

# design Choosing the Right SMT Connector

# FAQs

Bill Wong

Embedded/Systems/Software Editor

## FREQUENTLY ASKED QUESTIONS

**SMT CONNECTORS ARE** needed to match the Surface Mount Technology (SMT) circuits found on today's circuit boards. The challenge is choosing the right kind of connector for the job.

**Q: What are the key challenges in choosing the right SMT connector?**

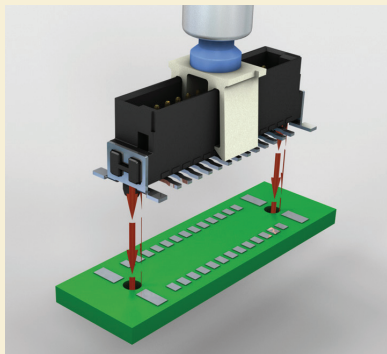
**A:** Two key challenges are ease of processing and robustness. For processing, there is packaging in tape and reel form factors for pick and place assembly. Most SMT connectors can be handled using vacuum nozzle pick up – straight connectors with a removable pick and place pad are available and angled connectors can be picked up directly. All contacts are guaranteed under 0.1mm coplanarity and are aligned for termination to the PCB pads. SMT connectors also provide mechanical robustness for reliable and enduring fixing to a PCB.

**Q: What differences and issues do designers need to consider when moving to SMT connectors?**

**A:** Designers need to be sure that the connectors can be reliably terminated with a consistent process and that the connectors do not become detached from the board. This demands accurate alignment of the surface mount contacts onto the PCB pad and consistent soldering. Additional hold down features are also a benefit, to compensate for the lack of through hole soldering/fixing which comes with wave soldered or press fit connectors.

**Q: How does contact density and modular tooling affect designers' choices?**

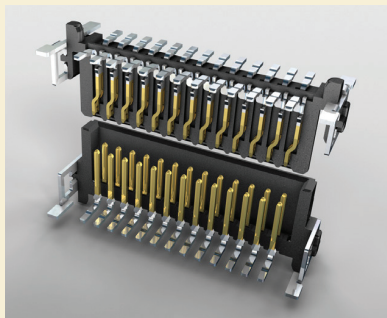
**A:** For contact density, the smaller pitch connectors increase overall packaging density thereby allowing designers greater freedom in design in terms of both overall size of their systems and



Pick-and-place compatible for fully automated assembly.

sub-systems. A smaller connector can also free up available real estate for other components and physically smaller connectors also allow improved airflow.

Modular tooling at the component level allows the manufacture of specific pin count connectors. This brings even greater freedom as the designer can select a pin count that fits his need, rather than having to choose from a list of standard options. For example, a "standard" 50 pin connector may have more contacts and be larger than required for an application whereas a 42- or 44-pin connector meets



Contact wiping length of 1.5mm allows straight connectors to achieve a range of stack heights.

the exact pin count requirement.

**Q: Mezzanine or stacked systems are very common these days.**

**What connector issues must designers address in this type of environment?**

**A:** Designers need to consider stacking height and alignment issues. A good connector family must be able to achieve a range of stacking heights. One way to achieve different connector heights that would not require different height connector bodies is to adjust the contact wiping length. For example, a 1.5 mm contact wiping length allows a range of heights to be achieved from 8 mm to 13.8 mm. The wiping length also aids in minimizing tolerance stack ups.

Stacked connectors must be correctly aligned. Alignment issues include inclination and misalignment.

**Q: How important is having features like fixing and locking options when it comes to system robustness?**

**A:** As connectors reduce in size and move towards SMT design they become inherently less robust. Contacts are smaller/thinner hence easier to bend and the connectors don't benefit from secure fixing that can be achieved with traditional through-hole solder contacts. Furthermore through-hole connectors can have additional mechanical fixing such as screws or board locks. When considering factors such as vibration or repeated connecting and disconnecting (both of which can create stress on solder joints), secure fixing is a must.

Secure locking applies to connections between a cable connector and a PCB connector. Fine pitch IDC connectors with as few as 6 contacts have a much lower insertion/withdrawal

per contact such as 0.5N/contact compared to a larger pitch connector with 20 pins that may have a contact force of 1N/contact. Here a secure latching system between cable and board mount connector is essential to prevent accidental disconnection.

At the same time the design must provide adequate protection of the IDC contact termination area through the inclusion of an effective strain relief mechanism.

**Q: What are the options for mating connectors to a PCB and how do these affect reliability?**

**A:** The most versatile PCB connector series will offer connectors with straight and angled PCB versions, plus cable or wire mount versions. With these options the designer has maximum freedom allowing horizontal stacking (mezzanine), angled to angled (extender card), angled to straight (mother-daughter card) and cable to board configurations. Such a connector range could be used as the standard connector type throughout a system, for multiple board to board and board to cable assemblies.

**Q: What are some of the new features found in the latest SMT connectors?**

**A:** Some of the new features have been added to address the need for mechanical robustness. This includes PCB hold down fixtures that are soldered to the board. Through-hole plastic guiding pins help alignment and also to give additional robustness against shear forces.

**Q: Is there a difference between connection systems for inside and outside the box?**

**A:** This varies depending on the application and external environment. However, when considering typical IP20 industrial applications, field installable I/O connectors allow easy installation of the system. Here wire to board connectors and terminal blocks can be terminated using traditional screw termination or push in spring cage tool-less termination. As with in box connectivity there are increasing trends towards reduced contact spacing and SMT on the board. ■



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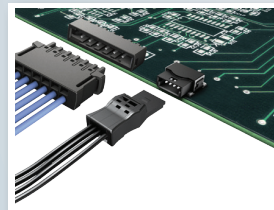
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