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## **Dodge Caliber Loads Up on Quality**

- Chrysler Development System improves quality and Dodge Caliber's speed-to-market while reducing costs
- State-of-the-art aero-acoustic wind tunnel blows away competition
- Real-world testing conditions provide true test of Caliber's capabilities

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The Dodge Caliber is all about injecting emotion in the compact car market. With a team of dedicated engineers focused on producing the highest-quality vehicle possible, one emotion customers are sure to feel is satisfaction.

Using state-of-the-art technology and dedication to excellence, Dodge Caliber engineers have produced a vehicle that carries twice its weight in quality advancement.

"Innovation, performance and bold styling are all hallmarks of the Dodge brand," said Stephen Walukas, Vice President – Corporate Quality. "Because of those attributes, our expectations were high, and those of our customers were even higher. We knew that we had the processes in place to deliver on the promise of Dodge, and we feel confident that we have exceeded those expectations."

### **All About Process**

The 2007 Dodge Caliber was designed and engineered using the Chrysler Development System (CDS), a comprehensive, coordinated and disciplined product creation process that improves quality and speed-to-market, while reducing costs and encouraging practical innovation.

CDS emphasizes systems engineering, design and up-front planning to avoid time-consuming and costly trial and error or changes during the latter phases of the product development cycle. With CDS, all product and process planning is completed and fully integrated before production tooling begins. Using the system, the Chrysler Group has seen a 40 percent decrease in Expense Per Unit Sold (EPUS) between the 2001 and 2004 model years.

The new Dodge Caliber also took advantage of the successful Quality Gates process that was adopted as part of the best-practice synergies of the DaimlerChrysler merger. Prior to the merger, Chrysler used the Chrysler Development System to ensure quality from the vehicle's design sketch stage, through concept and prototypes, to testing, and ultimately, to production at the plant. The merger added the Quality Gates process, a system that requires a 12-step checks-and-balance review of the project at critical stages of development by senior management.

### **Something Good in the Aero**

Testing was done on full-scale Dodge Caliber models in the company's state-of-the-art AeroAcoustic wind tunnel. Dodge Caliber engineers took a full-size clay model, applied actual underbody parts, tested it in the wind-tunnel, removed the parts, retested it and then returned it to the studio. This test cycle took only half a day, but provided invaluable information that helped improve Caliber's aerodynamic performance.

The Dodge Caliber also logged countless hours in the world-class testing facilities at the DaimlerChrysler Technology Center (DCTC) in Auburn Hills, Mich. During development, engineers logged nearly 5 million miles of customer-equivalent driving and experience in the Caliber.

Four basic tools were used in the aerodynamic development of the Dodge Caliber:

- Computer Simulation: Engineers used Computational Fluid Dynamics (CFD) in the earliest stage of Caliber's development to reduce aerodynamic drag
- 3/8 Scale Clay Models: These models gave Dodge Caliber engineers the first indication of the vehicle's

aerodynamic status. These models were used to shape the upper body as well as specific underbody parts to smooth airflow. A lip at the rear edge of the hood was used to tune wiper wind noise and a rear spoiler was used to improve drag and down force as part of this process

- Aero-acoustic Buck: This structure was used to evaluate wind noise and helped in the development of Caliber's rearview mirrors, side glass areas and wiper blades
- Full-size Vehicles: Engineers used early production-intent vehicles to verify and validate data gathered throughout the process

"Technology allowed us to make the highest-quality Dodge Caliber, while giving us the flexibility to detect any issues early on and preserve its speed to market," Walukas added. "Faith that our vehicles are the best is not enough; we need proof, and the Dodge Caliber is it."

### **Going to Extremes**

To simulate difficult real-world driving conditions, engineers tested Caliber in the most extreme conditions, including cross-country drives through heat, humidity, freezing cold and high altitude, from the sweltering heat of late summer in Mexico to the coldest winter weather in Northern Minnesota and the steepest mountain pitches in Austria. In addition, Caliber also was subjected to a 100,000-mile/10-year simulation of corrosion protection testing.

Caliber's three World Engines were subjected to additional testing thanks to the joint venture partnership between DaimlerChrysler Corp., Hyundai Motor Corp. and Mitsubishi Motor Co. More than 15 million customer-equivalent miles were completed during durability testing by the three automakers — more than three times the usual amount — to ensure that these engines launched with a high level of reliability.

Because Dodge Caliber's Continuously Variable Transaxle (CVT2) is new to the Chrysler Group, engineers also did extensive durability testing on it. To make sure Caliber could handle the most severe driving conditions, its CVT2 test schedule was doubled to 1,400 powertrain cycles with no failures allowed. Eight dynamometers continuously tested Caliber's CVT2, and development transaxles consistently completed these tests without failure. The company has done more durability testing on Caliber's CVT2 than any other new transaxle program.

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