

# Composite Materials Technology in Formula 1 Motor Racing.

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## Abstract

If the pundits are to be believed, something approaching 10% of the world's population watches each Formula 1 race. Having said that, beneath its glamorous surface, few understand what exactly is involved and why it has evolved into "technological warfare". The strategy of Formula 1 will be discussed with a view to explain why the cars are so dependent on the use of advanced materials, in particular fibre reinforced composites. Any engineering structure, irrespective of its intended purpose, must be made of one or more materials. More often than not it is the choice and behaviour of those materials that determine its mechanical performance. The introduction of fibre reinforced composite chassis was one of the most significant developments in the history of Grand Prix motor racing. Technology advances gained from these advanced materials have produced cars that are lighter, faster and safer than ever before. A short introduction to the science of composite materials will be followed by a history of their use and development within the sport. Design manufacture and operation of composite structures will be reviewed. Reference will also be made to their energy absorbing properties that have contributed so significantly to the improved safety record of Formula 1 and the more specialist composite materials, such as carbon-carbon, used in brakes and clutches etc.

## The design of Formula 1 racing cars

The general arrangement of single seat racing cars has remained the same since the early 1960s. The central component, which accommodates the driver, fuel cell and front suspension assembly, is the chassis (Figure 1).



Figure 1: The chassis is the central component of an F1 car.

This is a semi-monocoque shell structure which is more like a jet fighter aircraft cockpit, both in terms of shape and construction, than anything one would expect to find on the road. The engine, in addition to providing propulsion, has a structural function and is attached directly to the rear of this unit by high strength metal studs.

# Composite Materials Technology And Formula 1 Motor Racing

**Jiyuan Zhang**



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