

Considerations for Addressing the Demands of Today's Power and Signal Connections

Trend Paper

Smaller, lighter, more portable yet still flexible and rugged. Sound familiar? These are just some of the requirements for today's engineering needs. Will your design address the needs for intense heat or cold with gold plating? Will it be light enough with a slim profile to suit a range of applications? Will it provide quality along with reliability?

Today's engineering designs - from consumer electronics to medical equipment to test and measurement applications - often require all of these characteristics with power and signal connections. They require smaller profiles to take up much less space, must be lighter in weight and often have to withstand varying environmental conditions. And just as important, they have to adapt and be flexible enough to allow your design engineers to continually push the boundaries of design. The right interconnects can make all the difference, allowing you to address tough design specs without compromising on connection reliability.

Just as no two applications are quite the same in terms of their demands, you may require a wide variety of flexible options for your interconnects. And if you think that any of these trends will abate as the Internet of Things (IoT) and Industrial Internet of Things (IIoT) take hold, consider this from a recent DBS Bank study: "The installed base of IoT-connected devices will soar from about 11 billion today to 125 billion in 2030, and the volume - and value - of data created by B2B industries will far eclipse those generated by mobile devices and people surfing the web."¹

With interconnect solutions required along with hundreds of billions of sensors already embedded in a vast array of networked physical objects, enabling everything from sophisticated health care devices to test and measurement and drones for all kinds of applications, this is just the beginning.

In this TE Connectivity (TE) trend paper, we explore three applications and trends that your design engineers may face. At TE, we believe that the right interconnect solutions help optimize applications for design engineers.

Application #1:

Medical Equipment - Healthcare goes Digital

The medical device market and digital health are thriving and growing as more and more devices benefit from the latest trends in digital/mobile technology, artificial intelligence/machine learning, and IoT developments. Even high-tech players such as Google, Apple, and Amazon have entered the healthcare sector offering new innovations.² According to a report by Ernst & Young, medical device companies that fail to invest in digital health R&D may have a tough time staying relevant in an increasingly data-driven healthcare sector.³



Just as sensors can play a key role, so too can interconnect devices - particularly given the importance of safety and reliability in medical applications.

A good example is what's happening in the wearable device market. This market is expected to grow 23 percent CAGR through 2023,⁴ including growth of devices such as activity monitors, smart watches, smart clothing, as well as diagnostic, monitoring and therapeutic devices of various types. The electronics in the medical device market are getting smaller, lighter, more portable and more affordable. And this places greater challenges on engineering teams.

Noteworthy, wearable medical devices are now helping to manage various chronic conditions such as diabetes, asthma and cardiovascular diseases. In fact, providing solutions for the medical industry enables engineers to design products that help people live healthier lives.

Wearable medical devices may use thin, flexible circuits. In some cases, a rigid printed circuit board (PCB) is not appropriate and flexible printed interconnects may be the best choice. Miniaturized connectors can save valuable space - and can be highly useful for many medical applications.

As a design engineer, whether you are designing a respiratory device, glucose or blood pressure monitor, or EKG machine, space on the board may be needed to ensure that your designs are manufactured efficiently. To address the challenges of the expanding market, this application may require smaller centerlines, lower profiles and lighter interconnect solutions that are useful for medical equipment applications.

TE offers one of the most expansive Flexible Printed Circuit (FPC) connector portfolios available today. Alongside those interconnect solutions, we also offer comprehensive sensor solutions that are designed into medical applications where patients' lives may be at stake.

Application #2:

Test & Measurement - Emerging Trends and the Digital Transformation

Within the test and measurement market, a digital transformation is underway, not unlike what is happening in other industries. Many observers believe it is not just growing, but accelerating. What are the factors driving this trend? They include Industry 4.0, IIoT, cloud, connectivity, 5G, mobility, advanced analytics and even the demand for quality assurance. All are having a profound impact on applications for test and measurement.

According to a report published by Market Research Future, the test and measurement equipment market could reach more than \$28 billion in value by 2023. Further, according to the report, "[the] surge in the adoption of electronic devices and increasing use of modular instruments are giving rise to the integration of [the] test and measurement equipment industry."⁵

A Frost & Sullivan research report indicates significant growth opportunities with the largest ones centering around 5G, autonomous driving, data centers, high-speed digital standards, and power applications.⁶

Continuous advances in technology such as the 5G networks along with the increasing adoption of modular equipment and consumer electronics make the test and measurement industry more important than ever. Virtualization and automation are among the long-term trends in test and measurement - and 5G plays an important role. It will be essential to cost-effectively test the networks and services that are supporting many new use cases.

As the precision of electronics continues to increase, engineers may need to quickly and accurately measure current, voltage and other parameters to ensure quality along with reliability. In fact, test and measurement products are shifting away from bulky and stationary, to mobile, handheld and miniaturized. This may require low-profile FPC connectors like those from TE that give designers space savings capabilities to include far more technology into smaller spaces and design flexibility with our dual-contact FPC connector. In addition, many applications require connectors that can provide reliability such as latching features along with gold plating for more precision and accuracy.

TE offers a comprehensive portfolio of interconnect solutions and also sensor solutions to address the needs of customers who are involved in test programs, product research, development, test and evaluation. Our FPC connectors are useful where small centerline spacing makes larger wire-to-board interconnects impractical.

Application #3:

Drones - A Market Opportunity Too Large to Ignore

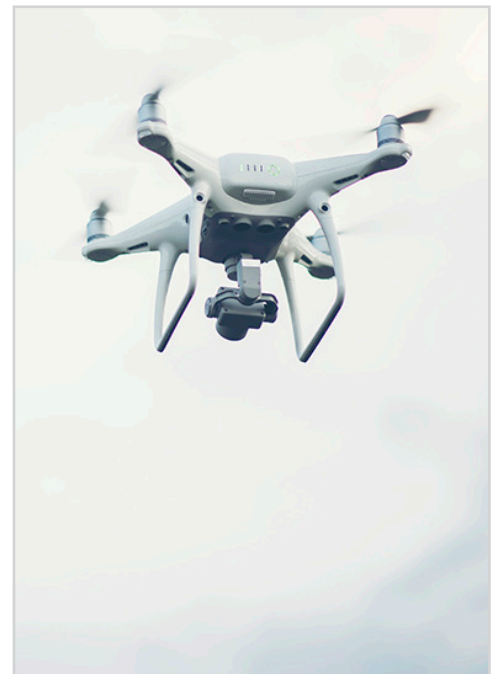
Yes, drones are reporting for work. According to a study by Goldman Sachs, drones are evolving beyond their military origins to become powerful business tools. They are now used for firefighting, farming and in other commercial and civil government applications. Between now and 2020, there will be a \$100 billion market opportunity for drones. The fastest growth area will be in business and with civil governments in applications such as construction, agriculture, insurance claims, off-shore/oil gas refining, police, fire, coast guard, customs, real estate, utilities and more.⁷

According to research from MarketsandMarkets, the drone services market has been segmented as follows:⁸

- Infrastructure
- Agriculture
- Logistics
- Media and Entertainment
- Oil and Gas
- Utility and Power
- Security, Search & Rescue
- Mining
- Scientific Research
- Insurance
- Others (Healthcare, Weather Forecasting, Aviation)

Applications include:

- Aerial Photography and Remote Sensing
- Data Acquisition and Analytics
- Mapping and Surveying
- 3D Modeling
- Disaster Risk Management and Mitigation
- Inspection and Environmental Monitoring
- Others (Product Delivery, Pollution Monitoring, Storm Tracking)



What Design Engineers Need

As the popularity of drones increases, the applications for them have become more varied and more rugged than ever before. Designers are responding with evolved solutions that help provide “can’t fail” performance for these high-flying investments. But with the rise of increased regulations for drones, it is today more important than ever that users can depend on their signals and power connectivity to keep them on the right flight path. And ultimately, this affects the design and manufacturing phase.

This requires that engineers have the electronic components that may provide protection against the most challenging situations your application may experience including strong vibrations and foreign object debris (FOD). These applications require lightweight connectors that have design flexibility and can extend the battery life of drones, and connectors that provide gold plating to withstand varying environmental conditions.

Choosing the right connectivity solution is critical to the efficient manufacturing and assembly of drones.

TE’s interconnects can help you deliver exciting and dependable flight experiences.

From Manufacturing to Performance - TE Can Address Your Design Needs

The above examples highlight just a few of the demands engineers face today. They must address design considerations that go beyond end-user performance to also include manufacturability - clearly one influences the other and vice versa. Interconnects that are challenging to install during manufacturing can compromise reliability and the end-users experience.

TE understands these challenges. With increasing performance demands across a wide assortment of applications and manufacturing conditions, design engineers likely need a partner who can provide input on the optimal interconnect solution for the specific application. As the examples above demonstrate, these applications cannot fail. The cost of poor performance can damage your brand reputation, business profitability, and potentially your customers.

The right interconnect solution can optimize your application. TE’s engineering and decades of experience provides FPC connectors with market-leading miniaturization, design flexibility, reliability in connection and sustained performance even when exposed to varying temperatures and conditions.

TE’s FPC connectors enable the design flexibility engineers desire. In addition, they allow for low profile height, space savings and reduced assembly time. Whether you’re working on a new engineering design or optimizing an existing one, TE’s FPC connectors can be easy to use across critical applications.

What Design Engineers Need

¹ Source: <https://www.bcg.com/en-us/publications/2019/incumbent-advantage-internet-of-things-iot.aspx>

² Source: <https://www.theverge.com/2019/1/3/18166673/technology-health-care-amazon-apple-uber-alphabet-google-verily>

³ Source: <https://www.bigfootbiomedical.com/blog/4-digital-health-trends-set-to-transform-the-medical-device-market-in-2019>

⁴ Source: <https://www.medgadget.com/2019/10/wearable-medical-devices-market-size-worth-usd-27200-million-at-a-23-cagr-by-2023-future-trends-growth-analysis-and-global-smart-medical-devices-industry-trends.html>

⁵ Source: <https://www.marketwatch.com/press-release/test-and-measurement-equipment-market-2019-global-industry-analysis-by-size-share-sales-revenue-opportunities-development-status-emerging-trends-and-regional-forecast-2023-2019-05-31>

⁶ Source: <https://ww2.frost.com/frost-perspectives/electronics-test-services-market/>

⁷ Source: <https://www.goldmansachs.com/insights/technology-driving-innovation/drones/>

⁸ Source: <https://www.marketsandmarkets.com/Market-Reports/drone-services-market-80726041.html>

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