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REFINEMENT AND DOES IT ORIGINATE IN DESIGN OR DEVELOPMENT OR BOTH

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Anyone who has had anything to do with the design of a vehicle realises only too well that to achieve a satisfactory degree of refinement without incurring the wrath of a cost conscious management necessitates attention to detail right from the initial conception of the vehicle to the stage where the first customer's car rolls down the production line.

The early detection of any design fault is of vital importance in the development of any product so the evaluation and test of all aspects of a new design should have the highest priority and take place at the earliest opportunity.

The procedure adopted to achieve these ends whether a mathematical study or measurements on hardware will take off where inspiration and previous knowledge leave off. It must help to make a choice among alternatives, diagnose faults and search out oversights. The evaluation will therefore have to do two things; one, give a satisfactory description of the product's behaviour and performance, and two, provide a critical standard by which the performance can be judged. This is obvious as measurements in themselves are useless unless there exists some criteria by which they can be judged.

In applying these principles to vehicle drive line design the importance lies very much in the choice of engine. For instance, the choice of a 4-cylinder in line engine makes the transmission design critical for not only bending resonances but also torsional ones because of the large second order vibration found on them, while the choice of a V8 or 6-cylinder engine, because of their inherent in balance and smoother torque characteristics, makes the drive line design far less critical.

If one realises that engine and transmission parts have to be released early in the vehicle design, because of the time taken in their tooling, it becomes vital to simulate the design at a very early stage, often before real prototype parts can be made, and the test and evaluation carried out on the real design components is then more an insurance that the design meets its specification and will prove satisfactory in service. Any changes then will be costly and time consuming.

It is indeed fortunate for us that generally no new vehicle is completely new, so usually there are current vehicle parts that are identical or adaptable to the proposed designs. This enables us to make experimental hardware for a lash up/system to simulate the design proposal. The behaviour of this system is then investigated for resonances using electromagnetic vibration equipment. If satisfactory, the whole experimental drive line is then mounted in a spaceframe to simulate the actual vehicle and motored on a chassis dynamometer enabling actual operating vibration levels to be measured. This type of approach enables us not only to design an engine

transmission ensemble for a new vehicle with a predicted vibrational behaviour but also to design it in such a way that we maintain as low a vibrational level as possible throughout the operating range.