

SPRAY-ON PROTECTION

Alan Lis reports on a new safety product being developed to increase the thermal protective performance of race suits

FIGURE 1 BURN TEST



ABOVE The conditions of a pit stop fuel spill were re-created in the lab. Two pieces of fabric were doused in fuel and subjected to a flash fire test. The left-hand fabric, which was Molecule-treated, experienced a faster, lighter burn than its untreated counterpart on the right

FIGURE 2 LONGER BURN RESULTS



ABOVE The less intense burn on the Molecule-treated fabric flickered out in 46 seconds; the untreated fabric burnt beyond a minute. More than 85 percent of the untreated material burnt, compared to 15 percent of the Molecule-treated fabric

MOLECULE LABS has been making inroads into the motorsport market with an innovative product aimed at improving flame retardant race suits. It has been developed by company owner Michael Guasch, who competes in the US Formula Mazda Pro Series.

"I've been working with DuPont, the developer of Nomex, for many years and I own a chemical manufacturing company," he says. "Because I'm a racer myself I initially designed the product for my own use. Having done that, I decided that the motorsport industry needed it too..."

While Molecule Labs offers a complete care system – a wash, a spot cleaner and an anti-microbial spray to keep the suit smelling nice – its flagship product is its protective spray, which prevents oil, water, grease and other contaminants from penetrating the fabric suit.

"In normal use a flame retardant race suit will stay clean and stay safe. You don't want oil or any other combustible material in the

fabric of the suit in case you are in a fire," says Guasch. "The real benefit of the spray is that it repels gasoline at saturation levels up to 70%.

"If you are in an accident and get gasoline on you, it won't soak into the Nomex material. So if by any misfortune the suit catches fire, it's not soaked in gasoline. Only 30% will be in the suit, which is a great improvement over the performance of a regular race suit in that scenario. Untreated, a race suit will soak up fuel like a sponge. The objective is to repel the fuel so that if you do catch fire there is significantly less absorbed in the fabric of the suit. The fire will be less intense, and will be on the surface of the suit, so the wearer will not get as badly burned as they would in an untreated suit."

Application of the protective spray is a DIY process using home laundry equipment. After the suit is washed, it is hung up and the protector is sprayed on.

"Normally the protector would be applied to the fabric at the mill and heat cured

there," says Guasch. "What we have done is provide the ability for the process to be carried out in a home tumble dryer. No-one has ever done that before and we have a patent pending on that process."

The protective spray is water-based and contains no environmentally-damaging or flammable materials. After spraying, the suit is placed in a tumble dryer and the protector is cured by the heat applied. "The protector is applied directly to the Nomex fibre and the heat curing is a crucial part of the application process," says Guasch. "You can't just spray the suit and leave it to air dry. The protector needs heat to help it impregnate the fibres of the suit but it doesn't form an impenetrable coating, it allows the fabric to breathe."

According to Guasch, the race suit spray is derived from similar products that would be used on protective clothing in oil and gasoline industries.

"I've been working on fabric protection



ABOVE A number of F1 teams entrust the care and maintenance of their racesuits to the David Charles Group. The organisation is currently testing a full range of products from Molecule Labs (Photo: Molecule)

processes for many years," he says. "The race suit treatment is partly derived from those used in other industries but there is a significant difference in the polymer of the protector. The molecular structure of this polymer has a very high fluorine content and that is what gives it its high resistance to oil and hydrocarbon. Essentially the principle is the more fluorine in the polymer, the greater its resistance. It's a close relative of Teflon coating – polytetrafluoroethylene (PTFE) – which is a highly fluorinated polymer.

"It's a chemistry that is typically used in a finishing process in a mill where it is applied to fabrics for stain and water resistance in the likes of camping gear. At the lower levels, the coating might be wax- or silicon-based. When you get into fluorinated products the costs are significantly higher so they don't tend to be used in everyday

“ We are looking at changes to the polymer that could yield further improvement to the TPP rating ”

applications, only highly specialised ones.”

Would anyone using the protective spray invalidate FIA or similar certification for their race suit? Guasch thinks that unlikely, pointing out that the spray has been tested by the Snell Foundation and passed all of its tests.

"It doesn't reduce the thermal protective performance (TPP) of the fabric. In fact, our tests have shown improvements in TPP and that is leading us in a new direction in the

RIGHT The protective spray has been trialled successfully in a number of motorsport disciplines, including Champ Car

development of the product," he says. "Now we are looking at changes to the polymer that could yield further improvement to the TPP rating. In our tests we have achieved 3-6% improvements in TPP simply by applying the product as it is now. Over and above its fuel and oil repellent qualities, that represents a huge improvement but we think there may be more.

"Another advantage is that because the protector can be sprayed on and cured at home, it's possible to protect race suits that have had badges and embroidery added to them after leaving the factory. Typically those additions don't have the same fire resistance as the suit itself and, perhaps more importantly, can absorb spilt fuel."

Although it has been on the market less than a year, the Molecule spray is already in use by a number of teams to protect the suits

of not only drivers but pit crews too. "We are also looking at other markets like snow wear and camping clothing and equipment for this product but our main focus is in

motorsports right now because we are a motorsports-driven company," says Guasch.

"We have already made a move into off-road racing. In the 2006 Baja 1000 we supplied the product to a number of competitors and they loved it. It was a wet event and the protector not only kept them safe from oil and fuel spills, it also kept them warm and dry. If you are soaking wet and driving through the desert at night at 120 mph it can get very cold." **RT**

