

# Case Study

## Laboratory Applications

*“With the exceptional engineering support from Falcon, we took a major step forward in solving this voltage issue.”*

– Chris Sculthorpe,  
Technical services and  
lab manager  
Milliken Chemical



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## Falcon Solves Voltage Stabilization for Milliken Chemical

*R&D of new molecule for Polyurethane foam leads Milliken to Falcon*

When Milliken Chemical set out to research and develop a new molecule for Polyurethane foam, a few revelations about voltage and power came up that Milliken was not expecting.

Milliken Chemical ([www.millikenchemical.com](http://www.millikenchemical.com)), a division of Milliken & Company, researches, formulates and produces hundreds of products and colorants used in paints, petroleum, plastics, textiles, fibers, and a variety of manufacturing processes. Its parent company, Milliken & Company, has been granted over 2,200 patents and it is the host to the largest textile research center in the world. It's this research that helps define the company as a leading innovator in products used in everything from cars and medical devices to building and construction products to appliances and household essentials.

In undergoing research and development for a new Polyurethane foam, Milliken Chemical conducted many performance tests of the new foam to meet real world specifications. This was a significant \$25 to \$50 million product launch for Milliken and pressure was on for results. In the testing process of the new foam, a gigantic 5' high by 5' wide slab stock of foam pours out of a mix head and goes down a conveyor belt (tunnel) and reacts and grows in the process. An exothermic reaction generates heat in the core of the foam slab which can cause degradation. In order to fully test the foam's performance, Milliken needed to

assess the foam on a large scale. "Developing small blocks of foam in the lab, you won't see the degradation properties unless you use artificial heat – such as a microwave – heating from the inside out – concentrating the temperature towards the center of the core in order to replicate what goes on in the real world," said Chris Sculthorpe, technical services and applications lab manager for Milliken Chemical.

### Not any microwave will do

When heating the foam with an ordinary microwave, Sculthorpe couldn't get the accurate and precise readings he needed as there was no way to dial down the power to a small enough increment. "All store bought microwaves toggle off and on by 10 percent increments and are not sensitive enough. We needed to dial in by one percent," reflected Sculthorpe.

A 10 percent sway in power was too much for the foam as the degradation process is self-propagating requiring a small window to get it just right. The solution was to purchase a laboratory-based microwave in which the voltage could be dialed down within one percent. The included thermometer sets a heat profile and will determine the amount of power to the microwave automatically. However, there were voltage dips on the power line ranging from 203 volts to 217 volts. "The utility said this was normal," said Sculthorpe. "We then ran a dedicated power line to the microwave, but we were still getting too much voltage variance."

## On-Line UPSs to the rescue

Since the ongoing problem had to do with power voltage, Sculthorpe theorized that what he needed was an uninterruptible power supply (UPS) that could smooth out the voltage. He reached out to Falcon to see if they had a system that could fix the problem. "Falcon immediately understood the issues and went so far as to contact the manufacturer of the microwave to understand exactly what we needed for power," said Sculthorpe.

The first Falcon on-line 3kVA UPS Sculthorpe tried was not powerful enough to handle the microwave's wide voltage variances. Falcon then sent out two higher powered units – the Falcon FN 10K UPS. The on-line units were set up to run in parallel providing a total of 14,000 watts. "The Falcon FN Series UPSs solved the voltage problems and supplies clean power to the microwave," said Sculthorpe. "In addition, the redundant configuration gives us the overload capacity we need as well as backup power during power outages – this is a win-win for us."

## One UPS – Many Uses

Falcon's FN Series UPS can easily be configured using individual 3, 4, 5, 6, 8 or 10kVA models, providing up to 30kVA with N+1 redundancy. In addition, parallel configurations of 6 to 40kVA are achievable if N+1 redundancy is not required. In contrast to most modular scalable UPSs, the FN Series are stand-alone units that can be connected in parallel. This economical approach eliminates the added expense of buying cabinets to house control, power and battery modules.

For Milliken, the FN Series' wide input voltage was exactly what its lab needed to accommodate the inrush current from the microwave. The UPS's true regenerative on-line technology receives the incoming AC utility source and converts it to a regulated DC voltage. From this DC voltage, a new AC voltage is generated, providing clean, tightly regulated power - mitigating "dirty" power as well as frequent voltage dips. Moreover, the ability to parallel the units for more power as well as have the extra security

of backup batteries made the FN Series a comprehensive and cost-effective solution for Milliken's unique application. Should an individual UPS require maintenance, the UPS is automatically sensed and taken offline. The user is notified through the LCD display and an audible alarm. The unit may be serviced or replaced without the remaining UPSs or connected load having to be powered down. Internal UPS batteries are user-replaceable and hot-swappable, again while the UPSs and connected equipment are in full operation.

"With the exceptional engineering support from Falcon, we took a major step forward in solving this voltage issue," said Sculthorpe. "The microwave manufacturers did not know the inrush capacity of their microwaves." The usage of microwaves for organic reactions is out of the realm of what microwaves are typically used for in labs. "We may share this power solution with other foam manufacturers as we can now dive much deeper into the science and evaluate the nuances – whether it is blends or different foam types, we can now better understand the foam's reactions. We plan on replicating this solution in our other regional labs as well as help our global labs solve this once perplexing power problem," said Sculthorpe.



### Falcon FN On-line UPS Benefits:

- **Clean Power** - Double-conversion on-line design with galvanic isolation
- **Scalability** - Easily increase power levels with parallelable UPSs up to 40kVA - eliminates expense of modular approach
- **Redundancy** - True N+1 redundancy up to 30kVA eliminates single point of failure
- **Extended Runtime** - Optional extended battery cabinets and chargers available
- **Ultra-secure SNMP/HTTP Agent** - option available. Shutdown client software included at no extra cost.



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