And Now, a Few Words About Strain Reliefs

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Strain is rarely a good thing. In weight training, sure. For maximum benefit you want to strain a bit to complete the last few reps of each set. At least that's what I've been told. But for every other instance of strain I can think of – back strain, muscle strain, a repetitive strain injury, a new strain of virus and so on – strain is not good. Strain is definitely not good for the connectors, cables and connections that help power the products of the manufacturers and design engineers I work with. In the electronics industry we of course have an entire class of components that address this problem: strain reliefs.

When designing in strain reliefs, job one is to determine what it is you're trying to relieve stress on. Typically, with most electronics you want to achieve one of three objectives:

1. Remove stress from a connector
2. Remove stress from a cable
3. Remove stress from a printed circuit board or panel.

Many applications though, don't need strain relief because the cable's not heavy enough to cause stress or cause *enough* stress that you need to be concerned with it. For example, you have a wired aboard application with a cable going from one PC board to another PC board inside a cabinet. Say it's a small wire, 28 gauge. In this case you can literally just plug the connectors into the PC board on each side and let that cable free hang.

In other instances your application might need strain relief but a strain relief itself won't be necessary. You'll have other, more economical options. It could be harnessing, it could be a clip, it could be a clamp, it could be shrink tubing, it could be a simple cable tie. Take the earlier example; let's say instead of 28 gauge, the cable was six gauge. A 6-gauge cable would cause a lot of stress on the connector. But instead of using a strain relief you might be able to fix that cable with a cable tie or some sort of clamp to the box or something else in the cabinet. If so, you'll save money.

So if job one in the specification process is determining the stress point(s) in your application, your next task is deciding what strain relief option offers you the best value.

Additional cost considerations when specifying strain reliefs

Strain reliefs come in a variety of materials, shapes and sizes and of course using an off-the-shelf option will always be your most economical choice. In the electronics industry, the most common materials used for strain reliefs are nylon, plastic and rubber. Occasionally, a manufacturer will have a need to use PVC or polyethylene.

One important consideration affecting your choice of material is the shelf life of your product. If it's only going to be in use for a year or two, my experience is that you're fine with nylon or

polyester. On the other hand, if the strain relief will be used in a solar application and bake in the sun every day for the next 2 – 5 years you'll need to spec a more rugged, durable (and pricey) material.

Off-the-shelf strain reliefs come in square, round and oblong shapes. You can also get strain reliefs in any other shape as well, but that will be a custom job and cost more. I can tell you from experience though, that it's sometimes well worth it to invest the extra money in a custom strain relief.

For instance, I have a customer that manufactures a robotics device. This small device attaches to a large, heavy, high-strand cable and is deployed in sewer systems to identify problems. But the strands in its cable were cracking fairly close to where it went into the device, causing the product to break down and triggering expensive service calls. After some trouble-shooting the manufacturer devised a solution: it overmolded a custom strain relief onto the cable. With the custom strain relief it moved the stress far enough away to prevent the cracking. Now, the product lifecycle is back to where it needs to be and the manufacturer and its customers are happy.

As a final comment, another factor that can add cost to a strain relief is its environmental rating. Many times strain reliefs are positioned at the box or on the cabinet, and depending on your application you may want it sealed. For example, if your product will be hosed down or pressure-washed on a regular basis you want to specify an IP 67 or an IP 68 rating.

And now, there you have it. A few words, 793 to be exact, about strain reliefs.