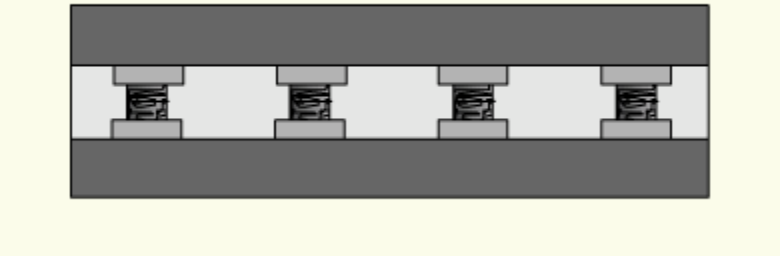
Conductive Inserts

Polymers are used widely in demountable connectors. Usually these are assemblies of pressed metal contacts retained in a thermoplastic body, but alternatives proposed for making an array of conductive connections between boards include inserting metal columns or plugs into an insulating adhesive film in the required positions (Figure 1).

Figure 1: Conductive inserts in an insulating film

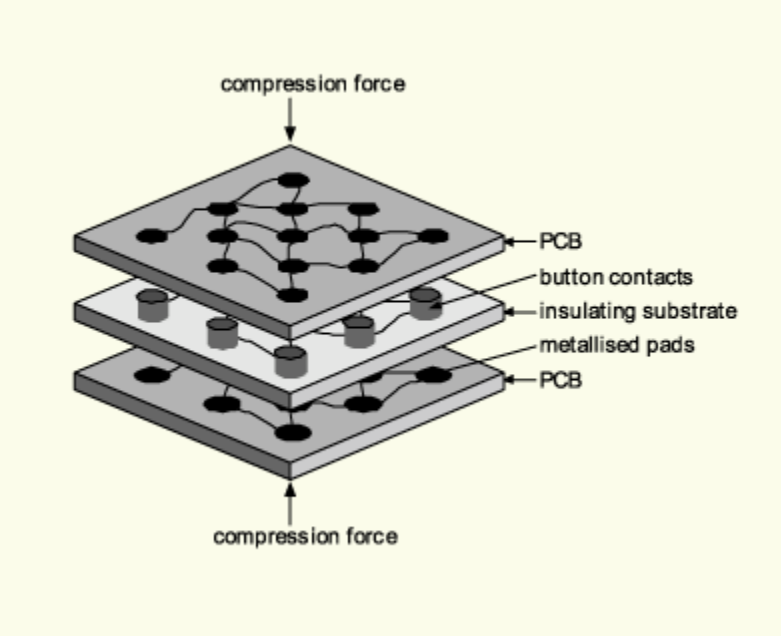


The advantages are guaranteed isolation between columns and controlled separation between the substrates to be bonded. However, there are a number of drawbacks to this general approach as it requires additional design, fixturing and processing which will increase the cost of assembly, and accurate alignment will be required between the different layers to be bonded.

One attempt to circumvent these drawbacks is the Cinch Cin::Apse™ connector. In its most simplistic form, this consists of an insulating substrate in which are positioned randomly wound cylinders of wire 0.5mm or 1mm in diameter. These ‘button contacts’ (Figure 2) are designed to protrude slightly, so that when two metallised surfaces are pressed against the substrate, the contacts will deflect and form the electrical connection between the two. Depending on the application,

these metallised surfaces might be pads on printed circuit boards or flex circuits, semiconductor packages or connectors.

Figure 2: Schematic of connector assembly using conductive inserts

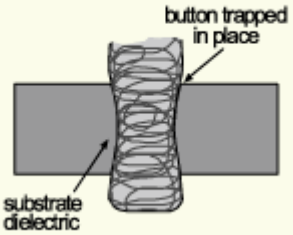


The insulating substrate, which is generally a moulded thermoplastic material:

- Provides dielectric separation between the contacts
- Traps the contacts, using an hour-glass shaped hole to squeeze the centre of the button
- Aligns contact and pads
- Prevents over-stress by restricting button deflection, so that the elastic limit of the material cannot be exceeded, thus ensuring that the contacts will not take a compression set after repeated use

The button contact is made of a single strand of randomly formed wire (inset), resembling a cylindrical ‘Brillo pad’. The randomness:

- Creates a structure with many different spring segments, sharing the stress of contact deflection
- Gives sufficient resilience to build connectors with insulating substrates as thin as 0.8mm, with a typical compression force of 60-90g per button
- Provides redundant points of contact at the mating surface, with a wiping action on compression which ensures a good electrical contact, even under adverse environmental conditions



The contact has very low resistance and inductance, so is useable at microwave frequencies, and its very low mass and lack of resonance makes it resistant to shock and vibration.

Although the concept can be applied to a range of wire and plating materials, a common choice is gold-plated molybdenum, to withstand the military temperature and corrosion environment.

Source : http://www.ami.ac.uk/courses/topics/0116_coni/index.html