Know your Component Car – Parts II & III

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As promised, part 2 & 3 in our series comparing an early replica GT40 and the CAV GT!

Part 2: Front and Rear Suspension

The front uprights on the CAV GT are machined from billet aluminium on CNC lathes and 3-D machining centres before being anodised (see fig. 3). The new design includes an adjustable bumpsteer bracket and revised geometry (see fig.4). By contrast, the car pictured in the adjacent photos has a cast steel unit which is sourced from a standard production car (see fig. 1 & 2). A picture is worth a thousand words – compare the two for yourself.

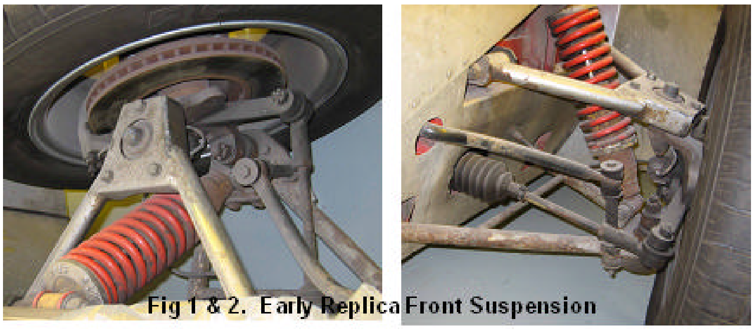

Fig 1 & 2. Early Replica Front Suspension

The replica we bought, has fabricated rear uprights (see figs. 9 & 12). They are made from pieces of steel plate that have been welded together. There are no rose joints so adjustments have to be made using shims at the wishbone to chassis attachment points. While this system works, it can best be described as agricultural. Even the trailing arm yokes are fabricated and not machined from a billet of material. Most other replicas make use of donor parts (by this we mean parts used in production cars). This is somewhat limiting as it means the chassis has to be designed around the pick-up points used on a completely different car and not necessarily the best ones for a GT40. For example, Ford Granada suspension is used quite extensively on many GT40 replicas. This suspension design was never intended to be used on a car capable of heading towards 200 mph mark!

The CAV GT rear suspension is faithful in concept to the original GT40's, featuring independent double trailing links with an inverted lower A-frame wishbone and upper transverse link with anti-roll bar linkage coupled to cast aluminium uprights (see fig. 10). As we have customers putting 600 HP motors in their CAV GT's, and racing them, the suspension has to be capable of handling that kind of power and needs to be fully adjustable (the rear suspension alone features 16 rose joints). Out of necessity the new upright had to be asymmetrical due to the revised suspension geometry and Wilwood braking system. This may not seem like a big deal but in terms of cost we now required two moulds instead of one, (a left and a right hand side) and of course more complicated tooling and jigging when it came to machining (see figs. 5, 6 & 7).

Fig 5. Old CAV Rear Upright next to New Polyurethane model

Fig 6. New Upright – Blank Casting

Fig 7. New CAV GT Rear Upright - Machined

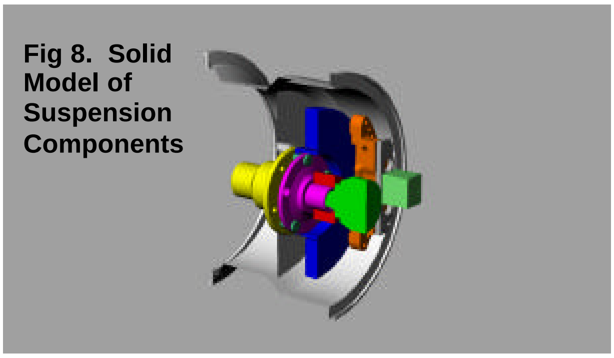

Fig 8. Solid Model of Suspension Components

We started with the suspension geometry points on our 3-D CAD package. Each suspension component had to be modelled in 3-D and assembled on the computer (see Fig 8.). The shape for the new upright could then be modelled around the existing components. Once the necessary strength calculations had been done, focus turned to casting considerations. With the aid of a specialist company, the casting was modelled and then sent for rapid prototyping (see fig. 5). The result was two polyurethane models, which we could evaluate before going to the expense of casting aluminium uprights. We decided to do an initial casting run of 3 sets to complete our development work. These were used to develop the machining process for the upright and to do physical checks on the car. (The polyurethane models were useful but were too fragile to actually machine or install on the car to check fit and function). The uprights are cast from LM 25, a castable grade of aluminium, which is then heat treated. Once heat treated, the castings go for precision machining. Jigs needed to be made to hold them correctly during the various machining processes. A three axis CNC machining centre is used, thus ensuring a consistency of product and dimensional accuracy. By contrast, the dimensional accuracy of the fabricated upright would be no where near as good (even if it was welded in a jig). With our first set of uprights on a car, we could verify all our mounting points, offsets and brackets to hold brake lines and cables. There is an old saying that if it "looks right", it probably is. Well, we haven't just relied on what it looks like; we have spent more than six months getting to this point and have now put the upright into production. The end result is a suspension system that is fully adjustable and can handle big horse powers.

Fig 9. Early Replica Style Rear Suspension

Fig 10. CAV GT Rear Suspension

Part 3: Brake System

Fig 11. CAV GT Front Disk & Caliper - Racing


Fig 12. Space Frame Style Rear Suspension


Fig 13. CAV GT Handbrake Caliper


Fig 14. Tandem Master and reservoir – CAV GT

The new Wilwood braking system allows for the perfect set up for road or track and was chosen primarily for its racing pedigree. Fig 11, to the left, shows the 6 pot billet aluminium Wilwood brake caliper used in the racing version of the CAV GT. Standard CAV GT's use a 4 pot forged alumniuim unit also by Wilwood. The configuation is different to that of our replica space frame car. The brake rotor bolts onto the aluminium brake disk bell where the replica car uses a production car single piece cast disk. We all know that the first thing you do when trying to make a car go faster around the track is to improve the braking. A production car's brakes might feel awsome on the road but when the car is pushed to the limit, the brakes are almost guarenteed to fade after a few laps resulting in poor lap times. As stated, Wilwood braking systems are race proven which is why they were selected for the new CAV GT. Fig 13., to the right, shows the compact lightweight Wilwood handbrake caliper. This helps to reduce the unsprung mass. There is also brake bias adjustment from inside the cockpit so you can balance the brakes to suit conditions. So go ahead, buy the CAV GT, find some serious horse power, get behind the wheel and go and break some lap times!!