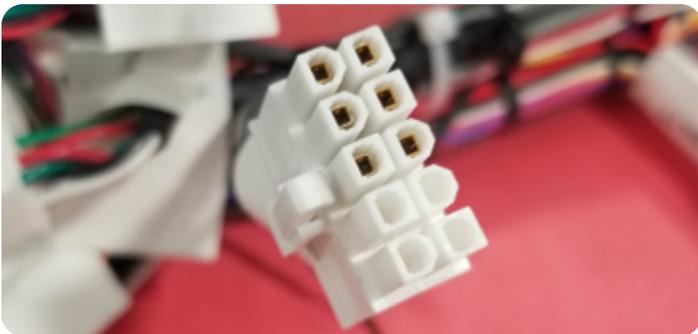
Telecommunications

Military

Industrial

Automotive

Solar



The Benefits of Wire Harnesses

The simple design and versatility of wire harnesses make them useful for a variety of applications. The benefits of wire harnesses include:



Cost Reduction

Wire harnesses are less expensive to install and maintain than multiple individual wire runs.



Enhanced Organization

Bundled wires improve organization, particularly for large-scale wire arrays.



Protection

Sheathed wire harnesses are protected from moisture, temperature extremes, and chemicals present in the surrounding environment.



Greater Productivity

Better organization of wire arrays means faster installation for enhanced productivity.



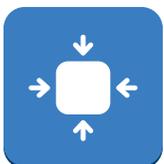
Improved Safety

Bundled wire harnesses reduce trip hazards and loose wires, which enhances safety.



Simplified Design

Including additional components in the harness will streamline system integration, saving time and money.



Space Efficiency

Organized wire harnesses take up less space than disorganized wiring arrays, allowing technicians to easily locate components when necessary.

The Manufacturing Process of Wire Harnesses

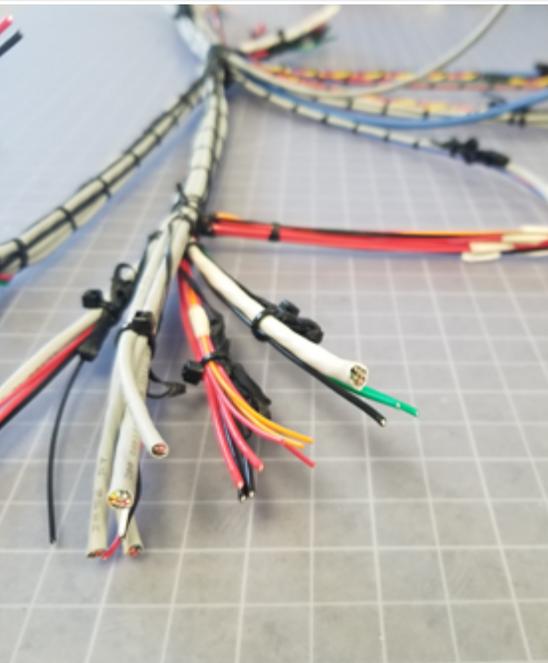
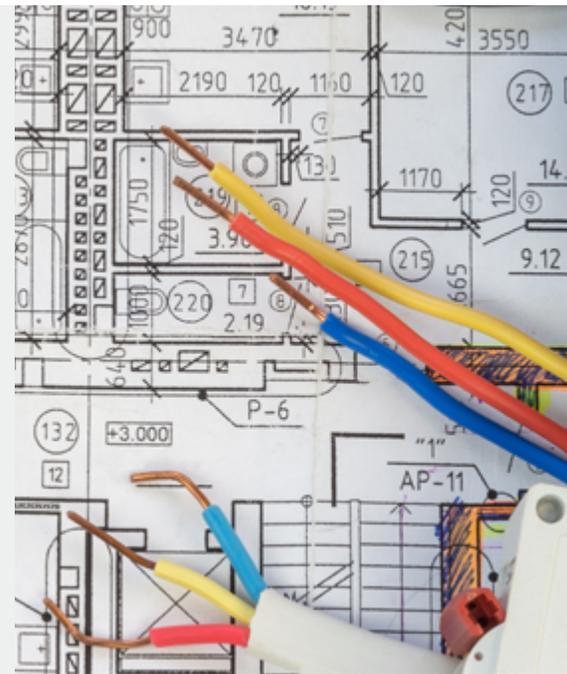
Wire harness manufacturing is highly specialized and labor-intensive. It is therefore important to work with a manufacturer who specializes in their production. With expertise and specialized equipment, wire harness manufacturers like Electro-Prep can manufacture quality harnesses to meet the specific needs of your applications.

Wire harness manufacturing can be divided into four steps: Design, Prototyping, Production/ and Assembly, and Testing.

Step 1: Design

During the design phase, engineers conduct thorough product research to develop an effective, efficient wire harness design that meets the specific mechanical and electrical needs of the finished assembly.

With a complete understanding of the intended use and operating conditions of the final application, engineers ensure that wire harnesses meet both customer specifications and industry quality standards.



Step 2: Prototyping

Once the wire harness design has been completed, engineers often create a prototype to test each component of the design to ensure that the harness operates as intended. Prototyping provides the opportunity to make modifications before the product enters full production.

Step 3: Production/Assembly

After the prototype phase, manufacturers move to production and assembly. This step of the manufacturing process involves cutting, stripping, and marking wires, as well as crimping terminals, adding discrete components, routing on harness boards, and binding wires and cables together. Each step requires close attention to detail, which makes this process impossible to automate. With great care, manufacturers manually assemble intricate and complex harnesses to produce a quality final product.



Step 4: Testing

To ensure that the final product meets quality standards and design specifications, each wire harness undergoes rigorous testing. Manufacturers test the product to ensure that each connection operates correctly within the system for which it is designed. The final construction and product labeling will also be checked for accuracy.

Wire Harness Design Considerations

The functionality of your wire harness depends largely upon the overall equipment design and intended end application. Each wire within the harness assembly exhibits unique features tailored to each application. Important characteristics to identify for your wire harness include length, color, size, current and voltage requirements, insulation, wire end properties, signal levels, UL rating, and custom OEM specifications. Other key factors to consider include:



Terminals and Connectors

To ensure that your wire harness works as intended, it's important to select terminals and connectors that are compatible with the existing equipment.



Discrete Components

Can components be added to the wire harness to simplify the overall system manufacturing process?



Harness Flexibility

You must consider whether the harness will be continuously bent or flexed in the end product to determine the right harness materials and design.



Environmental and Operating Conditions

The design of your wire harness must be able to withstand the environmental and operating conditions of your application, including moisture, extreme temperatures, chemicals, corrosion, corners, and sharp surfaces.



Shape and Configuration

It's crucial to consider size, shape, routing, breakouts, and the number of circuits and conductors needed for the application.



Environmental and Safety Requirements

Industry standards, safety requirements, and environmental regulations are all considered when choosing, installing, and inspecting your wire harness.



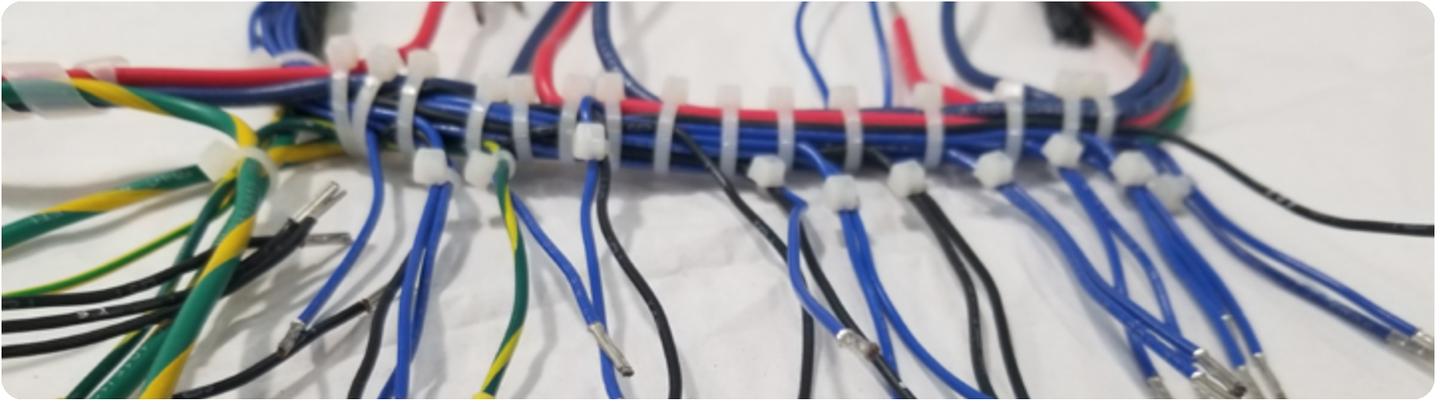
Wire Gauge and Terminal Sizes

It is important to consider the wire gauge necessary, as well as the appropriate terminal sizes.



Wire End Treatments

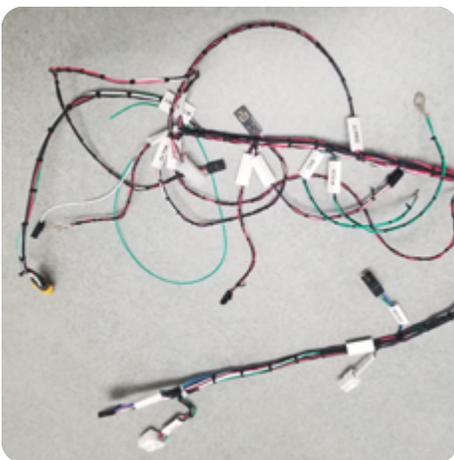
You must ensure that your wires have proper end treatments for safe, efficient connections and terminals.



Factors to Consider When Choosing a Wire Harness Partner

Choosing the right wire harness partner for your application can help ensure reliable, cost-effective solutions that are tailored to your particular needs. It is important to select a wire harness partner with extensive experience and the ability to create custom solutions to meet even the most detailed and complex specifications. A quality harness provider will be able to assist with every aspect of the wire harness manufacturing process, from design through prototype testing, production, and quality testing.

When selecting the right wire harness partner for your needs, consider the following factors:



Quality Control

Your wire harness manufacturer should maintain high standards for industrial operations, precision, and operational safety.

To ensure that their work is consistent with industry standards for wire harness manufacturing, check to be sure that they carry ISO 9001:2015 and IPC/WHMA-A-620 certifications.

Also, check for UL registration for wire harness manufacturing.

This helps to ensure that the company meets strict safety standards as established by Underwriters Laboratories.



Collaborative and Communicative

It is important to have a manufacturing partner who listens closely to what you need and is dedicated to creating a collaborative environment. This helps to ensure that all of your project needs are met quickly and efficiently, without unnecessary delays or complications.

Product Offering and Lead Times

When choosing your wire harness partner, be sure that they keep a wide selection of wire and components in inventory. Quick access to components means that your partner can complete and return your order on time, which is crucial to the success of your project.

Cost Saving

It is critical to have a wire harness partner who considers your best interests when making suggestions for your wire harness projects.

A good wire harness manufacturer will help you find the most cost-effective solutions to produce reliable, high-quality products while saving you both time and money.

Quality Wire Harness Manufacturing by Electro-Prep

Since 1977, Electro-Prep has been a leading provider of superior quality wire and cable arrays for electronic instruments in industrial, commercial, military, and medical settings, among many others. We pride ourselves on producing custom wire harnesses to meet exacting specifications and stringent industry standards.

Our commitment to quality is evident in our extensive certifications, including IPC/WHMA-A-620, IPC J-STD-001, ISO 9001:2015, UL, and CSA. To learn more about our comprehensive wire harness manufacturing capabilities, contact us or request a quote today.

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