Finite Element Analysis

Stiffer means faster.

Now we understand how the tub works and interacts with the other components, we can consider what external load condition we should apply for analysis.

The chassis has many load cases applied to it. The one that we're going to consider is a pure torsion test which effectively is applying a pure moment to the front of the car through the suspension, and it basically applies a pure moment to the front of the car by applying a vertical force in one direction on one side and down on the other side, to apply a pure torque. Which means there's a big twist in the chassis and it's constrained at the rear bulkhead at the fasteners as we mentioned before.

There are good reasons for being interested in the torsion test. For example, the torsional stiffness of a racing car chassis is vital in determining overall performance, whatever it is made of.

The stiffer the chassis the better the car in terms of handling. The suspension design, operation and adjustment can be compromised if the chassis isn't stiff enough. A stiff chassis enables the suspension to work correctly and give the driver confidence in the handling - it will be responsive to small adjustments in the setting and tuning of the suspension at the race track.

A flexible chassis on the other hand will smother or subsume the results of any suspension adjustments and so the car will not be predictable when handling on the limit of adhesion and probably spook the driver and be uncompetitive.

Another reason is that it is a non-destructive test and can be easily set up in the workshop. Teams can evaluate their latest chassis design or the results of any modifications in a repeatable manner, and thus build up a data base of knowledge and performance which will also be useful in verifying computer models.

The actual value of the load in this case is not important - we are looking at stiffness measured as Nm torque per degree of twist.