

Small problems? 4 challenges & opportunities in PCB development



Small might be beautiful. But smaller, more flexible technology is also driving evolution in the utility and usability of electronic devices. None of which would be possible without **PCB innovation**.

Miniaturisation is changing the world through embedded IoT in a greater range of products including wearables and implantable medical devices.

In recent years, the demand for this kind of connected, compact and portable tech, has driven the demand for ever smaller, more flexible, more powerful and resilient PCBs.

PCBs are supporting devices responsible for increasingly sensitive tasks, creating new challenges for designers and manufacturers alike.

Here are 4 areas where PCBs are throwing up new complexities and opportunities, which can only be met by more collaboration and cooperation between designers and manufacturers

1. High-Density Interconnect (HDI) technology (HDI)

Smaller, more lightweight, reliable and robust than traditional PCBs - HDI PCBs are ideal solutions for wearable, mobile, and handheld electronics. But the intricacy of the manufacturing process, in which an eight-layer through-hole PCB is reduced to a four-layer HDI micro-via PCB, can introduce the potential for more noise and interference, consequently impairing performance.

To respond to these issues, **PCB designers** need to find manufactures who are willing and able to share information about capabilities, tolerances and working practices from the outset. At the same time, manufacturers need to respond to new design demands in knowledgeable, proactive and innovative ways.

2.Flexible PCBs

The polyesters and polyamides that comprise FPCBs are able to tolerate more severe environmental conditions than rigid boards. They can withstand vibration and are more resistant to corrosion and moisture, making them ideal for wearable and implantable medical devices, as well as other unusually demanding user cases.

But designers still need the insight and support to ensure they select the materials that are the right fit for the end user and setting. Should you use single-sided (with or without a stiffener), a multi-layer flex PCB, or a rigid-flex PCB to deliver the required functionality?

Many companies are now combining flex and HDI approaches in PCB designs to create smaller devices with fewer potential performance issues. This combination is delivering improved reliability through the reduction of thermal stress and improved signal quality.

Can your PCB supplier make the board that meets all of your requirements and proactively helps you assess your options?

3. IoT security

Miniaturisation and the use of more robust, yet highly flexible materials have made IoT possible for a wide range of industrial, domestic and medical devices. But the presence of connected devices powering critical applications and collecting sensitive data, raises legitimate security concerns. The danger of counterfeit PCBs, compromising quality and security is real, and simple barcode identifiers may not be enough to counter the threat. As a result, manufacturers are changing the way they design and validate their products to guarantee, more effectively, their provenance. Some manufacturers are adding encoded identifiers in each physical layer of the PCB, with each one corresponding cryptographically to the rest. Innovative problem solving like this requires more shared insight and collaboration between designers and manufacturers than has previously been the case.

4. Sustainability

But while the search goes on to use ever more flexible and robust materials to fulfil market demand, there is also another pressure on PCB manufacturers. A demand for more sustainability in materials and production techniques is being driven by regulation and consumers alike. This means switching from traditional substrates to more eco-friendly alternatives, reducing reliance on harmful etching chemicals to finish the assembly process. Responding to this will mean a switch in mindset away from the commoditization of PCB manufacture towards more collaboration and communication.

As **Ryan Pellow**, General Manager at **NCAB Group UK**, pointed out in **this blog** in December last year:

“As technology demands continue to increase it’s important to select a PCB supplier that can not only support your demands now but can adapt to requirements in 5-10 years time.”

Back then, Pellow talked about the need for a 'triple bottom line approach' - a three way conversation between end customers, EMS companies and PCB suppliers - building greater trust and innovation around functionality and sustainability:

“A focus on building long term relationships means time spent developing these relationships aren't wasted and it also means they are well placed to react to any future market changes.”

In the post-Covid world, supply chains are under threat and fresh geo-political earthquakes are disrupting business in ways scarcely imaginable six months ago. In this context, the kind of deep thinking around sustainability and longevity in collaborative relationships, seems even more important.