



Rigid Flex | Whitepaper

Why Rigid Flex PCBs May Not Be Right For Your Application

As electronics components grow more complex, so does the circuit technology used for connectivity. As a result, rigid flex printed circuit boards (PCBs) have emerged as an amalgam of traditional PCB and flex PCB technology designed and engineered with layers of flexible circuit substrates affixed to rigid boards. The result: rigid flex PCBs provide the high reliability and lower weight required by many developers creating increasingly complex electronic components.



Some advantages of using rigid flex PCB technology include:

- **Flexibility:** Inherent in the name, rigid flex means more flexibility to fit the circuit into devices of varying shapes and sizes. This flexibility also means the circuit will have better shock and vibration resistance.
- **Lightness:** The flex portions of the component are much lighter than rigid boards, making the full component lighter than a solid rigid part.
- **Durability:** The polyamide layer means flex circuits can withstand higher ranges of temperature — from warm to cool — better than fully rigid board.

However, there are a variety of factors that would make alternative PCBs a better choice than rigid flex. Let's take a look at four reasons why rigid flex may not be the best solution for your electronics component application:

1. Design Doesn't Include Non-Circuit Components

Many rigid flex applications have a sensor — and even a heater — attached. Some even require chips and diodes on the circuits. Integrating all these components in a single solution adds tremendous value for many applications.

But if your application doesn't include integrated components, using a rigid flex PCB is likely overkill. Rigid boards with ribbon cables or wire bundles work very well in more simplistic electronic devices — and they cost less because it's a low-tech application.

2. Shock and Vibration Aren't a Major Issue

Some electronic applications are unlikely to experience shock and vibration or the likelihood of shock or vibration causing a critical system failure is low. In these cases, using a less expensive and simpler component to produce than a rigid flex PCB might do the trick.

However, a major benefit of rigid flex PCBs is that they can withstand shock and vibration much more effectively because of the resistance the flex component provides.

For example, military and aerospace applications require the high reliability rigid flex PCBs deliver. Given the likelihood for vibration in military equipment — and the potential catastrophic outcome of failure caused by shock and vibration — a reliable circuit component is non-negotiable.

3. Cost is a Critical Factor

Rigid flex PCBs are seven times the cost of a rigid board and two to three times the cost of a flex PCB. That's because rigid flex is more complex due to the multifaceted assembly of connection from one board to another.

A flex PCB with stiffener may be considerably cheaper than rigid flex. In turn, a PCB with ribbon cables between two rigid boards can work well for some applications that are more simplistic. Again, the complexity and performance requirements of the application typically drive the decision whether to use more low-tech PCB technologies and avoid the higher cost of rigid flex PCBs.

4. Dynamic Bending Isn't Needed

The flex material in a rigid flex PCB allows it to bend for custom installation and dynamic flexing. This is especially important if you need a PCB that can fit in smaller devices and you need a reliable bend radius.

If the design doesn't call for a bend, a rigid flex PCB may not be needed.

The Case for Rigid Flex

Rigid flex PCBs bring the best of rigid PCB board and flex technologies together. This robust material combination provides the additional protection needed in aerospace, medical and defense applications. The use of rigid flex is also growing in the high-end consumer electronics sector that is increasingly focused on developing smaller, lighter weight devices. So much so, market intelligence firm [Research and Markets](#) forecasts the Americas rigid flex PCB market will grow at a CAGR of 10% through 2025.

The inclusion of integration-ready features is one the best reasons to choose a rigid flex PCB. Multiple stack up variations create a perfect blend of electrical and mechanical performance. Rigid flex assemblies reduce connections and increase the reliability of the electrical component. In the end, choosing rigid flex PCBs result in a compact, robust circuit solution.

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