Q&A with IFR Automotive

By: Matthew Beecham | 7 December 2010

IFR Automotive has developed and patented its Twin Brake Disc (TBD) system. As the name implies the lightweight stainless steel brake system comprises twin discs, each with turbine shaped slots for maximum air cooling and braking efficiency. To find out more, Matthew Beecham talked with Ignacio Fernandez of IFR Automotive.

The principal characteristic of this design is that heat is dissipated quickly and does not accumulate, thereby permitting much thinner discs. The result is a significant weight saving of more than 70% compared with normal brake systems.

Having more than one brake disc also makes the calliper requirements smaller, and hence much lighter, further reducing the total mass of the brakes, which in turn helps to reduce the overall weight of the vehicle.

In addition, a lower unsprung mass is immensely beneficial for a vehicle's ride and handling performance.

The claimed advantages of this system are:

- maximum air cooling and braking efficiency;
- improved active safety from improved handling of the vehicle;
- more traction from increased contact of the wheel with the road;
- improved ride comfort;
- less fuel consumption and fewer emissions through ultra lightweight design;
- better feel of the brakes for the driver by avoiding the need for a servo;
- increased durability of brake pads and discs.

On the company's Aspid technology demonstrator vehicle, the company claims that the combination of the TBD brake system and patented DLR wishbone suspension, results in a very low unsprung mass which matches that of an F1 car built in composite materials – yet on the Aspid this has been achieved with steel brake discs and an aluminium suspension. Compared with normal road car brake systems, the weight saving is more than 70%.

j-a: What are the forces driving innovation in foundation braking for passenger cars and light trucks? Are those drivers the same for every car segment?

Ignacio Fernandez: In terms of further development, the major challenge is about reducing the weight of the system, which is probably the most crucial factor for two main reasons. The first relates to the unsprung mass of the vehicle, which has a significant impact on the forces transmitted to the chassis, which are proportional to the unsprung mass. Consequently, the unsprung mass of the brakes has a big impact on the set-up of the suspension and the vehicle dynamics generally, influencing both active safety and ride comfort.

The second crucial factor is that the unsprung mass is also rotating and has inertia, which also has to be managed. For IFR Automotive, which is focused on lightweight technology, the main driver behind our technical innovations is weight reduction. Whether a disc or drum, it's a very heavy component located in the most critical part of the vehicle. As well as providing the fundamental active safety and vehicle dynamic benefits of lightweight brakes, IFR's advanced twin-disc system, or TBD, also provides a significant step change improvement in resistance to fading at medium and high speed, comparable to that achieved when the industry changed from drum to disc brakes. The improved fade resistance compared with a conventional disc system is one of the major benefits resulting from the rapid cooling delivered by IFR's twin-disc brake system.

j-a: To what extent do those drivers change when looking at the developing regions, such as India? For reasons of low cost and ease of maintenance, I guess the developing regions still use drum brakes. Is that correct?

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