



Formula 1 drivers and fire fighters have more confidence in their survival in the event of fire than ever before, thanks to better design, regulation, and greater input from the fibre and textile industries. Considering that oxygen is needed to sustain fire, work completed by the French partnership of Europrotect France and Proline Textile may come as a surprise: new fire fighting clothing combines air insulation comfort with flame retardant materials.



Photo courtesy DuPont

Hot comfort

It has been suggested by more than one social commentator that enthusiasts and spectators are only interested in the crash potential of a motor sport event. Why else, they argue, would thousands flock to see Formula 1 when the cars are out of sight for over half the race? Why else would the television broadcasting rights be so lucrative? Why else would spectators trek several miles on foot to watch rally drivers hurtle through the potential grief of

special stages?

If the theory is correct then the onlookers were on to a bonus during the 2001 Australian Grand Prix when first World Champion Michael Schumacher and then contender Jacques Villeneuve crashed spectacularly - and walked away without a life-threatening injury between them. The tragedy of Villeneuve's event was death of a track marshal after being struck by one of the Honda's wheels that flew off and found the only very small gap in the safety fencing.



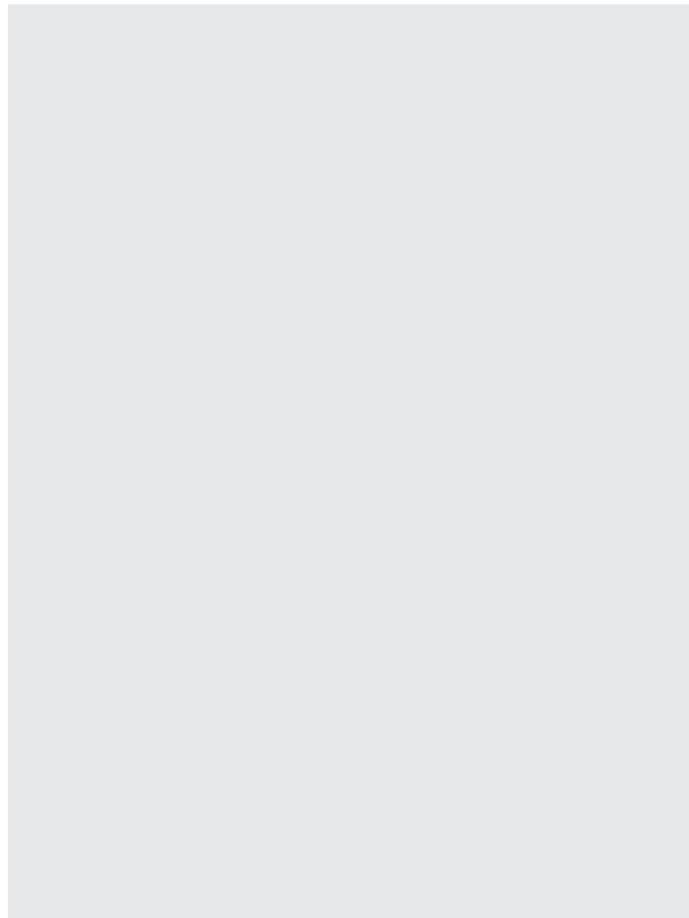
Photo courtesy DuPont

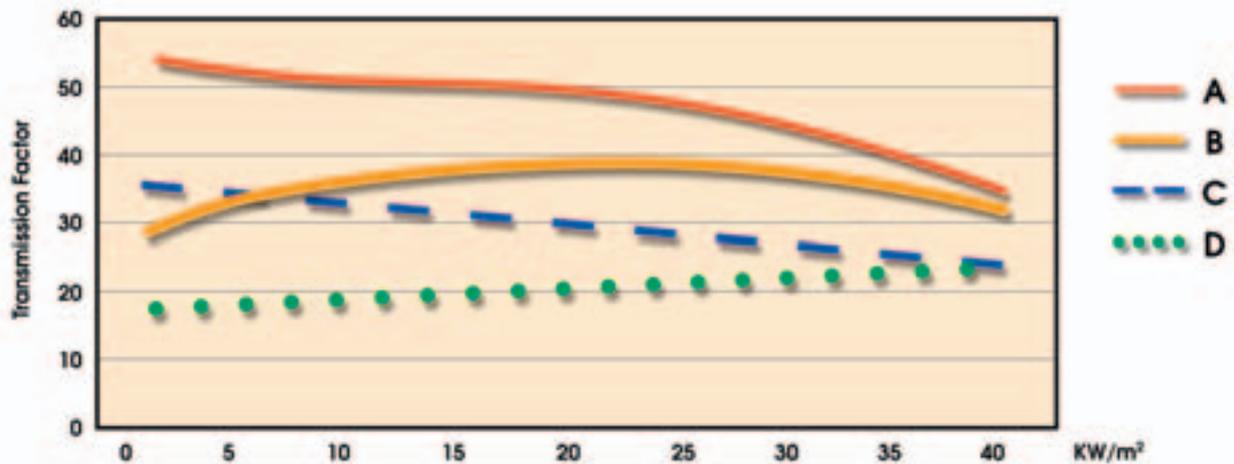
Both drivers owe their lives to the strength in construction of their cars and to the International Automobile Federation (FIA) regulations that govern the design and building. These have given all competitors justifiable confidence in their machines, but all will also admit that the one possibility they still fear more than any other is fire. Fire is unforgiving and uncaring in its effects and long-term injury potential. Short of unconsciousness, there is little to alleviate the instant pain, or its constant aftermath. Small wonder, therefore, that all involved in motor sport, drivers, team managers and event organisers, pay particularly close attention to fire prevention and fire protection.

Essentially the strategies employed operate at two levels. First, direct protection for the individual by means of clothing and personal hardware. Second, incident regulation with the provision of a fully equipped and trained fire-fighting team at every event.

Requirements and benefits

The textile industry's input includes fibres, fabrics and processes that confer flame resistance and temperature deflection as the main benefits. Most readers will be familiar with the one-piece suits worn by drivers and mechanics - more often than not based on fabrics produced from DuPont Nomex fibres in a variety of weights and finishes to match the application and all of which have to





meet the finality of DuPont's Thermo-Man test before being accepted and certificated as suitable for their intended purpose.

The Thermo-Man test is the last in the Nomex Quality Programme. Developed with the aim of ensuring the highest qualities in production and protection for technical clothing, the NQP matches specification against practice in every aspect. Comments Danielle Blomert of Dupont Nomex: "The programme is based on very vigorous specifications for protection against heat and flames, for continued resistance over time, and for appearance and design. Protective clothing is subjected to a series of checks that conclude with the difficult ThermoMan test. This involves a human dummy specifically developed for the purpose by Dupont and currently in use at our Textile Research Laboratory in Geneva. The system is capable of evaluating the fire-resistant properties of textiles and protective clothing in conditions of simulated fire."

The Nomex brand has been in operation for more than 30 years and now consists of a complete family of products, all of which are characterised by exceptional resistance to high temperatures. The fire-fighting teams and fire marshals at every motor sport event are equipped too with clothing manufactured specifically for their role as protectors. Much of it is manufactured in Nomex-based fabrics but, because fire fighting has a universal application, there is a much wider textile choice available. As an example of this there is the work recently completed by the working French partnership of Europrotect France and Proline Textile in the production of a light, thermally effective lining to replace the felted materials currently on offer.

Comfortable air

Europrotect is a specialist manufacturer producing clothing to meet a wide range of conditions hazardous to human beings. Proline specialises in laminates - particularly waterproof breathables - and for a number of years its customers have been requesting lighter fabrics with a high performance factor as an aid to

greater comfort in protective clothing. The problem lay in combining comfort with the maximum protection. The answer, according to the textile technicians, lay in the use of air.

Air is an excellent insulator, which is why motor sport drivers wear three layers of clothing of different weights and flexibility. It has no effective weight. It is easy to wear. It doesn't take up a lot of space. Ergonomically it seems to be perfect, but the company was proposing to take the main thermo-dynamic factor and apply it to the protective clothing issued to fire fighters working in the most difficult and dangerous situations possible. The same clothing must also meet the requirements of EN 469:1995 in respect of thermal transfer efficiency under extreme conditions.

The partner companies developed a new lining for fire fighters' clothing based on a breathable waterproof membrane laminated to a non-woven fabric and with an inner face of woven aramid and fire resistant viscose. Additional ribs of aramid yarns are built into the latter textile and protrude to provide a series of channels where air can freely circulate. Overall thermal insulation is said to be improved with no loss of moisture vapour transmission performance. The finished garments are light, comfortable but keep the wearer sufficiently aware of the surrounding operating conditions so as not to tempt him into overstepping the personal safety limits.

Proline says that complex textiles of the type described, using the air as an insulating medium in association with heat resistant fibres and MVT laminates can provide many of the answers to operational clothing problems experienced by fire fighters. Emergency services at motor sport venues are likely to be exposed to chemical and fuel spills at any time during an event; as a consequence the operators spend long periods wearing the full complement of protective clothing. This new development may just be the answer to the discomfort they experience. 🌐

Derryck Draper/Research Jenny Pickman

An upgraded heat transfer rate is preferable for two reasons:

- a) it provides an early warning of high external temperatures*
- b) it permits an efficient movement of heat from inside to outside the garment*

The above graph (supplied by Proline Textile) shows the transfer rate efficiency of a variety of sample products allied to fire fighters' clothing. The company's new lining product (C) offers a consistent level of performance and weighs considerably less. A= unlined leather; B= leather with a woollen lining fabric; C= 195gsm aramid outer; 130gsm MVT membrane laminated to para aramid; 220gsm Proline lining; D= 195gsm aramid outer; 130gsm MVT membrane laminated to para aramid; 120-130gsm aramid felt; 120gsm aramid and fire-resistant viscose lining.