



Finite Element Analysis

The boundary conditions for the tub.

The boundary conditions for the tub are really quite straightforward. You will recall that the entire back end of the car - comprising the engine, gear box and so on, is attached solidly to the rear bulkhead of the tub. Other bits and pieces such as electrical wiring, controls, and water pipes we can forget about.

The engine itself forms a structural member, so it's the front of the engine which bolts firmly to the tub, using 6 threaded fasteners. No rubber anti-vibration mountings on racing cars! The engine of course is hugely stiff - almost a solid lump in fact.

Thus we can say that the chassis tub connects to an infinitely stiff structure at 6 mounting points. We say that under any load condition on the tub - the back end mountings are going nowhere - we assign them a boundary condition restraint of zero displacement in all 3 directions, x,y and z.

That's restrained the tub. The load is applied at the front end as equal and opposite moment arms, a couple in other words, acting through the suspension pick-up points. The suspension itself is assumed to be very stiff too, no spring resilience for this bit of the exercise, so the chassis tub experiences a pure torsion due to the applied couple.

For both the boundary condition restraints and load input points we can expect some localised high stresses. We're not interested in these though - as long as the loads and reaction forces are fed into the structure, the main part - the bit we're interested in - will be modelled and behave close to the real thing.