Do I Specify

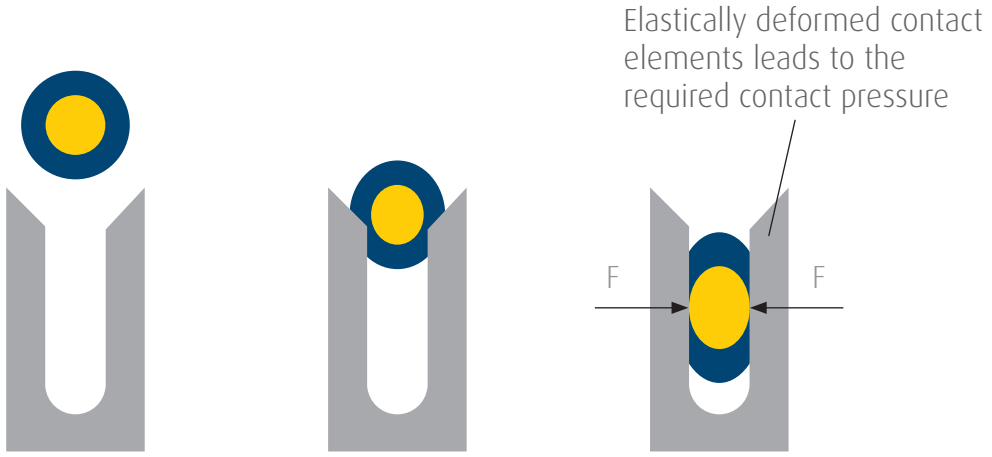
IDC Ribbon Cables or Discrete Cables?

Despite the rise of wireless, cables are still vitally important in modern electronics, and necessary within equipment enclosures. Both ribbon cabling and individual (discrete) wires are common, and both IDC and single crimp connections give reliable connectivity. So how do you choose?

What is an IDC Connection?

IDC is an acronym for Insulation Displacement Contact or Connector. That name also describes the way the contact makes connection to the cable conductor.

The rear of the connector, where the cable connection is located, has two rows of twin fork shapes. Each of these shapes has sharp points and a U channel between. The two rows of forks are offset by half a pitch – for instance a 1.27mm pitch connector has the rows offset by 0.635mm, ready for a 0.635mm pitch ribbon cable.

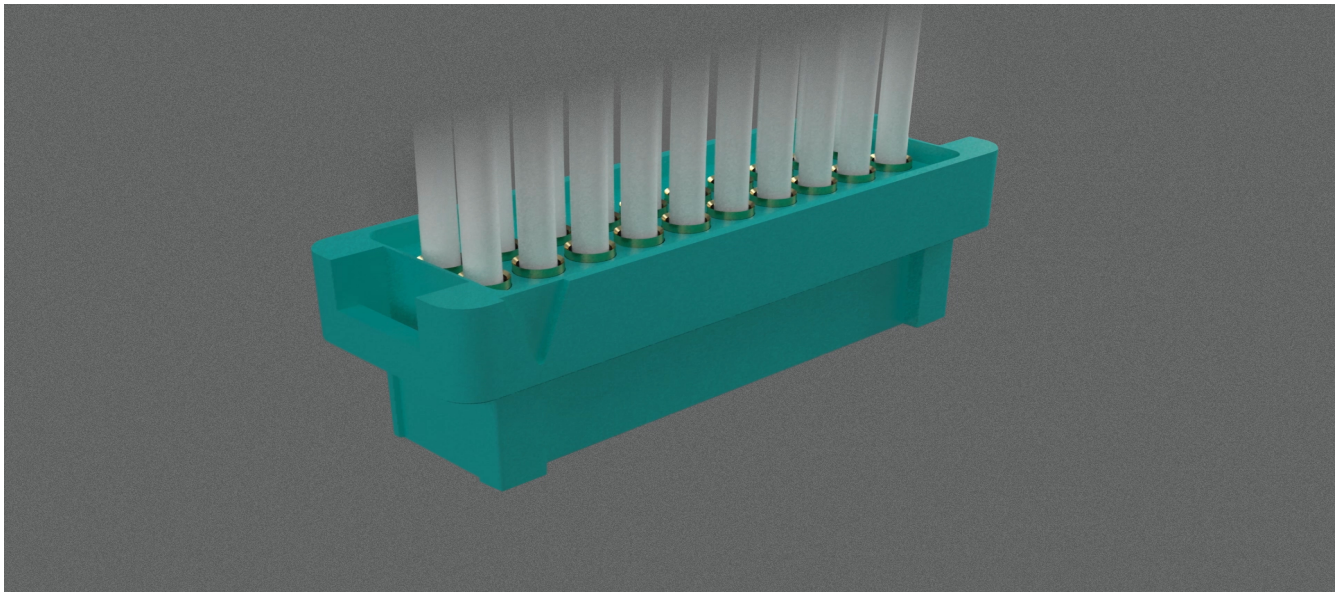


When you push the ribbon cable onto the rows of contacts, the sharp points pierce through the insulating rubber material, pushing it out the way (displacing it). As you push the cable further down, the sides of the center conductor are now in contact with the inside faces of the U channel. The conductor is squeezed slightly, ensuring a good connection joint between the cable and the contact.

This is where the name comes from - the **insulation** is **displaced** by the **contact** beams.

What is a Discrete Cable?

To make sure we're comparing like-for-like, we'll quickly define discrete cabling. This is a connection method that involves single cables with a single conductor (stranded or solid). These are often called equipment wires. You would attach them to single contacts, one at a time – whether that's by crimping or soldering. Solder cup contacts may be pre-assembled into the connector, but crimp contacts will also need assembling to the housing.



The BIG Advantage of IDC

It's a really big advantage in terms of assembly processes – with IDC and ribbon cables, you'll connect all your conductors in one action.

An IDC connector has a bar that goes over the back of the connections. This bar helps push the ribbon down into the right position. It also makes sure that in use, the cable stays on the contacts, and that the sharp beam ends are covered up.

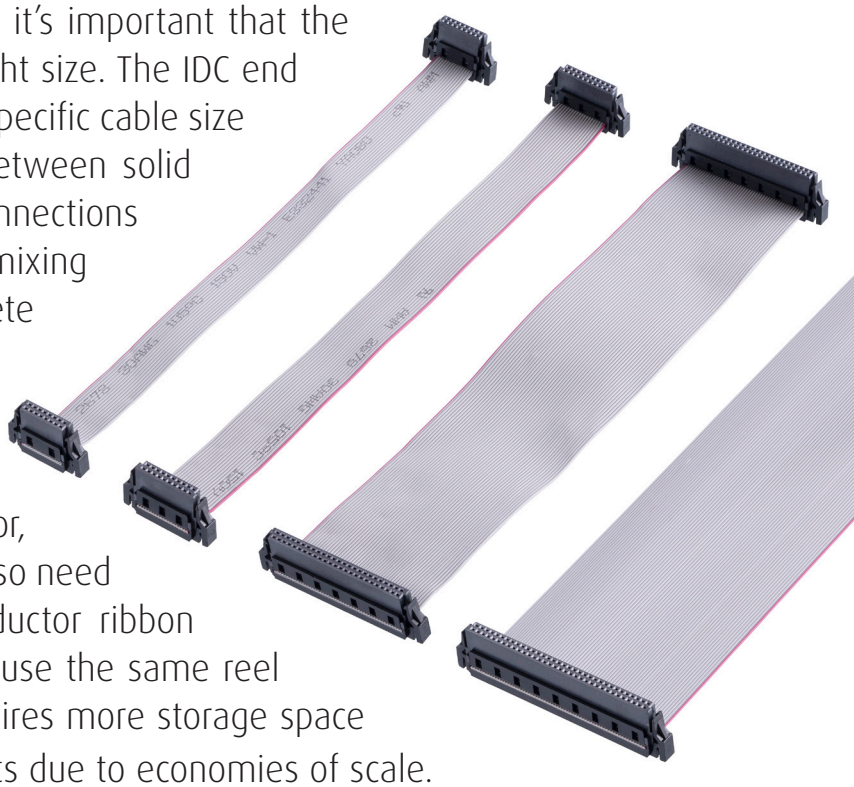
If you've only got a few contacts in your connector, it might be possible to do this assembly just by hand. But the more contacts you have the more force you'll need, so tooling is available to help. This tool works like a vice or clamp and helps push the contact, cable, and bar together.

Clearly, this process is much quicker than discrete single cables, where every single contact must be (a) stripped, (b) crimped or soldered, (c) inspected and (d) assembled into the housing (depending on contact type).

This is a big saving in time, which means saving in costs. So why are aren't all cable assemblies using IDC and ribbon cables?

Why Discrete Cables Win over IDC

- **Cable sizing:** To make sure the ribbon cable conductor makes a good connection with the IDC contact, it's important that the forks and U channel are exactly the right size. The IDC end of the contact must be designed for a specific cable size and type – including the difference between solid and stranded core. And all those connections must be the exact same wire size – no mixing cable sizes in one connector. With discrete contacts and cables, mixing is possible.



- **Cable duplication:** If you have multiple connectors in your designs for, say, 10, 20 and 40 contacts, then you also need to keep stock of 10, 20 and 40 conductor ribbon cables. With discrete cabling, you just use the same reel of cable for every connection. IDC requires more storage space for cabling, and less chance of discounts due to economies of scale.

- **Cable routing:** Ribbon construction can limit the amount of routing you can do with the cables. Bundles of individual cables are often more flexible, and each wire moves independently to get your harness through and round obstacles.
- **Connector availability:** Because IDC contacts are more difficult to design and the sizing issue limits their flexibility, there are just less connector choices out there. And ribbon cable sizes normally stop at 22 AWG, so that's no good if you have higher current requirements.

Finally, it's not generally a good design choice for high reliability connectors that need to withstand the extremes of vibration, shock and temperature.

The performance of the contact design for IDC contacts often doesn't match the more rugged and capable contact design we use on connectors like Datamate and Gecko.

Making the Decision

So how do you choose? Consider that your options will often be dictated by the connector performance you need. Make sure you first know what specifications you need from the connector, as that may eliminate one or other connector type.

If you still have a cabling choice, consider if it's a one off, whether you have cable routing restrictions, and whether there are ready-made cables available. If you're making cable assemblies in house, do you have the tooling or training for a particular type already?

Harwin's Experts are ready to help guide you through the variety of cable connection styles and can eliminate the problems of in-house limitations with ready-made cable assemblies – contact us today.