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## **Advanced Technologies Give Caliber Excellent Ride and Handling and Body Stiffness While Reducing Noise, Vibration and Harshness**

- High-strength steel reduces weight, improves impact performance
- Structure designed to meet aggressive regulatory impact requirements
- Sealers and sound-absorbent materials create a quiet interior

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To address stringent frontal, side- and rear-impact performance criteria around the world, Dodge Caliber engineers used many advanced technologies to create a safe, quiet body structure.

"We used high-strength, lightweight and sound-absorbent materials from across the globe in Dodge Caliber," said Matt Liddane, Chief Engineer — Dodge Caliber. "Combined, these materials give Caliber excellent impact performance and body stiffness, as well as a smooth, quiet ride."

### **High-strength Steel Reduces Weight, Improves Impact Performance**

Dodge Caliber's body components combine to form a structural safety cage that provides occupant protection in the event of an impact. By mass, 40 percent of Dodge Caliber's body structure is constructed of high-strength and hot-stamped steel, making it one of the few current production vehicles to feature such a high level of combined advanced steel technologies.

"The higher weight-to-strength ratio of high-strength steel allowed us to develop a body-in-white safety cage that meets more aggressive front-, side- and rear-impact requirements, but without the added weight of regular steel," Liddane added. "Hot-stamped steel used on the A- and B-pillar and roof-rail reinforcements reduce Caliber's weight overall by 44 lbs."

The Dodge Caliber represents Chrysler Group's first use of a tailor-rolled, hot-stamped steel B-pillar. The Caliber's two-piece B-pillar construction features a lower section made from mild-strength steel to maximize energy absorption, which is combined with a tailor-rolled, ultra-high-strength upper portion for enhanced occupant protection.

Dodge Caliber also features Chrysler Group's first use of a magnesium-alloy, cross-car beam in a high-volume production vehicle. For rear-occupant side-impact protection, a hot-stamped steel, roll-formed cross-car beam is bolted to the body structure underneath the seat. During a side-impact event, the beam works together with the integrated foam in the rear doors to transfer impact energy from one side of the vehicle to the other. The beam is designed to take up to 60 percent of the load during a side-impact event. Steel beams within the front and rear doors provide additional side-impact occupant protection.

Caliber also is the first high-volume production compact car to use a hydroformed front closure and upper cross member. These modules previously had been limited to trucks and sport-utility vehicles, but technological advances now allow for smaller diameter tubes and thinner walls, making them practical for smaller vehicles like the Dodge Caliber. The strength and versatility of this design reduces weight, while providing a flexible base for mounting many parts and components.

The dual-phase steel used in Dodge Caliber's front and rear rails, tunnel reinforcements and floor cross members represents some of the steel industry's latest technology. In the event of a high-speed front impact, the structure and steel combine to protect the occupants by absorbing the impact energy in a controlled manner. Dual-phase steel tunnel reinforcements and floor cross members also allow the rails to handle greater impact loads than conventional steels. The steel's structural benefits also make the Caliber stiffer for better ride quality and a quieter interior.

Engineers also used new, non-brittle adhesives on the Caliber to strengthen the vehicle's joints during an impact and improve stiffness and impact energy management compared with spot-welded and laser-welded joints.

### **Structure Strengthened to Meet Aggressive Regulatory and Impact Requirements**

Dodge Caliber's structure was strengthened to meet third-party organization front- and side-impact tests, such as those conducted by the Insurance Institute for Highway Safety (IIHS).

The newly revised IIHS side-impact test, which crashes the equivalent of a 3,300 lb. pickup or sport-utility vehicle perpendicularly into the driver's side of a passenger vehicle at 31 mph is one of the tests that influenced the design of Dodge Caliber's body-in-white and safety cage. Foam in Caliber's doors and the magnesium-alloy, hot-stamped steel cross-car beam welded under the rear seat are designed to take up to 60 percent of the load during a side-impact event, managing energy by transferring loads from one side of the vehicle to the other, increasing resistance to intrusion. Steel beams in the front and rear doors provide additional occupant protection in side-impact events.

Dodge Caliber's front crumple zone and engine box are designed to absorb energy during a front impact. Rear impact features include an enhanced rear structure that ensures fuel system integrity during 50 mph high-speed rear offset deformable barrier tests.

### **Sealants and Sound-deadening Materials Create a Quiet Interior**

Dodge Caliber's use of sealers and structural adhesives is world-class, giving customers a smooth ride with minimal road, wind and powertrain noise.

Seam sealing, which was only previously added to the inside of a vehicle's body, is applied to both Dodge Caliber's interior and exterior, adding stiffness to the body and reducing noise, vibration and harshness (NVH) characteristics. Caliber's doors are triple sealed to form a strong sound and moisture barrier. A continuous, one-piece channel weather strip mounted in the upper door frame provides effective sealing against wind noise and water leaks.

Engineers designed several of Caliber's exterior body features to reduce wind noise. Large exterior rearview mirrors, which provide good visibility, also minimize aerodynamic drag and turbulent wind noise. Caliber's windshield water channel and radio antenna were refined in the Chrysler Group's state-of-the-art AeroAcoustic wind tunnel to minimize wind noise. A lip on the trailing edge of the hood directs air flow over the wipers, reducing wind noise inside the vehicle.

Caliber also includes an NVH package designed to isolate passenger compartments from powertrain noise. This includes balance shafts on the 2.0-liter and 2.4-liter World Engines, a low-rumble intake manifold, acoustic engine box silencers, fender silencers, isolated air-conditioning lines, a three-layer metal-plastic-metal oil pan, select-fit engine bearings and tappets, wheelhouse outer silencers, sound-deadening material in the instrument panel and carpet with sound barrier.

### **No Drag on Fuel Efficiency**

Chrysler Group engineers and designers worked extensively to develop and shape the Dodge Caliber's body to reduce drag and improve fuel efficiency.

The shape of both the liftgate spoiler and the rear of the vehicle were balanced to ensure the Dodge Caliber is both aerodynamic and visually appealing. The rear liftgate spoiler reduces drag by separating the air stream from the rear of the vehicle. D-pillars and taillamps are shaped to separate the air cleanly.

The following additional features also reduce drag:

- An air dam under the front fascia streamlines airflow around the car rather than under, reducing drag more than "belly pan" treatments. The air dam also cools the airflow
- Front and rear tire spoilers designed into the splash shields direct air around the tires to reduce drag
- Two large underbody panels help close out a cavity between the floor pan and the fuel tank to eliminate drag-inducing turbulence
- The muffler angle (up slightly at the rear) and height were tuned to direct airflow from underneath the back of the car

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