

## What Sort of Crash?

by Frank Catt >>

Somewhere in one of the many books on specialist car manufacture, and I think it may be in Jabby Crombac's book about Colin Chapman, was a very telling story when Chapman said 'tell me what sort of crash you are going to have and I will try to design for it', or something along those lines.

Chapman was a shrewd cookie; he knew that he couldn't cover every eventuality, whether foreseeable or not, and his cars were based on minimalism and lightness with small concern for the occupant's safety in all possible incidents.

Of course, some designs ultimately proved quite dangerous, and would in no way meet current requirements, either by VOSA or the MSA, for use in today's cars.

I started driving (legally at least) in 1960, before the present legal requirements of car design for passenger protection. Of course we, as teenagers, scoffed at the idea of the need to be protected in any way - why should we want or need seat belts, MOT tests and such? We were invincible - or at least we thought we were - until we became aware that some of our mates were no longer with us, and we either visited them in hospital or went to their funeral.

Soon designers started promoting safety as part of the reason to buy their cars, firstly with the 3-box 'crushable' designs, then with monocoque structures that would progressively collapse in a controlled way to soften the shock of impact. Rigid structures in the vehicle frame diminished in scale as manufacturers used computer-aided design to build a pressed sheet steel body which had the strength to be rigid in use, but progressively collapsible on impact, thereby protecting its occupants.

Which leads to my point. Why are we still able to build and drive cars that are, in essence, as dangerous as the things we drove back in the 1960s?

Most of the specialist kit car (I hate that term!), amateur/home built/call-it-what-you-will market relies on a rigid spaceframe structure as its base platform, with a bolted/bonded-on bodyshell to form the enclosure for the occupants. The bodyshell, normally of a composite material such as fibreglass, offers minimal protection, due to the way it will delaminate and splinter under impact, rather than deform in any way that will absorb energy. The underlying steel chassis is a strongly welded frame that will transmit impact forces, rather than dissipate them. Even small impacts can cause structural damage anywhere in the frame, and possibly in the cockpit area, which is much more lightly triangulated due to the need for space for the occupants.

Having witnessed and repaired accident-damaged replicas over a considerable period, and having been commissioned to investigate and report to insurers on the cause and effect of damage to these cars, I have a strongly-formed opinion on some aspects, particularly

on those of occupant safety.

I was concerned, at the very least, to read comments in the last issue of *Fortyfication* regarding the very lucky survival of the driver of a GTD in an impact accident. The writer postulated that the driver's survival was due to the installation of an internal safety roll over cage inside the cockpit, whereas the facts were that this structure was more the cause of his quite severe injuries and, but for good fortune, could have been the cause of fatal injury.

If, in this particular accident, had there been no added internal cockpit structure, impact damage would not have intruded into the occupied area other than that caused by broken bodywork and wind-screen. The point of impact was just behind the right hand front wheel, between the wheel and the front of the pontoon, which caused distortion to the chassis.



Point of impact, showing severe damage to roll cage

However, the impact (with a tree) also caught the front leg of the roll cage, just above the point at which it was welded to the chassis. This created a massive distortion to the cage, forcing it back onto the driver's head, causing facial and skull fractures. The impact forces on the front leg of the cage were transmitted through it to the extent that load was then applied to the rear bulkhead behind the driver, collapsing this backwards onto the Holley carburettor on top of the engine.

I was asked to study and report on this particular accident for an insurance company, not only in respect of the damage and injuries caused, but also for a view on future insurance risks with this type of vehicle. This type of report can have significant impact on future premiums and the insurability of these cars.

Following this, and other accident damage investigations and repairs that I have been involved with, I am

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Massive distortion of the roll cage



Bulkhead collapsed onto carburettor



convinced without any doubt that the installation of any steelwork structure inside the cockpit of a GT40 or similar car is inherently dangerous, and I will not supply or fit an internal roll over cage, either for road or track use. I have recently lost good friends, experienced drivers, who have been killed by head impact with internal steelwork 'safety' cages.

Having said that, and having just completed a GTD40 race car development programme, there are ways of offering substantial structural safety within the car, together with significant increases in structural rigidity, without compromising driver safety. This involved extensive design work with the co operation of the MSA, including very great assistance by MSA scrutineers' visits to our workshop as work progressed.

There have been very few rollover crashes suffered by GT40 type cars. The only 2 of which I have knowledge were caused by arrogance and stupidity, and the only fatality I know was caused not by the crash itself, but by inability to escape from the car due to the doors being jammed shut, inverted, in a roadside ditch; the subsequent petrol fire caused death.

It is my submission that, rather than rely on putting yourself inside a steel cage with a tiger, first learn to tame that tiger or stay out of it. But of course, if the only reason for adding such a structure is for the posing value, *get a life - or at least keep the one you already have.*

Ongoing and continuous discussions, regarding the development and safety of these cars, between ourselves at Wealden Engineering and Mick Sollis at SouthernGT, has created a consensus based on experience gained over many years regarding the best way forward on future improvements.

We both watch the ideas and construction of both amateur builders and companies supplying them, and can feel concern on occasion when safety items are, in our opinion, compromised. Our thoughts on components manufactured by others, that have proven to be inadequate, along with continuing denial that a situation urgently requiring recall exists, are well-known and documented.

Ultimately this type of safety issue will cause a review of risks by VOSA, the insurers, potential purchasers and users of this type of car which could be hugely detrimental to the whole industry.

Consider your head as an egg; would you rather be thrown onto the floor in a crushable egg box, or in an empty tin can? In which would you best survive?