



## **Finite Element Analysis**

*The hub takes massive stresses.*

Although we now know how the hub works and interacts with all the other components, we still don't know what external load condition we should apply.

This is step 2 of the process and where we have to start making engineering judgements. Out of the possible infinite number of loads and load cases which could be applied we have to select one which we hope will cover most eventualities and be an appropriate worst case. Let's hear what Lewis has to say...

The car takes a considerable amount of abuse during a race, and obviously within that, there are probably thousands of different load cases, all of different magnitudes and directions. We can't obviously possibly consider all of those in our modelling, so what we tend to do is, break these loads down into worse cases which are, for the 3 axis of the car in terms of the loads applied to them, one of which is lateral cornering which is considered at high speed, longitudinal; braking which goes up and down the car like this and vertical which is effectively analogous to hitting a big bump. So for the component in question, the hub, by far the worst case, is the cornering which is the one that we consider.

So Lewis considers the lateral cornering force as an appropriate worst case.

Notice that in reality the forces are changing from one moment to the next. We are looking at the situation for one instant.

By considering the force statically, and perhaps increasing it with a safety factor allowance, we hope to embrace all load cases that are likely to arise.

This is a decision you make as the designer, based on experience, the computer won't do it for you, and it is no good leaving it to a computer analyst either.

If you are in any doubt about which might be a worst case it may be advisable to try a range of load cases.