FIELD-ASSEMBLED CABLES OR OVERMOLDED? KEY FACTORS TO CONSIDER.

A SWITCHCRAFT & CONXALL WHITE PAPER

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Making, securing, maintaining and protecting your connection - you'd be hard pressed to come up with any functions more important to the ongoing operation of your equipment or vehicles than these four. No connection, no power, no go. Bad connection, poor performance, repairs, downtime, lost productivity, unhappy customers. Your success or lack thereof begins and ends with connectivity.

Cable assemblies of course are the core components for your most critical connections. In many instances, you'll have the option of choosing between field-assembled cables or overmolded cables. For some designs the choice will be clear cut; for others not so much. In this Switchcraft white paper we draw on more than 60 years of design, manufacturing and in-the-field experience and expertise to help you answer this question: Field-assembled or overmolded?

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Field-assembled cable

With field-assembled cables you manually assemble your connectors to your cables. For many designs field-assembled cables will work just fine; and in certain instances they will be your only option.

For example-

1. You have very specific or custom installations that require a specific length or varied lengths of cable, depending on the install.

2. You have to route a cable through a channel or piece of conduit and the design dictates a connector size such that one end of the cable won't fit through the opening with the connector pre-attached. We see this, for example, in some vehicle-related installations.

3. Your cable will be in a protected environment and once connected it will seldom be disconnected and reattached, i.e. no repetitive use.

4. For prototype installations in which the quantity you need is very small.

Using field-assembled cables: Factors to consider

Often you'll have to make a choice between field-assembled cables and overmolded cables. Cost, quality, market, product/application, end-user – these criteria and others will factor into your decision. We'll now address these factors.

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How qualified, how experienced, how *good* is the personnel assembling your cables?

We're taking it on fact that your cable and connector suppliers are providing you with top-quality, highly-functioning components. In turn, that leaves us with this other fact: Your field-assembled cable connections are only as good as the people in the field doing the assembling. So if you're highly confident about the experience and skills of your employees–or those of your contract manufacturer–and this confidence if borne out by product performance, then overmolded cables would not seem necessary.

But assembly personnel–in-house and outsourced–can and do make mistakes.

For example, we once worked with a manufacturer that had a problem with its contacts opening up. When we researched the problem we determined that during the cable assembly process the contractor overheated the contacts when applying solder. And that resulted in melted plastic and open contacts. So the customer switched to overmolded cable assemblies and the problem was resolved. In another instance, the contract manufacturer used a sealed IP-rated connector in a cable assembly for a refrigerator ice maker – but, left out the O ring. This mistake of course rendered the connector's IP rating meaningless and severely degraded the performance of the connector and the ice maker.

By no means do we intend the above information to be an across-the-board slam against contractors. There are many outstanding contract manufacturers and we're familiar with most of them. We'll conclude this section though with this bit of common-sense advice:

> Before you commit to using the services of a contract manufacturer make sure you ask how they will – and how *often* they will – test your cable assemblies. And be sure you're comfortable with and confident in the answers you get. This is especially important if your cable assemblies are being used in such critical-functioning applications as bomb suits, commercial pilot headsets or mission-critical industrial applications.

Cost comparison

Comparing the cost of field-assembled cables to overmolded cables is, for the most part, like comparing apples to oranges. The product costs for field-installable cable assemblies are obviously less expensive. But add in the cost of labor and the costs associated with higher error rates for field-installable cables and you may well come to the conclusion that overmolded cables offer you a lower total cost of ownership.

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Overmolded cable assembly
An overmolded cable seamlessly combines the cable and connector into a single part. In overmolding, molten material is injected into a mold cavity and the cooled material conforms to the shape of the mold. The resulting mold cavity can be plain and simple or quite elaborate, replete with your company name, logo, flanges, an extended strain relief area and more. Overmolded cable assemblies give you ease of installation and a commonality among installs that you won't get with field installs.

There are many applications and products for which an overmolded cable assembly is your only choice or clearly your preferred choice.

Key factors that commonly drive the specification of overmolded cable assemblies:

1. **Environmental concerns** – Unlike with a field-installable cable that's subject to human error, there's little to no chance the sealing on your overmolded cable assembly will be compromised. The rear of the connector area is sealed and, barring extraordinary circumstances, will forever remain sealed.

   Additionally, you can be confident that the connector part of your overmolded cable will perform as rated in harsh weather. This is particularly important for equipment that is continually exposed to moisture or for machinery and devices that get regular high-pressure wash downs – such as those used in food preparation and healthcare.

   For solar applications, you most likely want a harsh environment seal and some UV protection. You can get that with overmolded cable assemblies.

2. **Strength and security of connection** – Overmolded cable assemblies have integrated strain relief, giving them the ability to absorb up to seventy pounds of pullout force. Getting this strength of connection in a field-installable cable is typically more difficult.

3. **Aesthetics** – Sometimes it's all about the appearance. Medical equipment, high-end, high-tech hardware, any expensive, sleek, high-performance machinery or equipment about which every aspect you want to reflect quality – you want overmolded cable assemblies.

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For example, a Switchcraft customer and manufacturer of an expensive communications device had been using field-installable cables and electrical tape to form a Y junction on its cables. As you can imagine, the look didn't exactly scream quality and prestige. We suggested an overmolded Y junction cable assembly; the customer implemented our suggestion and loved the new, more professional look.

4. **Flex relief** – Overmolded cable assemblies offer the option of a secure flex relief which will help limit the cable bend radius at the exit of the connector – you'll always get consistent flex relief and higher, longer fatigue. That's not often the case with a field-installable cable.

In addition, overmolded cable assemblies can be used for EMI shielding applications and can be custom designed for right-angle exits or any exit configuration you might require. Plus, overmolded cable assemblies can be color coded to foolproof equipment installation or usage.

Example: A manufacturer of auto-diagnostic equipment we work with color codes its cables and receptacles. This way when the shop guys hook things up it's always quick, easy and, most importantly, accurate.

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Summary

So there you have it; a brief discourse on essential factors to consider when deciding between field-installable cables or overmolded cable assemblies. To succinctly sum up the gist of this white paper:

1. In a controlled environment, for volume installations of equipment and for devices with a limited number of mating cycles and with competent field-assembly personnel, field-assembled cables will usually serve your purposes just fine.

2. In all other instances give strong consideration to using an overmolded cable assembly.

Three questions to consider when considering overmolded cable assembly manufacturers.

If you decide that overmolded cable assemblies are the best choice for your design, you'll have many suppliers to choose from. As you go about the process of narrowing a long list of potential manufacturers down to a short one, here are 3 questions that can help you decide what companies make the cut:

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1. Is the manufacturer overmolding its own product or somebody else's? The supplier that manufactures and overmolds its own connectors controls every aspect of its production. It stands to reason then, that the manufacturing and overmolding process will involve a higher degree or precision and uniformity and result in a higher quality component. In addition, by utilizing the connector manufacturer to mold your cable assembly you are ensured that the connector interface you specified is used in the assembly. Not some cheap knock off sometimes supplied by contract manufacturers to increase their profits and typically not found out about until it's too late, after the product has failed.

2. Is the manufacturer local to your continent? Simply put, shipping cable is expensive. So whether your operations are U.S.-based, Europe, Asia or wherever you're almost always better off sourcing product local to your continent.

3. Does the overmolding supplier have its own equipment and is it doing the overmolding in-house? As with number one, this question speaks to precision, uniformity, quality – and quality control. It's highly unlikely that you'll get the same level of attention to detail and quality control if the entity you're dealing with is farming out your product.

   For example, at Switchcraft and Conxall we – and we alone – are responsible for your overmolded cable assembly. From design and production of your connector and overmold to precision-assembly of the finished unit – there are stringent quality control checks every step of the way. Plus, we back every molded cable assembly we produce with a lifetime limited warranty.

For more information on Switchcraft and Conxall connectors and overmolded cable assemblies please visit www.switchcraft.com, call us at 773-792-2700 or email sales@switchcraft.com.

About SWITCHCRAFT®
SWITCHCRAFT®, Inc. is a leading US-based manufacturer of connectors, jacks, plugs, switches, molded cable assemblies and patchbays. Conxall® is a manufacturer of connectors and cable assemblies, who was acquired in 1999 by SWITCHCRAFT®, Inc. SWITCHCRAFT® and Conxall® products are used in a variety of applications from broadcast and pro audio to medical, transportation and other industrial applications. Products are sold direct to customers and through networks of stocking distributors. Founded in 1946, SWITCHCRAFT® is headquartered in Chicago, IL USA.

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