# Sauber turn F1 inside out

Matthew Morris: As we all know, Formula One is the pinnacle of technology in motorsport. As I'm sure you've all seen on the TV and in magazines, there are lots of pictures of Formula One cars. But wouldn't it be really cool if we took a Formula One car and split it and opened it? Just like an apple.

Here at the Sauber F1 team, that's exactly what we've done. We've split a car straight down the centre line. It's taken us two years, but here it is.

One of the challenging points of designing a Formula One car are positioning and packaging all the components that make the Formula One car work. Here you can see all these components and how they're positioned on the car. So starting at the rear, we've got the gearbox, we've got the clutch, we've got the engine, we've got the oil tank, we've got the fuel system. Here we've got all the electronic boxes. And then moving up to the front, we've got all the pedals and the steering system.

Now, it's very important on a Formula One car that we keep all the weight very low. This reduces the centre of gravity of the car and brings us performance.

This is the car steering system. We start with the steering wheel. Clearly it's not just a steering wheel, it also doubles up as the driver's interface to the rest of the car and also to the pits. On the back of the steering wheel we have the gear shift paddles and also the paddle to lift the clutch. On the front, there are many buttons: to talk to the guys in the pit lane, to change engine settings, to save fuel, more power, and in the middle, there's a little computer screen, which tells them if there's any problems with the car, split times, all sorts of really useful data for him.

From the steering wheel, we come down the steering column - the thin wall carbon tube which has quite a tortuous route as it comes down through the car. It has to come through the pedals, turn an angle, and then come down to the steering system. The steering system is actually a very simple steering system, due to the regulations and very similar to that that you have on the road car. Obviously a lot smaller and lighter.

Here we have the driver's seat. Obviously where the driver sits. Then immediately behind him, probably 50mm away is where we store the highly flammable fuel in the fuel cell. This is a kevlar fuel system and as you can see we have lots of horizontal baffles in there. Now if we didn't have these horizontal baffles, the fuel would surge around, particularly under braking with the high g levels, and in cornering. In each of the baffles, there are little flap valves, which allow the fuel to go down but not up. So as the fuel drains, the fuel could never come above one of these horizontal baffles. By doing this, we keep the centre of gravity always as low as possible. There are also lots of pipes and pumps in here, these are positioned strategically to feed the engine whilst also allowing the fuel cell to breathe.

We've spoken about all the technical components on the car and how we position them and package them. I guess the final piece of the jigsaw now is to position the driver. Some say he's the most important part of the car, so let's get him in.

Sergio Pérez: It's important to be fit. You are not in a normal position. You have a lot of forces, especially in a crash. I had a big accident last year in Monaco, so we know that it's a safe car.

Matthew: Shall we get you in then?

Sergio: Of course.

Matthew: You sitting comfy?

Sergio: Ah, a little bit. This, how it looks, as I told you, not a very comfortable position to be sitting in, two hours.

Matthew: We've spoken about getting all the components as low down on the car as possible, obviously you're just another component to us, as you can see, your backside is 10mm away from the tarmac.

Sergio: From the floor.

Matthew: Which obviously you feel when you're racing in the car. There's usually a good gauge to tell us if the car is too low, because his backside may be gets a little warm.

Sergio: Yes, I feel a small torch back there.

Matthew: Yep. Safety is obviously paramount in Formula One. Obviously if anything does happen, we have a fire extinguisher system on the car, which sits here, which can either be activated by the driver or the marshals at the track. The actual chassis is one big safe haven for the driver. We make the chassis from carbon honeycomb so it's very strong and very light. There are many other safety features on the car such as the head padding to stop the driver's head getting injured. We have crash structures above the driver's head and in front of the driver and then as you move down the car, we have a crash zone at the front. All this packaging that we've spoken about makes it very difficult to try and find anywhere for my apple to fit, other than this huge void at the front that has to be reserved for the frontal crash test. So anyway, I hope you've enjoyed your tour of a cutaway Sauber F1 car, thank you very much.