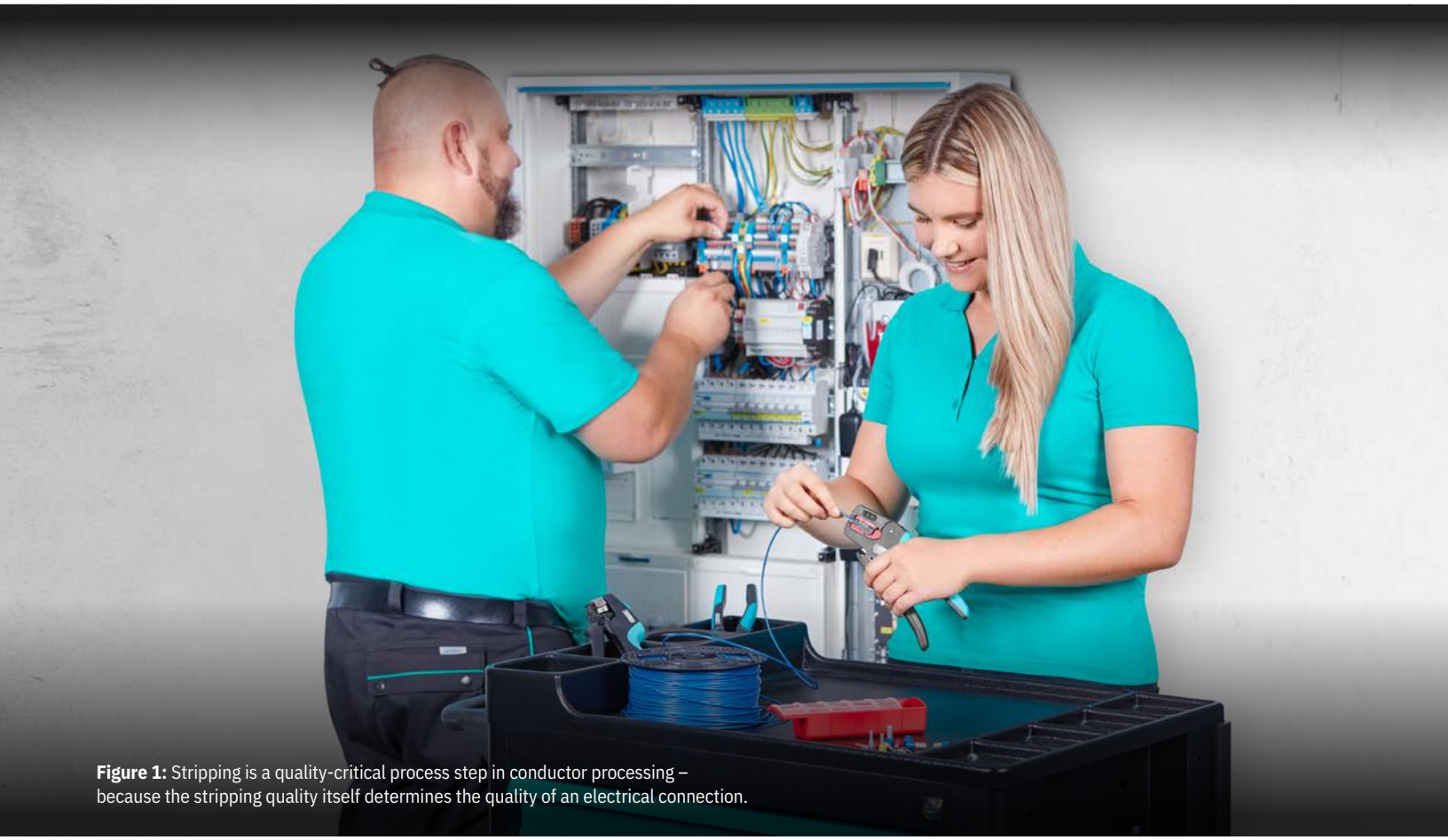


Figure 1: Stripping is a quality-critical process step in conductor processing – because the stripping quality itself determines the quality of an electrical connection.

From hand tools to automatic tools

Wire stripping in focus

Learn more about

- The importance of stripping wires properly
- The differences between hand tools and automatic tools for stripping
- How to choose the best stripping tool for your specific job

© PHOENIX CONTACT USA, Inc.

Introduction

Before an electrical connection can be made, the conductors usually have to be stripped. What should be taken into account? And which tool is best suited for what? This article answers these questions.

Simply stripping – easier said than done. There is a wide variety of conductor types on the market, and many of them have their own characteristics. The increasing focus on process reliability and efficiency places high demands on this processing step.

Stripping, in the narrower sense, is the removal of the insulation of an electrical conductor to a certain length. The geometry of the terminal point or connector determines the length over which the insulation must be removed. Stripping also includes removing the outer sheath. The outer sheath of a multi-core cable must be removed to expose the single-core wires.

For a safe electrical connection, it is important that the stranded wires, single-core wires, or the braided shield are not damaged. Figure 2 shows a perfect stripping result in accordance with DIN IEC 60352-2. Depending on which tool is used, clamping the conductor can lead to pressure points and to discoloration of the insulation. As long as the insulation is not damaged, the stripping result conforms to DIN IEC 60352-2.

To avoid damaging the stranded wires, stripping is a two-stage process involving "cutting into" and "pulling off" the insulation. The first step is to cut into the insulation up to a clearance to the stranded wires of approx. 0.1 mm to 0.3 mm. In the second step, the uncut area of the insulation is pulled off, and the insulation is removed. Typical stripping errors are also shown in Figure 2.



Figure 2: When is a stripping result ideal? Overview of permissible and incorrect results in wire preparation.

Contents

Non-adjustable hand tools	3
Adjustable hand tools	3
Automatically adjustable hand tools	3
Manually adjustable automatic tools	4
Self-adjusting automatic tools	4
Summary	5

Non-adjustable hand tools

Hand tools or automatic tools can be used for stripping. Hand tools can be split into non-adjustable, adjustable, and automatically adjustable tools.

Non-adjustable tools such as the Wirefox-MP VDE multi-functional tool are the simplest tools. They usually cover a large cross-section range (24 to 8 AWG), and different conductors can be processed quickly one after the other. Some practice is required for perfect stripping results. Due to the lack of adjustability, these tools are not suitable if a high level of process reliability is required.

Adjustable hand tools

Adjustable tools not only improve process reliability, but they also require little practice to use. Tools with a rotating blade, such as the Wirefox-D 40, are generally suitable for sheath removal and stripping in the cross-section range 8 AWG. In addition, it can achieve a constant depth of incision over the entire circumference. Non-rotating cutting edges are used for smaller cross-sections, with higher pull-off proportions.

In addition to tools with a wide range of applications, such as the Wirefox-D 40, some tools have been developed for very specific applications. The tools in the Wirefox D-CX... series are designed for the multi-stage stripping of coaxial cables. Depending on the type of connector used, a tool with the correct blade clearance is selected to achieve the required stripping lengths. However, due to the time required to set the tools, they are not suitable for frequent material changes.

Automatically adjustable hand tools

The automatically adjustable hand tools combine the advantages of non-adjustable and adjustable hand tools and enable fast material changes with high process reliability. Different blade geometries are used depending on the application. For example, the flat blade of the Wirefox 10 can be used to strip PVC cables up to 8 AWG. Half-round blades are used for cross-sections up to 6 AWG to reduce the pull-off proportion and, thus, the force required. The stripping lengths can be set using the adjustable stop. V-blades are used for hard insulation materials such as PTFE and short-circuit-proof cables with soft rubber insulation. The blades can be replaced – tool-free – to ensure a long service life of the stripping pliers.

Within the range of automatically adjustable hand tools, there are also tools designed for special applications. These include the stripping of SAC cables, AS-Interface flat cables, and the stripping of flat-ribbon cables. Wherever the application permits, the use of automatically adjustable tools is recommended (Figure 3).



Figure 3: The automatically adjusting stripping pliers are the recommended hand tool. These make stripping different conductors simple and reliable.

Manually adjustable automatic tools

With increasing quantities in series production and high demands on quality, hand tools are reaching their limits. It does not matter how ergonomically designed the hand tools are –some form of fatigue will inevitably occur. This is where the automatic tools come into play. The electric WF 1000 automatic stripping device is the entry-level model for automatic tools.

Once the cross-section, the stripping length, and the pull-off length have been set, many conductors can be processed in a short time without fatigue. As with manually adjustable hand tools, each material change takes a certain amount of time. The stripping parameters are set using rotary knobs, and the stripping result is checked. The machine is particularly suitable for processing identical materials.

Self-adjusting automatic tools

The new E.Fox S 10 automatic stripping device is the ideal choice wherever the production process or the order plan requires frequent material changes or parameter changes. The electrical adjustment of the stripping parameters enables material changes in the shortest possible time. Operation is quick and easy via an intuitively designed user interface with a touch display. The ability to save desired stripping parameters as favorites and call them up using a barcode scanner can significantly increase efficiency (Figure 4). This also reduces the potential for human error compared to devices requiring manual adjustment.

The E.Fox S 10 can not only be used as a standalone device, but can also be operated via the integrated Ethernet interface with the Clipx Wire assist worker assistance software. The focus here is on the consistent use of production data. This means that even larger, multi-version orders can be processed conveniently and with consistent reliability. In combination with other automatic wire processing tools and printing systems, which are also controlled via the same software, a customized worker assistance system can be put together for efficient wire preparation.

Figure 4: Strip conductors quickly and easily with the E.Fox S 10 stripping machine: different cross-sections and insulation materials can be processed efficiently.



Summary

The choice of the right tool for stripping depends on the application. From within the range of hand tools, automatically adjusting stripping pliers should be used if possible. Automatic wire processing devices can increase efficiency, help process larger quantities, and reduce fatigue and errors. Whether using a hand tool or automatic machine, regularly checking the stripping results and making the appropriate setting changes is crucial for consistently high quality.

Increased efficiency with Push-X and E.Fox S 10

Push-X technology enables tool-free direct wiring of rigid and flexible conductors with and without ferrules. Combining this connection technology with the E.Fox S 10 automatic stripping device is the perfect foundation for quick and easy wiring. Integration into the Clipx Wire assist worker assistance system ensures the best possible efficiency in semi-automated control cabinet wiring.



Jannis Münkner
Product Manager Industrial Cabinet Solutions, Phoenix Contact GmbH & Co. KG, Blomberg, Germany



Maria Schierscher
Associate Product Manager – Tooling, Phoenix Contact USA
mschierscher@phoenixcontact.com

About Phoenix Contact

Phoenix Contact is a global market leader based in Germany. Since 1923, Phoenix Contact has created products to connect, distribute, and control power and data flows. Our products are found in nearly all industrial settings, but we have a strong focus on the energy, infrastructure, process, factory automation, and e-mobility markets. Sustainability and responsibility guide every action we take, and we're proud to work with our customers to empower a smart and sustainable world for future generations. Our global network includes 22,000 employees in 100+ countries. Phoenix Contact USA has headquarters near Harrisburg, Pa., and employs more than 1,100 people across the U.S.

For more information about Phoenix Contact or its products, visit **www.phoenixcontact.com**, call technical service at **800-322-3225**, or email **info@phoenixcontact.com**.