

Harleys, Connectors, Design & Function

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When I'm not working one of the things I like to do is ride my Harley. Yes, this lady rides a Harley. To be specific, a 2005 Sportster 883L.

Like most Harley owners I can't imagine owning any other kind of bike. And as a former product engineer I appreciate the distinctive design touches that make a Harley a *Harley*. Take for example the V-twin engines, each with a 45° angle between the cylinders. This patented design feature makes it possible to fit the Harley's large, high-torque engine into a relatively small space. It's also largely responsible for the engine's unique sound, an integral component of the Harley-Davidson brand.

As you can imagine, I enjoy talking about Harleys. And with this blog post I can actually relate one fact about the Harley engine design to connectors. Not the fact about the unique engine sound of course, but the part about designing a large engine into a relatively small space. Because today, given the trend toward smaller and smaller products, the product engineer often has less space with which to work. At the same time, the amperage needed to power these products remains at least the same as it was before. In some cases, the design may require even more amperage.

That's why I felt it would be worthwhile to highlight a couple of relatively new connectors that can be efficient and effective design choices in tight spaces. Both connectors are from ERNI, founded by Ernst Erni in Switzerland in 1947. ERNI Electronics GMBH was formed in Adelberg, Germany in 1956.

- **IDC-PCB terminal** – This product was introduced in the second half of 2011 and ERNI touts it as “one of the smallest terminals in the world.” Measuring only 2.4 x 2.2 ml, with a height of right at 2 ml when shut, I can't say I disagree. Its miniature size makes it ideal for applications like light bulbs, LED systems – any design that presents you with the challenge of minimal space. Another feature I like about this connector is that despite its tiny size, it has a 5.5 amp current rating. That's a big current rating for such a small connector.

Now this connector is going to cost you a tad more than some of your other options. The extra cost though will be more than offset by the manufacturing efficiencies and quality control improvements you'll gain. Because whereas the typical alternative to this product is inserting a plain wire into a board hole – a labor-intensive process that involves prepping the wire and hand soldering – the ERNI IDC-PCB terminal is a tape and reel product that's placed on the board with all the other surface-mount products. No tools are required. Just insert the wire and push down with your finger. No stripping of the wire is needed since it is an IDC system. It doesn't get any easier than that!

In short, the ERNI IDC-PCB terminal is great for small spaces, transmits a high amount of current for its size and can lower your overall manufacturing cost while improving quality control by eliminating the possibility of human error. It's an excellent choice to

keep in mind as you tackle future product design projects.

- **1.27 mm SRC Single Row Connector (SRC)/Minibridge™ Cable System | 2.54 mm SRC Single Row Connector (SRC)/Maxibridge™ Cable System** – These are two more products ERNI offers that enable high-current connections within tight spaces. The Minibridge™ can carry up to four amps per contact with the number of pins ranging from two to twelve. So with a 12-position connector you can transmit up to 48 amps of power. Plus, its small size and the connection options it offers – right angle or vertical male connectors, female connectors with 90° or 180° cable outlet – makes the Minibridge™ ideal for a wide range of applications. In addition, ERNI supplies the cable assembly side with the wire already on. You just specify the length. And If you want a different connector on the opposite end, ERNI can take care of that as well. In this way, the Minibridge™ can give you more design options.

For example, I've had instances in which customers had different motors, different fans, or different power units coming onto their board. But not a lot of space for the connector coming *off* that fan, motor or power unit. So they created a jumper system to put a smaller ERNI package on their board. And this enabled the customer to transmit the specified amperage through the limited space. The **Maxibridge™** connector has similar functionality as the Minibridge™ but with a higher current carrying capacity. It features as many as 8 pins capable of carrying up to 12 amps per contact or 96 amps per connector.

Two more points worth mentioning about these products: (1) Each is a surface mount so it can go through the reflow solder process, and (2) These are tape and reel products so you'll enjoy the same productivity and quality control benefits as you do with the IDC-PCB terminals.

As a sales engineer in the electronics industry for the last ten years I've seen a lot of change. In the midst of this change though, one trend has remained constant: the trend toward smaller products. During this time there have been numerous instances in working with customers when they were looking to bring motors, fans, power units, etc. onto their PC board but only had a small space left for doing it. My job here at Heilind is to find a way to help them make that happen. When faced with this challenge today, the two connectors highlighted in my post are the tools I turn to most often. Because they usually get the job done.

So keep them in mind the next time you have a small size box that you need to pack with a lot of power and functionality.