



F1 Safety – The Car

This is Sidepodcast and the second episode of our latest mini series F1 Safety. Yesterday we covered all things helmets and clothing, and today we're going to take a closer look at the safety of a Formula 1 car.

We talked about carbon fibre briefly in the previous show, as the material is supremely strong but very light weight, ultimately a designers dream. Apparently there is also such a thing as carbon-fibre reinforced plastic but I think that's taking it too far. The majority of a Formula 1 car is made from the lovely carbon fibre, and in terms of safety, the driver is encased in a strong, reinforced tub. No matter what happens to the car, the tub should remain in tact.

There are a few rules to be followed when designing the cockpit. Firstly, no oil, fuel or water lines are allowed to pass through the area where the driver sits. The cockpit sides have very specific dimensions – specified to be even higher in 2008 after we saw cars flying over each other in '07.

Drivers are strapped into their custom made seat, moulded to them both for comfort and to stop them sliding around every lap. They have six point harnesses, which can be unclashed with one hand. A driver has to be able to get out of a car within five seconds, and replace the steering wheel in another five. If, in an accident situation, he is unable to get out of the car, marshals and rescue crews are able to pull both the driver and the seat from a car together.

Another useful safety feature is wheel tethers. In case of an accident, the tyres are tethered to the car so that some of the forces are absorbed. The idea is that a wheel doesn't go bouncing off down a track, but at the same time, the tethers shouldn't hold on to a wheel at all costs. If the forces are great enough that a wheel does get loose, it's speed should have been reduced to make it mostly harmless.

Before being allowed anywhere near a track, the cars must go through thorough crash tests, usually performed at the Cranfield Impact Centre, in Bedfordshire. The FIA set the standards and supervise the tests, to ensure the cars can survive all kinds of impacts. There are two main types of crash test – dynamic and static.

Naturally, the dynamic tests are ones in which the car is moving, and the effects of an accident are monitored. The impacts are tested on the front, sides and rear, with speeds of up to 15 metres per second. A crash test dummy situated inside the car is hooked up to monitors, and the deceleration on the chest shouldn't exceed 60G within three milliseconds. These are numbers that are almost meaningless to me, but it shows the detail the crash tests go into.

The static tests put the cars through their paces by applying pressure to the various sides, again with the intent of keeping the tub, the gearbox and the roll bar in good and safe condition. In these instances, the steering wheel needs to remain removable for easy access to the driver in case of an accident.

Once the car is cleared to race, it needs to have a black box installed on it. This is similar to the boxes on aircraft, that record all the important car information so that if an incident does occur, then it should be straightforward to find out what happened, and why. This box, the accident data recorder, is also linked to a medical warning system, which will give warning to the FIA and the medical car, ahead of the streamed pictures on the world feed. The black box needs to be accessible without having to remove any other parts of the car, but naturally it is tucked away so as not to interrupt with the aerodynamic design. It's required on all cars when they are on track with other teams, but not necessary if there is just a single team at a circuit for a testing session.



With all this on board, the car is now ready to leave the garage and get moving. There are some additional safety measures in place for when a car is out on track and far from the controlled environment of the pitlane. An onboard fire extinguisher must be executable from within the cockpit. There is also a master switch inside the cockpit to deactivate the electronics and fuel pumps in case of emergency.

The drivers have in-dash flags to let them know the state of the track as they go around it – whether there are yellow flags, or if the safety car is being deployed. Two more small things to finish, the rear view mirrors are supposedly a safety device but are to all intents and purposes useless – David Coulthard proved that – and the rear light is there to try and reduce pileups. It comes on when a driver is slowing to enter the pitlane, or if there is reduced visibility because of the weather.

That concludes the second part of our F1 Safety mini series. Don't forget to leave your feedback, either on the site sidepodcast.com or email me Christine@sidepodcast.com. I'll be back tomorrow with part three, please join me then.

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