

Wireless test tools assist in high-voltage upgrades at industrial plant

Case Study

Linamar Corporation

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Frank Hasenfratz was apprentice machinist at a Budapest engine maker in 1955 when he was called to mandatory service in the Hungarian military. A year later, uprisings began against communist rule and he joined the rebels.

But when the Red Army crushed the 1956 rebellion, Hasenfratz feared arrest or execution. He fled his homeland with other soldiers at night, first crossing into Austria, then passing through Italy before arriving at the coast of France where he boarded a ship across the Atlantic.

By 1964, Hasenfratz, had settled in Ontario, Canada, and started his own business based on his technical training. He installed a metal lathe in his basement and commandeered

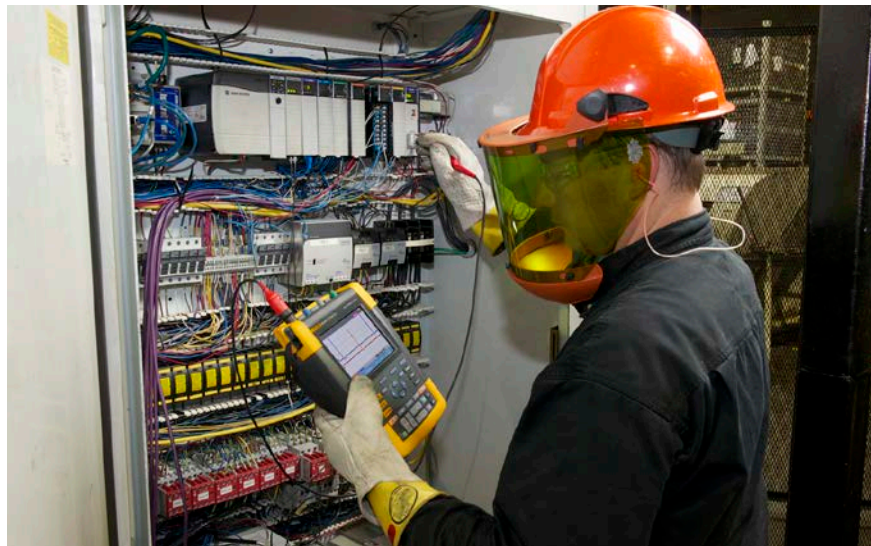
his wife's oven in order to heat treat metal. His company, Linamar, now boasts some 45 manufacturing facilities worldwide. And Hasenfratz, chairman of the board, is a billionaire.

Headquartered in Guelph, a small city just west of Toronto, Linamar is a multibillion dollar corporation and the second largest auto-parts maker in Canada. Linamar's focus is precision machining and among its many products are the engine blocks for the Dodge Viper and Chevrolet Corvette.

Tools: Fluke Connect™ App
Fluke v3000 FC Wireless AC Voltage Module
Fluke a3001 FC Wireless iFlex® AC Current Modules
Fluke v3001 FC Wireless DC Voltage Module
Fluke iFlex i2500-10 Flexible Current Probes

Operators: Linamar Corporation's Advanced Systems Group

Applications: Wireless monitoring of voltage and current
Monitoring three-phase motors in industrial setting





Linamar—a derivative of the names of the founder's daughters and wife (Lin-da, Na-ncy and Mar-garet)—still has its largest manufacturing footprint in the Guelph area where many of the motors and transmissions are machined.

Guelph operations

Keeping the 25 facilities in Guelph up and running safely and efficiently is one of the responsibilities of the team under Leigh Copp, an electrical engineer who started at Linamar when he was 17 and continued working at the company as he completed his university studies.

Copp is Engineering and Business Unit Manager for Linamar's Advanced Systems Group, managing a group of 38 people who design and engineer automation systems, troubleshoot electrical systems and electronics as well as process controls and command and control systems.

Inherent in that role is a commitment to safety and continuous evaluation of all the systems in the plants.

"Our warranty is never ending," Copp jokes about his group's work. "But we also have to compete with outside guys on some jobs, the lowest bidder."

A recent job awarded to Copp's team was a project to reduce the risk of arc flash from incident energy at one of Linamar's facilities.

"Like probably every other manufacturer of our size and station in our market we've got between, 3,000 and 5,000 KVA distribution boards in our plants," said Copp. "So in Canada we're predominantly 600 volts. So 3,000 to 5,000 KvA transformer outside and a 5,000 (amp) busway coming into a 5,000 amp switchboard."

The problem was that there was standard switch gear and vented panels that weren't arc resistant and thus posed a significant risk to safety.

"That's 5 times the old Category 4 boundaries so there is no PPE available," Copp said. "So we were pretty concerned and we started looking at alternatives on how we can improve the situation."

Like a grenade in electrical panel

In one event signaling the problem, a seal had failed in an outdoor panel and rainwater dripped into the enclosure, gradually filled it up until the bus bar failed and blew apart.

"It was outdoors and nobody was around but it literally was no different than if I'd put a hand grenade inside the panel," Copp said.

His team did a complete analysis of the system and learned that the high-incident energy potential was well above

what was considered high risk. Indeed it was between 190-212 calories per square centimeter—4 to 5 times above the acceptable safety threshold for the heaviest class of PPE typically available.

That led Copp and his team to design and install a high-voltage protection system around the feeder lines coming into the plant. Those 13,800 kV feeders from the local utility now go through a standard high-voltage 15 kV fuse before going into the transformer. A current limiting fuses respond in one quarter of a cycle—before fault current can build to a dangerous level. These high voltage fuses however won't respond quickly enough,

"It goes upstream of our fused isolation switch and becomes an additional point of lockout," he said.

In addition, the fuses have been augmented with a high-speed multiline circuit breaker—high technology switch gear in a sealed vault.

"We monitor the current on the primary side of the transformer and the secondary side and we set up a differential protection scheme where we look at the ratio of those two currents as well as their individual absolute values," Copp said. "With that I can say OK I need to make sure I don't exceed the transformer ratings and this ratio must always be what the transformer turns ratio is and if it isn't, that's indicative of a fault and we can trip open that breaker."

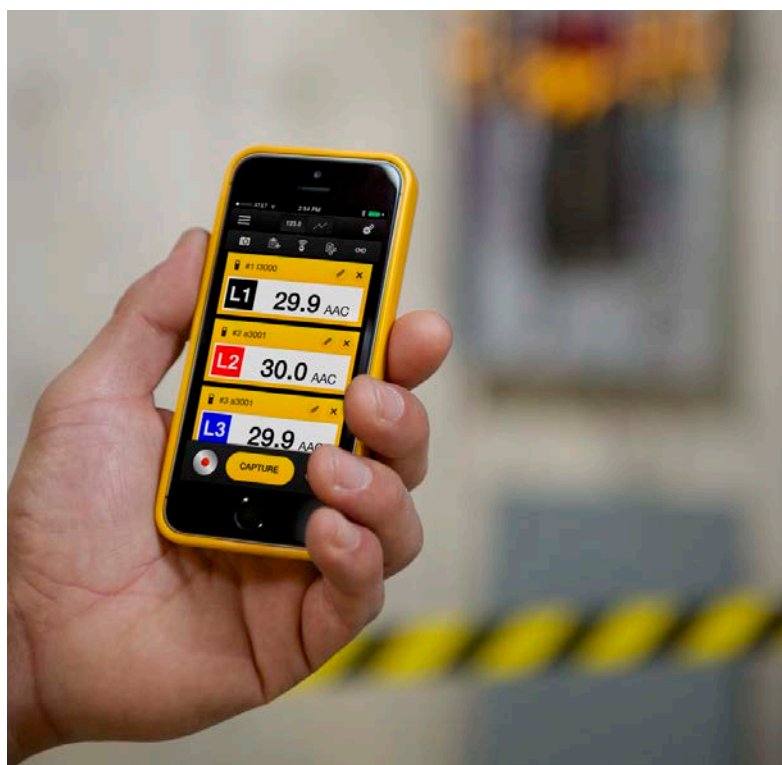
The new equipment brings the current levels down to a category 2 or 3 using the old category ratings, or to a level where there is practical PPE

Fluke Connect™: Preventative maintenance made easier

Beyond the valuable safety features of remote monitoring, implementing a preventive maintenance program is easier when you capture data and log it by the equipment under test. The Fluke Connect™ system, which includes a smart phone app and connected tools such as clamps, multimeters and infrared cameras, includes an equipment logging feature.

Developed to help Fluke customers work faster and smarter, Fluke Connect™ Equipment-Log can help reduce equipment downtime and costs. Users create a folder for each asset with a description of the asset and the location. It also stores all the measurement data captured for this asset over time allowing maintenance technicians to do a side-by-side comparison from previous inspections, so any accelerated trends can be easily identified to help determine when maintenance needs to happen. This keeps your equipment running longer, saving time and money and reduces the risk of unplanned downtime.

Another feature of Fluke Connect, called ShareLive video call, allows a technician to communicate critical data, get answers and additional work approvals instantly without leaving the inspection site.



available to protect the maintenance workers.

Wireless tools ‘a game changer’

When working among electrical panels in high energy incident areas or working on proactive maintenance like Linamar’s arc flash risk mitigation project, Copp and his team deploy the latest wireless test tools. He calls these the connected tools “a game changer” when it comes to high voltage work because it removes technicians from dangerous energized areas and provides real-time data.

For example, three-phase motors used throughout the facility can be monitored while in use after hooking up wireless clamp meters. Copp uses the Fluke ac and dc clamps equipped with iFlex devices with the Fluke Connect™ app on his Android phone.

“So I would put the instruments on, close the door, start the machine up, link them to my phone and then go around to the front of the machine and actually monitor the voltage and current while the machine’s operating with the door’s closed completely safely.”

Indeed deploying such an approach to maintenance—troubleshooting while the equipment is operating—is an ideal scenario to keep industrial processes running, according to Ken Bannister, an engineer, author and consultant who works with commercial, industrial and government clients in Canada on maintenance programs.

Keeping up throughput

“The more you can do from the perimeter of the equipment without going into lockout and shutting the equipment down and losing throughput in a manufacturing state the better it is,” Bannister said.

The Fluke Connect™ system is a growing number of wirelessly connected test and measurement

tools that leverages Bluetooth Low Energy (BLE) technology, industrial networking and cloud computing in an integrated test and measurement platform. The platform aims to improve efficiency and productivity—and data accuracy—by collection data.

Another advantage of an app such as Fluke Connect™ is you can collect all of the data from multiple tools in one place. The data is logged by date and equipment and can easily be shared.

“I was looking at a vacuum tube oscillator. I was monitoring the filament voltage and current at the same time. And inside this cabinet its 15,000 volts at radio frequency and its very dangerous. You need to be a meter and a half away from that,” Copp said.

“When I’m monitoring more than a couple of devices at a time it’s kind of tricky to look at them with your eyeball and actually catch the correlation. I love to graph the data and see the correlations so with the Connect App running on my tablet. I can link to those devices and store the data as well for subsequent analysis.”

Linamar continues to build its troubleshooting and technical maintenance workforce through a strong apprenticeship program that including seven young women—a conscious effort to increase female technicians in the industrial trades arena.

Using phone apps and high-tech tools is a snap to these younger workers. “They pick it up instantly,” Copp said.

Indeed, the younger technicians have been brought up around technology so they are very comfortable with it. And with connected systems and improved interfaces, you don’t need to be an expert to set it up.

Fluke. *Keeping your world up and running.®*

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