Safety Spotlight: Driver Uniforms

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Safety amongst motorsport is an ever-evolving topic, and multiple standards and updates have been made regarding driver uniforms. Protective standard 8860-2018 is the benchmark for Formula 1 helmets, while standard 8856-2018 is for all driver clothing including balaclavas, races suits, underlayers, and boots.

HANS Device

The Head and Neck Support (HANS) Device is a critical component of a Formula 1 driver's uniform, with its primary purpose to keep a person's neck and shoulders together. Regular seatbelts or harnesses alone keep the person's body from lurching forward in the event of a sudden stop, but do nothing to keep the head from moving. By limiting said movement, it helps prevent skull and spinal injuries. The most common of injuries was basilar skull fracture, which is characterized by the breaking of one or more bones at the base of the skull. By making the HANS mandatory since 2003, the incidence of these injuries has been greatly reduced. You can see the difference between having or not having the HANS here.

Helmet and Balaclava

The current standards for Formula 1 helmets are focused on a series of tests regarding impact and crush protection, fire resistance, mechanical strength, ballistics, and penetration. These also include various high- and low-velocity impact tests (because the materials of the helmet work differently based on different impacts) as well as lateral tests in the event of a side impact. As of 2019, the FIA has mandated that all drivers use the 8860-2018 helmet model.

There are no requirements regarding the materials used to make the helmets as long as it meets the safety requirements, however a zylon panel was a staple in the design during the 2010's. Zylon is a synthetic material with high flame and heat resistance that is stronger and more rigid than Kevlar, but can still be flexible enough to be made into clothes. This strip was implemented in 2011 after Felipe Massa's near-fatal accident during qualifying for the 2009 Hungarian Grand Prix during which a spring flew off the car in front of him, hit the helmet, and knocked the driver unconscious, resulting in a crash. Massa spent nine days in the hospital (two of which he was in a medically-induced coma), and needed plastic surgery to reconstruct the part of his skull that was struck. To read more about Massa's accident and his personal views and reactions in the following years, click here.

Now, the helmets (by 8860-2018 standards) have Zylon woven into the shell of the helmet themselves, and have a smaller visor opening for enhanced safety. They only weigh about three pounds, and can resist heat to over 1400 degrees Fahrenheit, as well as withstand a half pound projectile traveling at speeds up to 155 miles per hour.

Under the helmet is a balaclava, which covers the driver's entire face and neck area, except for the eyes. It acts as an extra layer of protection in the event of a fire, especially around the neck where the helmet and race suit don't entirely reach. It also has the added benefit of holding in place the tube attached to the car's drink system, as well as the in-ear radio system.

Gloves

Gloves are also an extra precaution when it comes to fire safety. Made of the highly fire-resistant Nomex, they reduce the risk of the drivers' hands from being severely burned in the event of an accident. They also include a 3 millimeter biometric sensor in the fingertip that relays vitals such as breathing, heart rate, and blood oxygen levels. These were implemented in 2018 after Carlos Sainz's accident at the Russian Grand Prix in 2015. During Free Practice 3, Sainz withstood a 46 G impact crash, which buried him in the tire wall, making it impossible for anyone to reach him until all the debris was cleared, which sparked concerns about driver safety and accessibility. If anything similar happened today, both the teams and on-site medical personnel are able to know if the driver is okay and how to take action accordingly.

Race Suit and Underlayers

Race suits have the interesting challenge of needing to be protective but also lightweight. Regardless of weather, the cockpit of the car can get very hot, so they have to be breathable enough to let body heat and sweat escape so as to not suffocate the drivers. This is accomplished via Nomex (just like the gloves) and the material is woven throughout the entire suit. Each suit is tailor made for each driver, specifically to be the most comfortable when sitting down so that nothing pulls or snags.

Underneath the suit is more Nomex in the form of a long sleeve shirt, long pants, and socks; all of which overlap with each other to make sure that the driver is entirely covered to protect them from fire.