Behind the scenes at L&L Products

Every time you speed down the freeway or fly in the stratosphere, chances are your trip is made possible in part by technologies from L&L Products. L&L offers unique expertise in static sealing, acoustics, vibration reduction, and composite components used in automotive, aerospace, large commercial vehicles, and other industrial applications. In just 15 years the company has been awarded more than 200 patents for material formulations, engineering designs, and manufacturing processes.

L&L has production facilities in the United States, Europe, China, India, Australia, the Czech Republic, Turkey, and Brazil; sales locations in seventeen countries; and engineering in fifteen of those countries. Many of those locations also have R&D groups, and each has its own production support team to ensure that all processes meet stringent standards. In its US headquarters in Romeo, Michigan, that job is done by controls engineers and a machine repair and maintenance staff of technicians.

Flexible products and processes

Although L&L’s products are categorized as rubber and plastics, the manufacturing process is very different than with typical rubber and plastics makers. L&L designs its products to activate at the temperatures of its customers’ paint curing ovens, which are much lower than for most rubber and plastics. Other major design considerations include flexibility and size. The machines run many different setups, so they must be quite flexible. Also, with the high cost of manufacturing floor space, each machine needs to have as small a footprint as possible.

The facility in Romeo covers 200,000 square feet (18.58 square meters) and manufactures the chemical formulations, shapes those formulations, and assembles them into parts. Its customers use those parts to seal; dampen noise, vibration, and harshness; and improve structural integrity. The plant also makes products that shield against high temperatures for industrial equipment, and makes noise reducers and lightweight trim and structural components for the aerospace industry.

Expanding the realm of possibilities

Derek Forsythe, Electrical Controls Engineer for L&L, and his team spend most of their time supporting the equipment on the manufacturing floor and managing the retrofitting and upgrading of those machines. The machines run the gamut of manufacturing processes.
"Our R&D and product development teams are always trying to come up with new ways to solve our customers’ problems, which means that our machines sometimes need to be modified to accomplish those changes," says Forsythe. "We often retrofit a 'standard' machine to run our specialized formulations or deal with specific characteristics of our processes. For example, we might have to add a heat circuit, extend an extruder for greater mixing capabilities, or add a product feeder."

Fluke tools—ranging from TS-1000 electrical testers to Fluke 87 Series III and Fluke 289 Digital Multimeters (DMMs), to the 199C ScopeMeter® Test Tool—play an important role for Forsythe and his team. He was first introduced to Fluke meters in high school and got his first Fluke 87 for Christmas at the age of 15, more than two decades ago.

"It’s up to the individual what test tools they want to use; but when someone here needs a new test tool, they come to engineering and our first choice is typically Fluke," says Forsythe.

**Maintaining accurate temperatures**

Most L&L products are subject to heat processing, so troubleshooting solid state and mercury relays, current monitoring devices, and temperature controllers is a major part of the job. The company uses both 0 to 10 V dc and 4 to 20 mA analog signaling, so the support team needs to measure dc voltage and current along with any electrical noise associated with those signals.
For that, Forsythe uses the Fluke ScopeMeter® 199C. “The ScopeMeter® is good for checking for noise and comparing two signals over time,” says Forsythe. “I use it to compare the ‘on’ command signal of the heat circuit to the signal sent to the PLC from the current monitoring circuit.” He also uses his ScopeMeter® test tool to compare the input to the relay coil with the output contact to check whether the contacts of a relay turn on and off when the coil is commanded.

Non-PLC-controlled circuits require a bit more troubleshooting. “We use a Fluke T5-1000 to measure voltage to the power circuit before and after the fuses, and to measure voltage out of the solid state, mechanical, or mercury relays,” says Forsythe. “We also use it to measure resistance on the heaters to check for opens and shorts, to measure current when the heater is commanded ‘on’, and to verify the proper operation of thermocouples.”

Troubleshooting versatility required

To troubleshoot failures of field devices such as valves; pressure, proximity, and optical sensors and switches; and ac and dc motors, the production support team uses the Fluke 87 III or 289 DMMs. “When a low-voltage device like a switch, sensor, or valve does not work, I typically start at the end of the line, checking to make sure the appropriate power is there and working my way back through all termination points and eventually back to the final termination—the PLC I/O card, relay, or fuse,” says Forsythe. “Fluke tools are rugged, reliable, and have many options for leads that help us diagnose issues with a high level of confidence in their accuracy and safety.”

With higher-current devices and motors, Forsythe starts at the main power source and measures voltage across and current through the circuitry to the final device. A heat circuit that gets too hot typically indicates a solid state relay that has stuck on or a cooling water valve with a faulty solenoid or blown fuse. A heat circuit that is too cool is often a blown fuse, faulty solid state relay, or an open heater. “Occasionally a cooling valve will mechanically stick in the ‘on’ position. Measuring the voltage across the solenoid will tell me if it is being commanded to open,” says Forsythe.

When it comes to troubleshooting variable frequency drives and servo drives, Forsythe uses a Fluke 289 to check motors for open or shorted leads or shorts to ground. He also uses it to measure incoming ac power, the dc bus, and the output stage of the drive to check for balanced phases.

“I use Fluke because the products are reliable and the support is great,” says Forsythe. To demonstrate what he means by reliability, Forsythe still has that Fluke 87 he got for Christmas those decades ago and is passing it on to the next generation. “I used my Fluke 87 a few months ago to teach my son how to use a multimeter to read voltage and current for his science project, which involved testing the output voltage and current produced by apples, oranges, potatoes, and grapefruit. I also used it to teach my Webelos Cub Scout den how to read voltage for their Scientist and Engineering activity pins,” says Forsythe.

We look forward to hearing from those new users in the years to come.