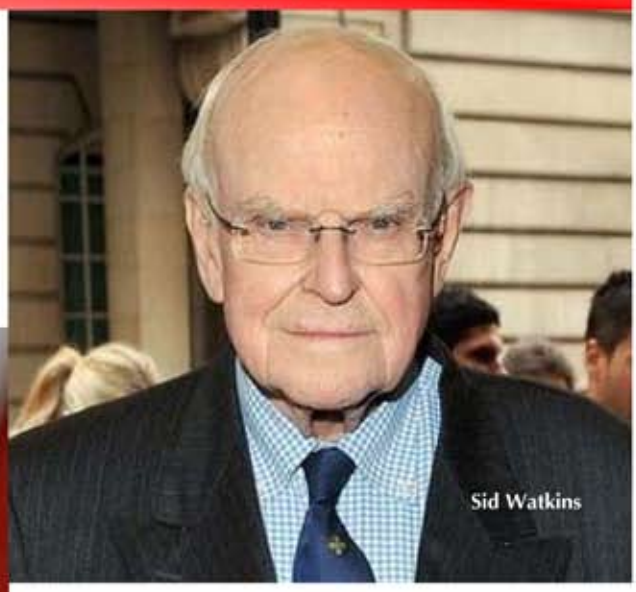
Crash Safety

by Frank Catt >>

A continuation of the crash safety issue.

Formula 1 was rocked by a series of accidents in 1994 and 1995, among them the deaths of Ayrton Senna and Roland Ratzenberger on 30th April and 1st May 1994. A series of huge improvements, to increase survivability, were brought about by imposed developments, insisted on by the FIA President, Max Mosely, and the ideas led by Professor Sid Watkins, Formula 1s Chief Medical Officer.



Sid Watkins

Few people who were in Monte Carlo on Thursday, 12th May really appreciated how serious Formula 1 driver Carl Wendlinger's accident was. Near the end of the morning practice session the 25 year old Austrian had spun going into the chicane and slid sideways into a water filled plastic, barrel-shaped barrier at the ridiculously low speed of 30mph.

But soon the seriousness of the accident became apparent. In the impact, Wendlinger sustained a brain contusion and subsequently was kept in a stable condition in hospital in a medically induced coma. He would remain comatose for 18 days. His career as a driver was effectively ended; Wendlinger was never the same again. Worse still, at Imola, Roland Ratzenberger and Ayrton Senna had been killed, Formula 1's first fatalities since Elio de Angelis lost his life in 1986.

Significant changes were introduced to the cars in the wake of the Imola and Monaco tragedies, but Formula 1 doctor Sid Watkins knew they weren't enough. He was deeply worried by what happened to a driver's head in the immediate aftermath of a violent accident. FIA President Max Mosley created what he called an Expert Advisory Group, to research and develop greater safety measures. Chaired by Watkins, it asked the Motor Industries Research Association (MIRA) to study the forces likely to be suffered by a driver in the cockpit in the event of an impact, using high-G sled testing of a McLaren chassis and specially instrumented dummies. The first tests simulated a frontal crash at 11.4 metres per second, giving a crash pulse of 23G at close to 25mph.

Watkins recruited FIA technical supremo Charlie Whiting, FIA advisor Peter Wright, Dr Harvey Postlethwaite, race director Roland Bruynseraede and Gerhard Berger to his advisory group, and together this team set to work to calculate the threshold at which a head injury would be sustained. They came up with a complex figure for head injury criterion (HIC). The threshold was deemed to be an impact of 80G over 3ms, giving a head injury criterion of 1000.

HEAD INJURY CRITERION (HIC) is a measure of the likelihood of head injury arising from impact. At a HIC of 1000, 1 in 6 average adults will suffer life-threatening injury to their brain. More accurately, an 18% probability of severe head injury, 55% probability of serious injury and a 90% probability of moderate head injury.

HIC	Level Of Brain Concussion and Head Injury
135-519	Headache or dizziness
520-899	Unconscious <1 hour, linear fracture
900-1254	Unconscious 1-6 hours, depressed fracture
1255-1574	Unconscious 6-24 hours, open fracture
1575-1859	Unconscious >25 hours, large haematoma
>1860	Non survivable

Unsurprisingly, it was declared that current Formula 1 cockpits, and many other race car formulas, offered insufficient protection to drivers.

After the Expert Advisory Group's findings were published, raised cockpit sides of specific dimensions, lined with a horseshoe-shaped foam collar, were