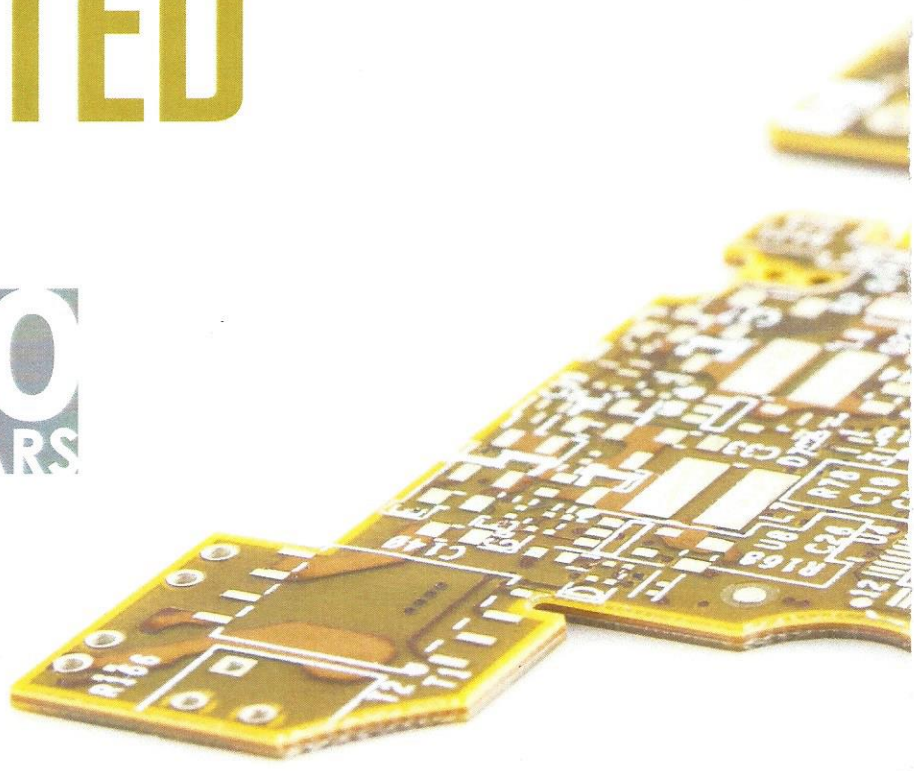


# KEEPING US CONNECTED



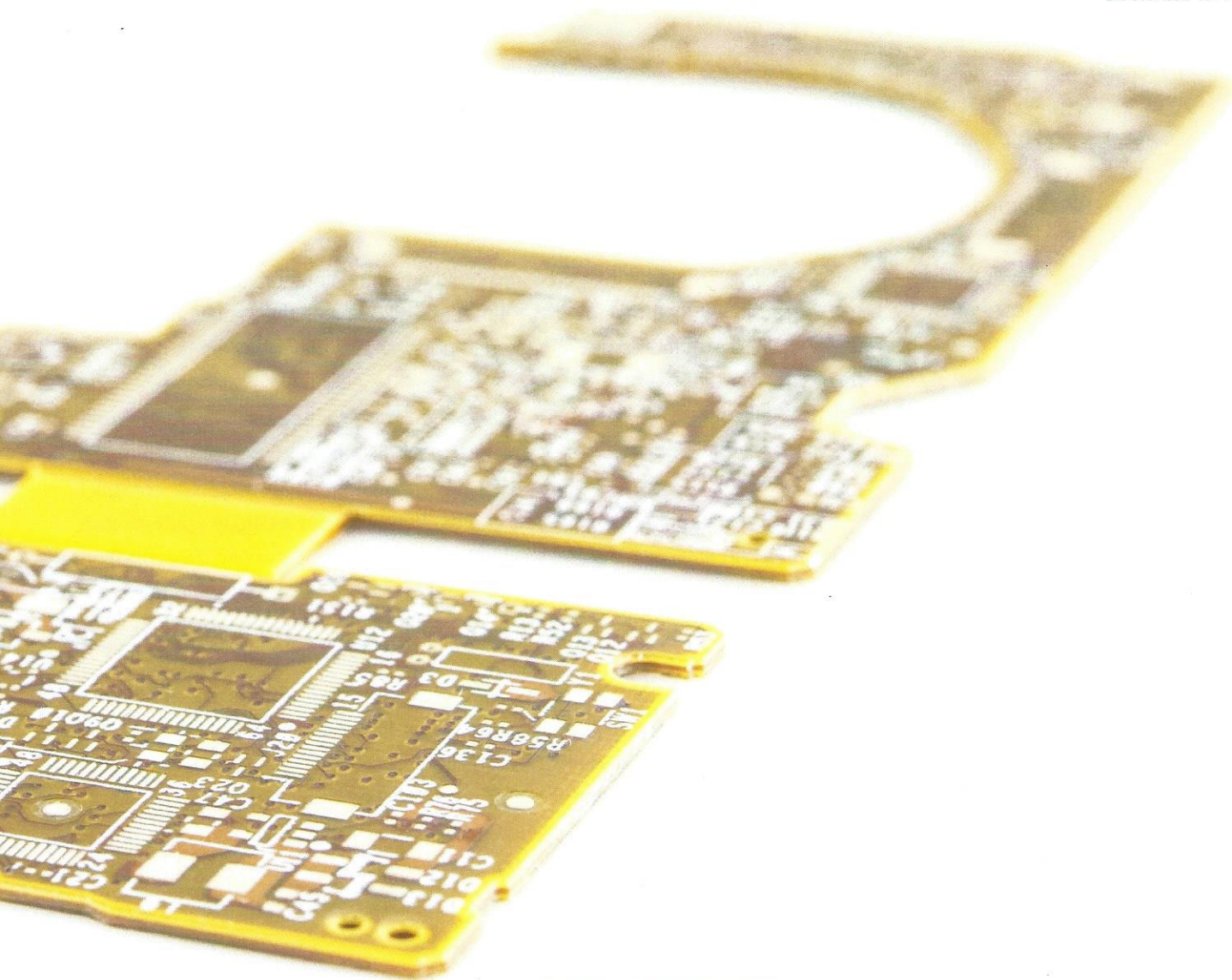
*PFC Flexible Circuits Limited is a designer, manufacturer and assembler of flexible circuit boards to be used in electronic devices across varied industries with telecommunications and medical applications making up the bulk of its work.*

**Written by Ryan Cartner**

**F**ounded in 1997 by company Chief Executive Officer Steve Kelly, PFC Flexible Circuits was a small one-man operation in Scarborough, Ontario, and, like any small start-up, it struggled to make ends meet. Kelly kept at it for two years until, in 1999, he was contacted by a hardware and software development company called Research in Motion (RIM) of Waterloo.

At the time, RIM had only about thirty-five employees but a lot ambition, and that year, the total assets listed in its balance





mobile market, becoming the company known for developing the Blackberry mobile platform, PFC built all the circuits and did all of the assembly. Today, PFC is a leader in the engineering of equipment used by many industries including the optical telecom market and the medical field.

Circuit boards are the circulatory system behind every electronic device. They carry the electronic signals from semiconductor to I/O. For more than fifty years, we have entrusted them with nearly every aspect of our daily lives from cooking our meals to running our cars, but every day, brilliant innovations in the field of electronics result in smaller electronic components. As the components get smaller, so do the devices, and the need increases for circuit boards to fit in smaller spaces.

Flexible circuit boards are functionally equivalent to their rigid counterparts, with the added advantage of being bendable. The boards usually consist of etched copper on a flexible plastic

density boards available. It was in 1902 that the first patents for circuit boards were filed, and those patents contained definitions not only for rigid boards but boards on flexible mediums as well. While many of the technologies and processes required for making modern flexible circuits would take decades to develop and perfect, the genesis of the technology is as old as its rigid counterpart.

Those ideas paired with more than one hundred years of technological innovation have resulted in the modern flexible circuit board upon which we depend. Without flex circuits, we would not have cars, planes, satellites, the internet, computers, flat screens, smart phones, any number of medical devices, or just about any other electronic device you can think of; flex circuits truly are everywhere.

The flex boards that PFC makes consist of conductive metal strips inside a sheet of flexible polyimide plastic. This flexible

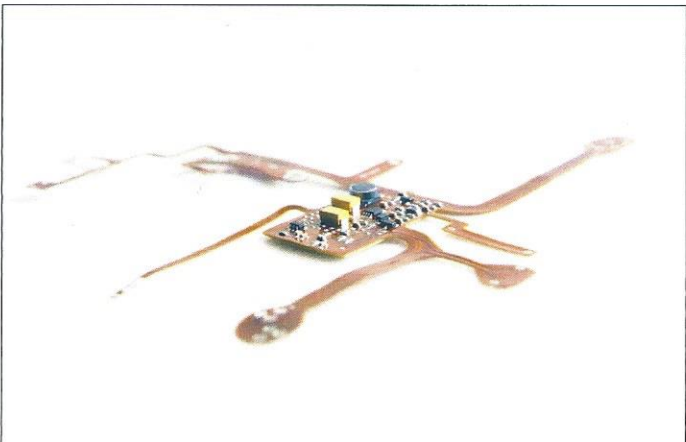
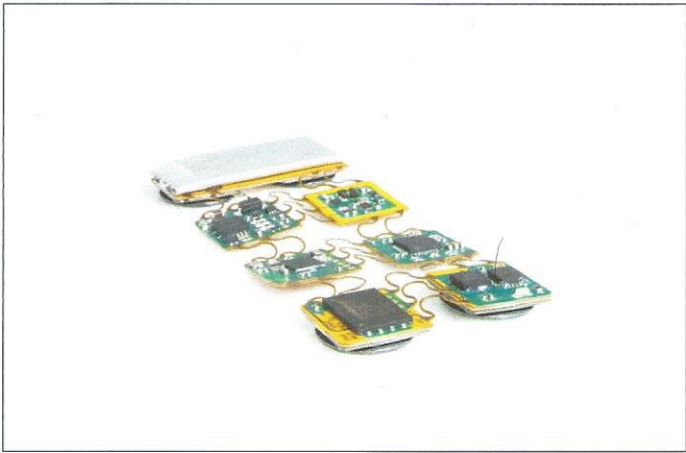


▶ resistance. These boards conform to any shape, are much thinner, lighter, and typically use about 60 percent less space than rigid boards. The end product is the most advanced available, and PFC has one of the most sophisticated operations in North America capable of fitting very fine electrical lines into minuscule spaces.

“Right now we do lines in spaces that are three times thinner than a human hair,” says Kelly. “We’ve always been focused on high-level technology.” PFC makes flexible circuits for varied applications, but its two principal focuses are optical telecommunications and medical equipment.

Optical telecom, sometimes called fibre-optic, is a communications technology where light is transmitted through a bendable plastic or glass fibre. This is similar to electrical signals being passed along a coaxial cable, or an audio signal being passed over a phone line for broadband internet, only much faster. PFC manufactures and assembles flexible circuits that control these systems.

**“PFC builds the circuit boards that keep us connected to our data and to each other.”**



Much of what it does in this field is for data storage farms where vast amounts of data must be stored and transmitted. In our modern connected world, where the internet and social media platforms manage so many aspects of our lives, we depend heavily on these communications systems. We can see just how much trust is placed in the hardware that PFC puts so much care into building. Fibre optic telecommunication is growing all the time, and PFC builds the circuit boards that keep us connected to our data and to each other.

Another focus of PFC is on building boards for medical applications. Hearing aids, defibrillators, and pacemakers are all examples of medical equipment that requires compact bendable circuit boards. These devices are quite sophisticated, and their reliability is critical. PFC has a team of highly-qualified engineers who have designed and built the equipment that doctors trust with the health and safety of their patients.

The company is ISO 13485-2003 (medical device) certified and has been for over ten years. Life-saving medical devices must be of the highest quality, and PFC has a proven track record to show that it builds them reliably. As medical technology continues to advance, and the need for smaller and more sophisticated equipment grows, PFC will continue engineering the tiny flexible circuit boards that make them work.

MC10 is a wearable technology company specializing in health-care products, and PFC is working with it to build a wearable body monitoring platform. Wearable technology refers to electronic devices that can be worn on the body and are commonly used to track physiological statistics. Activity trackers in the form of smartwatches are a well-known example and are often used to track fitness data such as the distance you have walked or jogged, your calorie consumption, your heartbeat, even the quality of your sleep.

What MC10 is building in collaboration with PFC is something far more cutting edge: a circuit built onto a small, stretchable stamp similar to a temporary tattoo, which can be attached to a person’s body and will passively monitor vital statistics. All of the tracking data that it collects can then be transmitted via Bluetooth to a smartphone where the wearer can see it. Wearable technology is already exploding into the mainstream with products like Fitbit and the Apple watch, but MC10 and PFC are pushing the industry in a new direction, and on the front line of development are engineers like the team at PFC with the advanced skill set to bring these innovations to life.

PFC designs, manufactures and assembles its circuits all in the same facility. Of all the North American flexible circuit manufac



As a premium supplier to the Printed Circuit Board industry, **Matrix Electronics** wishes to congratulate and recognize **PFC Flexible Circuits** as an entrepreneurial and creative organization that has made a significant contribution to the North American Printed Circuit Board industry over the past 20 years.

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turing companies, PFC is one of only four with the experience and equipment required to assemble them as well. Assembling these circuits is a highly complex process given the size of the components and the precision with which the components need to be connected.

"We took a product that was being manufactured out of China with fifty percent to sixty percent defect rates. There are no defects anymore," says Kelly. "We now do about three million dollars a year with them, and everything they had being manufactured in China is being made in North America."

PFC takes great pride in the reliability of its products. "Another client had five million dollars' worth of field failures. We redesigned the parts, and the failures went to zero." Equipment failure is expensive in terms of money and time, and PFC is committed to saving its customers both by preventing failures with reliable engineering.

"We spend a lot of time engineering the product with the customer the first time, so they don't have to come back for another go around and ship a quality product on time at the end of the day."

Flexible circuitry is a key enabling technology in electronics. It brings to life most of the world's trailblazing innovations, and most of us come in contact with it many more times a day than we realize. It is a rapidly-growing, fifteen billion dollar industry, and operating within it is a highly sophisticated and expensive endeavour. With an extremely stable workforce of 125 highly-qualified employees and hundreds of years of combined engineering and manufacturing experience, PFC is a leader in the field.

"The company has grown from me sitting at a tiny desk as one person, to 125 people, twenty-five million in revenue, no

debt and we own everything," says Kelly. PFC is in the business of building the circuits that keep us connected and keep us healthy, and flexible circuitry will continue to power the world's innovation far into the future with applications that expand far beyond the reaches of our wildest dreams. ■

