Inert Soldering and Insulation - Displacement Connectors

Inert soldering

It has been known for some time that reducing the oxygen level of the environment leads to reduced oxidation and gives a number of benefits with wave soldering:

- the amount of dross is greatly reduced
- the clean solder surface gives improved wetting performance
- less frequent maintenance is required
- there is less waste solder and oxide
- there are fewer solder defects.

It is this solution which can be used with both wave soldering and reflow soldering to enhance the process performance of fluxes that would otherwise be ineffective because of their reduced content of fluxing agents.

It may be thought that no-clean/no residue inevitably leads to using an inert atmosphere, but there is always a cost penalty associated with the use of nitrogen. Whilst nitrogen forms 79% of the air we breath, its extraction involves considerable energy expenditure, and it is costly both to store and transport. Careful consideration has therefore to be given to the nitrogen usage of machines:

With wave soldering, the benefits are more immediately apparent and the costs less, particular as it is feasible and cost-effective to inert the soldering area alone. With reflow soldering, the use of nitrogen atmosphere is also claimed to improve wetting times and allow a lower reflow temperature to be used, which:

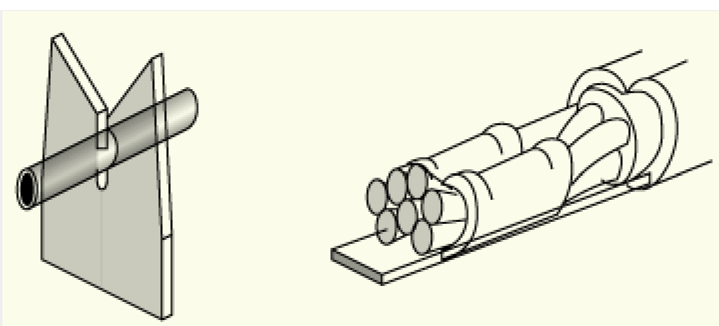
- gives a wider process window
- makes double-sided reflow easier to achieve
- causes fewer solder defects.

In practice, convection reflow systems have a high gas usage, and the cost is difficult to justify. Nor is it possible to inert just the reflow zone: because of the extended time at high temperature during the reflow process, the whole of the oven has to be filled with nitrogen, and the percentage of oxygen maintained at a low level (some experimenters reporting that this need to be less than 50 ppm).

Insulation-displacement connectors

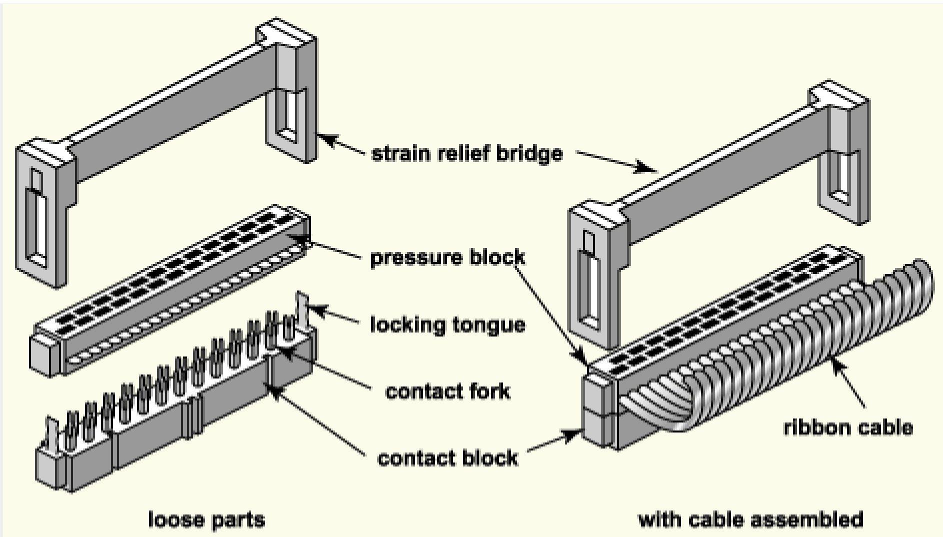
Insulation-displacement connectors were developed to provide a fast reliable means of terminating multiway cables. Like crimping, the connection is made (Figure 1) by pressure contact between terminal and conductor to break down intervening oxide (as well as ‘displacing’ the insulation around the conductor), using controlled methods of pressing together connector and cable.

Figure 1: Comparing an IDC connection (LH) with a crimped connection (RH)



Sometimes special jigs and presses are needed; in other cases the connectors are self-jigging (Figure 2).

Figure 2: Assembly of a typical IDC connector



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