



Finite Element Analysis

The hub's boundary conditions.

In step 3, we consider the physical component's boundary conditions. The boundary conditions include the restraints - how the component is actually held or located and what to do about modelling them - probably the most important aspect to get right. These conditions change for example if the car hits a bump, the driver dabs the brakes or accelerator some more, tweaks the steering wheel and so on.

It is important therefore to clearly understand what loads you are stressing for. For this exercise, Lewis has already said that an appropriate worst case is the lateral cornering force at high speed.

Remember that in reality we have a dynamic situation - the wheel and hub are rotating while the car itself is subject to a centripetal acceleration as it rounds the corner. We are however neglecting the masses and acceleration forces. We also consider the cornering forces to be applied statically, and the hub to be in equilibrium. Thus by a simple static analysis we arrive at the applied loads and reactions. We are regarding the car as fixed, that is containing the inertial reference axes for the hub free body diagram.