2010 Mercedes-Benz E-Class, Part I

BACKGROUND

For decades, the E-Class has been the vehicle that defines Mercedes-Benz - stylish, safe, solid and comfortable, not to mention packed with useful industry-leading technology. In recent generations, the 1996 E-Class set a new design theme for the entire auto industry with its distinctive elliptical headlights, and the 2003 E-Class eclipsed its predecessor with bolder, sleeker lines.

For more than a half-century, the E-Class has set new standards in vehicle safety, comfort and driving dynamics. With each new-generation vehicle, Mercedes-Benz engineers increased its chassis rigidity while reducing weight through extensive use of high-strength steel, lightweight materials and advanced manufacturing techniques.

Historically, the E-Class established many "firsts" in its segment. For example, the previous E-Class boasted PRE-SAFE®, a revolutionary system that represents the next big step in automotive safety technology. Mercedes-Benz safety engineers felt that cars could be equipped to take preventive action in the valuable seconds before the actual impact when sensing an imminent crash. As a result, they designed the innovative PRE-SAFE system to first tension the seatbelts if the car senses an impending collision. Further, if the front passenger seat is overly reclined or forward, and if the seat cushion angle is too shallow, PRE-SAFE moves it to a more favorable crash position. Finally, if the vehicle skids (sometimes a precursor to rollover), the system automatically closes the sunroof.

Beginning with the industry's first crumple-zone body in the 1950s, E-Class cars have always featured a full array of Mercedes-Benz safety technology, and in recent times, this has included ABS anti-lock brakes with Brake Assist, the ESC Electronic Stability Control and traction control as well as an adaptive restraint system using state-of-the-art air bags.

INTRODUCTION

The new 2010 E-Class represents the ninth generation of the highly successful model line, with a total of more than 10 million E-Class sedans produced over the past 70-plus years. Packed with useful new safety technology, the new E-Class is likely to become another industry trend-setter, and with a full compliment of sedan and coupe models, the lineup should appeal to more consumers than ever.

With an impressive aerodynamic drag coefficient of only 0.25, the base European model of the new E-Class is literally the slickest luxury sedan on the planet. While the wider tires of the U.S. model give it a Cd of 0.27, the car's still slippery profile means even better fuel economy and less wind noise on the highway. The new E-Class body is also 30 percent stronger, thanks to intelligent body construction, which includes more lightweight, high-tensile-strength steel.

Standard ATTENTION ASSIST

Among its many standard safety features is an innovative "ATTENTION ASSIST" system which couples a steering sensor with intelligent software that can identify the erratic steering corrections drivers make as they begin to get drowsy. Elegant in its simplicity, the system senses drowsiness and alerts the driver.

Other examples of trailblazing innovations include optional automatic emergency braking, which can now be activated 0.6 seconds before an imminent collision, and adaptive high beams that use a small windshield-mounted camera to control high-low beam operation automatically. This system also provides a soft transition from low to high beam. An optional Driver Assistance package includes Blind Spot Monitor and a new Lane Keeping Assist feature, which alerts the driver if the car drifts from its lane without the turn signals on.

The design of the new-generation E-Class begins with a "cubist" treatment of its trademark twin-headlight face. Two parallelogram lights are recessed into each front fender, bracketing the three-dimensional chrome frame of the front grille.

Both models have grown slightly as compared to their predecessors. The sedan grows wider by 1¼ inches and longer by 5/8-inch while the coupe is 1.8-inches wider and 1.9-inches longer. The overall E-Class body shape features large concave and convex surfaces defined by taut, clearly defined lines. In particular, a graceful line follows each rear wheel well and shapes the muscular contours of the rear fenders. While the car looks futuristic, aficionados might recognize styling cues reminiscent of the famous "Ponton Mercedes" of the 1950s.

Mercedes-Benz designers paid careful attention to the interior, to ensure that every surface is appealing in both functional and emotional terms with its form, color and material. The sedan cockpit features five analog gauges, including two outer pairs that overlap each other. Standard equipment includes a four-spoke, premium leather-covered steering wheel with integrated multi-function switches and a Direct Select electronic shift lever mounted on the steering column. Coupes feature a 3-spoke steering wheel and console-mounted shift lever with TouchShift.

Also standard is a new COMAND system featuring a seven-inch color display screen with a standard in-dash, six-disc CD / DVD changer. Using a console-mounted controller, the central display in the dash can be operated by either the driver or front passenger. The COMAND system can be equipped with optional GPS navigation, an iPod/MP3 interface, satellite radio and a number of other useful features.

Sport and Luxury Models

The New E-Class sedan is available in Sport and Luxury trim that is designed to appeal to a wide range of customer tastes. All Luxury models come with a comfort suspension, while Sport models are fitted with a sport suspension that has stiffer shocks and springs as well as slightly lower ride height.

The Appearance package for the E-Class coupe includes a number of features for the sport-minded driver - perforated brake discs with painted calipers, 18-inch AMG alloy wheels, aluminum pedals with rubber studs and black gearshift paddles. Multicontour seats are also available.

Carrying the Sport concept yet a step further, all E550 coupes come with shift paddles mounted to the three-

spoke sport steering wheel and sport body styling that includes a deeper front air dam, side skirts and rear apron. The E550 also has standard perforated brake discs and painted calipers.

Three Versatile Engines For The E-Class

The 2010 E-Class line is being launched in the U.S. market with three distinct models. The E350 sedan and coupe use the latest four-valve-per-cylinder V6 engine that produces 268 horsepower and 258 lb.-ft. of torque, while the E550 models are powered by a 32-valve 5.5-liter V8 delivering 382 horsepower and 391 lb.-ft. of torque. The high-performance E63 AMG sedan is fitted with the first engine developed entirely by AMG - a 6.3-liter V8 that makes 518 horsepower and 465 lb.-ft. of torque.

One of the most powerful naturally aspirated production V8s ever, the engine boasts a wealth of features derived from AMG's successful racing efforts. Built almost completely from a high-strength silicon-aluminum alloy, the 6.3-liter features four valves per cylinder, variable valve timing, "bucket" followers (rather than rocker arms) and a variable intake manifold.

EXTERIOR

New Face Goes Cubist

The trademark twin-headlight face of the E-Class has been reinterpreted in the new-generation car with a more rectangular design reminiscent of the geometric shapes in cubist art. Two parallelogram lights are recessed into each front fender, bracketing the three-dimensional chrome frame of the front grille. On each side, the look resembles a long rectangular lens with an angled stripe of body color separating the lens into two sections.

Below the headlights, optional LED daytime driving lights make a dramatic visual accent. Recessed in the front apron, the LED lights form an inverted "L" on each side.

The overall body shape of the new E-Class features taut lines that define large concave and convex surfaces. In particular, a graceful line follows each rear wheel well and shapes the muscular contours of the rear fenders. While the car looks futuristic, aficionados might recognize styling cues reminiscent of the famous "Ponton Mercedes" of the 1950s.

Sedan Versus Coupe

While there's an unmistakable family resemblance between the new E-Class sedan and coupe, the sedan wears a three-pointed star on the front hood above its familiar louvered front grille, and the coupe version has an entirely different look to its face, thanks to a large star emblem in the center of a sporty two-lamella grille.

In general, the two-door E-Class coupe boasts a more muscular shape that gives it an athletic, more dynamic presence. With "frameless" doors and no B-pillar, the coupe features an airy, uninterrupted expanse that extends from the front windshield to the rear window whenever the front and rear side windows are fully lowered.

At the rear, the E-Class coupe sports longer, more sharply angled LED taillights, as well as a center brake light

integrated in the trunk lid. The sedan has a more traditional look, with a third brake light in the rear window.

High-Tech Lighting

The larger "eye" holds a halogen low beam, with a turn signal at the outer edge, and the high beam is located in the smaller lens. Supplemental LED turn signals are integrated in the outside mirror housing.

Standard fog light/daytime running light pair is flush-mounted in the front apron below the bumper, and optional LED daytime running lights form a distinctive signature. The eye-catching daytime running lights are more noticeable than conventional low beams and are designed to last the life of the car.

Bi-Xenon Lights See Around Corners

Optional bi-xenon high-intensity gas-discharge headlights are self-leveling, so they're always aimed properly, regardless of vehicle loading, even under the pitching of braking or acceleration. Coupled with the new Adaptive Highbeam Assist, the bi-xenon lights can provide the maximum possible illumination for a given situation.

The bi-xenon package includes a high-pressure jet wash system with two telescoping nozzles on each side that clean the lenses whenever the windshield washer is operated.

The bi-xenon lights also feature active-curve illuminating technology, in which the headlights actually turn slightly (up to 15 degrees) with the steering wheel to light up each approaching curve. In a long curve, the driver can see about 30 yards farther with active-curve illuminating lights.

A cornering light is also integrated into each headlight (no longer in the fog light). At low speeds whenever the steering wheel is turned or the turn signal switched, the cornering light helps to light up the road.

INTERIOR

The interior of the new E-Class is appealing in terms of both style and function. Mercedes-Benz designers strived to ensure that form, color and material all work together, while ergonomics engineers developed a layout that is intuitive and logical. Although there are more features than ever, controls seem simpler and even easier to use, in part because many functions can be operated in multiple ways, i.e. - via a central controller, the multi-function steering wheel or console-mounted buttons.

The sedan's cockpit features five analog gauges, including two outer pairs that overlap each other. Standard equipment includes a premium leather-covered steering wheel with integrated multi-function switches and a Direct Select electronic shift lever mounted on the steering column.

A sweeping console groups many of the car's controls for easy reach, including audio system and climate control, remote lowering rear headrests, optional heated seats, power rear sun shade and PARKTRONIC parking assist.

A new standard COMAND system features a seven-inch color display screen with a standard in-dash six-disc CD / DVD changer. Using a console-mounted controller, the central display can be operated by either the driver or front passenger. A Bluetooth interface (standard on sedan models and optional on the coupe) allows

a phone still in a pocket or purse to be operated through the car's audio system.

The COMAND system can be equipped with optional GPS navigation, an iPod/MP3 interface, Sirius satellite radio, HD radio, real-time traffic information, Zagat restaurant ratings and an advanced voice control system for the audio, navigation and phone systems. Found in the optional "Premium I" package those features are paired with a 610-watt harmon/kardon audio system (450 watts on the E-Class coupe), a six-gigabyte hard drive with Music Register for music files and access to the Gracenote database.

Multifunction Display

The power-adjustable multifunction steering wheel provides the driver with large, illuminated rocker buttons that are a convenient way to control many of the car's systems. Linked to a multifunction display in the center of the speedometer, two clusters of six buttons can access anything from vehicle settings and navigation instructions to a selected radio station or personal phone book.

The multi-function switches can adjust many different functions such as the trip odometers and trip computer that includes fuel tank range; audio system (station seek, CD track, disc skip, seek, volume); interior / exterior light dimming; and Easy Entry function.

Within each of the basic menus displayed in the instrument cluster, the driver can scroll up or down between additional menus using the scroll buttons on the left side. These buttons also provide choices for various functions within each system.

An optional voice control system operates major navigation, telephone and audio functions. All it takes is a couple of words from the driver to enter a destination, dial the phone automatically, or have the car radio search for another station or skip to a new CD track.

First-Class Seating

Newly designed 14-way adjustable power front seats feature divided stylish seat cushions that cover steel seat frames with integrated suspension. Traditional Mercedes-Benz pictogram seat controls are conveniently located on the door panels. Seat positions for up to three people can be stored in memory (along with steering wheel and exterior mirror placement), and these positions are retrieved simply by pushing numbered buttons beside the pictogram controls.

An optional multicontour driver's seat (as well as passenger seat on the coupe) offers impressively variable seat adjustments through mechanical bolsters and a series of air bladders that are integrated into the bottom cushion and seat back. Additional controls for the multicontour seats are tucked between the seat cushion and center console.

Heated and Ventilated Seats, Too

In addition to multicontour and heated seats, E-Class coupes and the E550 and E63 AMG sedans offer Active Ventilated Seats, an option first introduced in the S-Class. Small electric fans inside each of the front seats draw up cool air from the footwell. The air passes through special plastic ducting and permeable fabric to flow evenly from the perforated leather seat upholstery. Seats that have been warmed up by direct sunlight cool

down quickly.

Two-Zone Climate Control

The new E-Class sedans and coupes come standard with dual-zone automatic climate control that allows front seat occupants to set their own preferred air temperature. A multifunction sensor monitors humidity and pollutant levels in the ambient air, so if nitrogen oxide and carbon monoxide levels in the air get too high, the climate control system automatically switches over to air recirculation mode.

Two Ways To Let The Sun Shine In

A tilt-slide power glass sunroof is standard on E-Class sedan models, while all coupes come with the Panorama sunroof (an option for sedans) that features twice the glass surface area. With glass from the windshield to the rear window, the Panorama sunroof essentially provides the car with a glass roof.

At the push of a button, the front section of the roof glides backwards, and a mesh screen pops up to act as a wind deflector. Designed to slide along the top of the body, the Panorama sunroof does not restrict occupant headroom. As with the tilting/sliding sunroof, the moving section of the roof can also be tilted upward. The SmartKey remote control will operate either roof. The Panorama roof also features power-operated roller shades to block the sun's rays.

Surround Sound On Wheels

An eight-speaker premium audio system is standard in the new E-Class. The optional harman/kardon Logic 7 digital surround sound system on sedans plays through 14 high-end speakers with a total output of 610 watts while the coupe features 12 speakers with 450 watts. All systems compensate for ambient driving noise. The harman/kardon system uses a digital signal processor to convert every conventional stereo signal from the car radio or CD player into surround sound with seven output channels.

Power Trunk Closer

An electronic trunk closer is optionally available for E-Class sedan models. Pressing a button on the inside of the trunk lid (or on the driver's door) pulls the lid downward, and a servo locking mechanism then locks the lid completely. As a safety precaution, applying just light force on the lid will stop it from closing.

Go with KEYLESS-GO

With the optional KEYLESS-GO system, simply touching one of the door handles or the trunk lid handle unlocks the car, as long as the driver has the key in a pocket or bag. After depressing the brake pedal, the driver starts the car by touching a button on the dash. Antennas located in several locations in the car pick up a signal transmitted from inside the SmartKey.

Easy Parking with PARKTRONIC with Parking Guidance

The optional PARKTRONIC uses sensors in the front and rear bumpers to detect obstacles in front, behind and to the left and right of the car's corners. To alert the driver about the proximity of obstacles, the system uses audible warnings and bar graph displays - one on the dash for the front and another for the rear, which is

visible in the rear-view mirror. PARKTRONIC includes Parking Guidance, a system that can identify right-size parking spaces and provide helpful steering guidance in the instrument cluster.

BODY

"The Right Material in the Right Place"

The 2010 E-Class features a lighter, stronger steel body structure with, in the case of the sedan, use of 72 percent high-strength steel - up from 47 percent for the previous model. In addition, newly developed grades of super high-strength steel are also being used. Several under-floor panels as well as the reinforcements used around the bumpers and springs are made from super high-strength steel with a special dual-phase microstructure that helps it withstand extremely high loads. As a result, the new E-Class sedan provides 31 percent more chassis rigidity as well as crumple zones that offer more collision protection.

The E-Class is one of the few large-scale production vehicles making extensive use of aluminum. Following the principle of "the right material in the right place," Mercedes engineers use aluminum in areas where it holds the greatest benefits compared to steel, and these components include:

Hood

Front fenders

Front cross member

Front bolt-on crash boxes

Trunk lid

Rear parcel shelf

Rear wall behind the rear seat backrest (on models without split folding rear seat)

Many body panels are assembled using the "low-stress joining" principle to ensure precision fitting. The flanges around the borders of the steel parts are shaped so that any tolerances are balanced out as soon as the panels are placed together, allowing the bodywork parts to be welded to one another under low-stress conditions. The rear side members, the firewall cross member, the rear wall of the passenger cell and the parcel shelf all employ this sophisticated manufacturing process.

Zinc-Galvanized for Corrosion Protection

The entire steel body shell is zinc-galvanized for good long-term corrosion protection. Precise fit of body parts, low-stress joining technology and state-of-the-art spot and laser welding methods used for assembly of the body shell all combine to further enhance corrosion prevention. These assembly techniques totally eliminate the need for MAG (metal active gas) welding seams at panel joints, which used to be particularly susceptible to rusting. Additional cavity preservation and seam sealing are used, and the entire body is immersed in an electrophoric primer bath.

By lining the entire underbody of the vehicle with Pentalaminat plastic panels - which also enhance

aerodynamic performance - Mercedes engineers were able to omit the conventional PVC underbody protection in the new E-Class without compromising long-term corrosion prevention. These panels cover the engine compartment, wheel arches, outer floor panels and rear axle links, effectively protecting the body from stone chippings that could lead to rust. To improve anti-corrosion and reduce weight, the spare tire well is formed from glass-mat reinforced thermoplastic.

Front Safety Structure

The E-Class has a front safety structure with a full-width cross member that connects the two firewalls, a design that distributes the force of an offset frontal impact over a broad area to help protect the passenger cell. Some of the crash forces are even directed into the transmission tunnel and the side members.

The entire nose of the vehicle is now connected to the passenger cell by four steel panels (previously three) at the firewall. A vertical reinforcement further increases the strength of the firewall and restricts movement of the pedal unit toward the passenger compartment in a severe frontal collision. Steel reinforcements around the wheel wells help prevent wheel intrusion into the passenger cell and minimize crash deformation.

Strong Sidewalls

The sidewalls of the E-Class are made up of a number of panels that are laser-welded together and then pressed into the desired shape. Steel tube reinforcements in each roof pillar also help to protect the passenger cell in the event of a rollover. High-strength steel blanks are used for the door shells, and each door incorporates two diagonal side-impact beams. High-strength door hinge mounting plates are welded to the inner door shells. The result is a rigid integrated side structure that provides effective protection in the event of a side impact.

Manufacturing Processes Ensure High Strength

Mercedes employs several different manufacturing processes to add strength to the body structure without adding excess weight. The main floor assembly consists of three different tailored blanks, which are laser-welded together and then precision fitted. The middle of the three blanks is a sturdy panel forming the transmission tunnel, the strong backbone of the passenger cell.

A "flexible rolling" technique is used for making the two connecting members - which extend the front side members back into the structure of the floor assembly - to give them the required material thickness and strength. The current E-Class represented the first time the flexible rolling technique has been used in large-scale series production.

In the flexible rolling process, high-strength steel can be machined at the rolling plant in such a way that a single component can contain varying panel thickness. As an example, the front of the connecting members, where the loads exerted in a collision are greatest, is made thicker (1.15 millimeters) than the rear section (0.88 millimeters), which is not subject to such high loads. Impact energy flows more smoothly through a component made with this process compared to using a number of different, pre-fabricated panel blanks joined together.

In addition to the two flexibly rolled connecting members, the body structure features a solid cross member running under the front seats, a load-bearing section between the B-pillars and reinforcement paneling in the foot wells. The rear side members use a continuous closed-box section with carefully graduated material thickness, which enables them to absorb high impact forces in a rear-end collision.

Impact Energy Absorption

The E-Class body absorbs impacts in three phases. In impacts up to 2.5 mph, the flexible bumper covers deform, but then return to their original shape. An aluminum cross member behind the bumper redirects the forces to the side, also absorbing impact energy.

Special "crash boxes," replaceable modules (aluminum in the front and steel in the rear of the car), absorb crash energy at impact speeds of up to 9.3 mph (15 km/h), ensuring that the supporting structures behind remain undamaged. Bolt-on connections make the front and rear crash boxes easier to replace after a low-speed impact, eliminating the need for straightening, welding and repainting. Even the individual components contained within the modules are bolted together.

At higher impact speeds, reinforced rear side members of the body shell use a continuous closed box section with carefully graduated material thickness to absorb high forces. A plastic fuel tank is located under the back seat where it is protected from any impacts.

SAFETY

Several innovative safety technologies make their debut in the next-generation E-Class. These new systems form yet another layer in the thick fabric of potentially life-saving Mercedes-Benz safety features. The company that pioneered the SRS concept, the crumple zone, ABS anti-lock brakes, traction control, ESP stability control and PRE-SAFE continues to lead the auto industry in the research and development of new approaches to vehicle safety.

ATTENTION ASSIST Makes Debut

Making its industry debut in the new E-Class, an innovative "ATTENTION ASSIST" system couples a steering movement sensor with intelligent software that can identify the erratic steering corrections drivers make as they begin to get drowsy. When the standard-equipment system senses drowsiness, a warning message appears in the instrument cluster, and the driver is also alerted by a display that says, "Time for a rest?"

The software receives signals from the steering sensor and monitors 70 different parameters that help calculate a driver's level of fatigue and drowsiness. Several years of research and testing have shown that drowsy drivers begin to make minor steering errors that are corrected in identifiable ways. Sophisticated enough to disregard sporty driving involving high cornering speeds and lane changes, the system works between 50 and 100 mph. Elegant in its simplicity, ATTENTION ASSIST essentially adds intelligent computer software to existing sensors.

Blind Spot Assist and Lane Keeping Assist

Optional on the sedan, a Driver Assistance package includes Lane Keeping Assist which alerts the driver by simulating rumble strip vibration in the steering wheel if the car drifts from its lane unintentionally. Images from a small camera are analyzed by a computer that identifies and monitors traffic lanes.

The Driver Assistance package also includes Blind Spot Assist, which uses two radar sensors in the sides of the rear bumper to monitor the blind spot area. When a vehicle enters the blind spot, a red triangle appears in the respective outside mirror. If the driver actuates the turn signal with a vehicle in the blind spot, a warning tone also sounds.

Adaptive Highbeam Assist

An optional adaptive high beam system uses a small windshield-mounted camera to control high-low beam operation automatically. The camera senses headlights from oncoming vehicles as well as the taillights of those ahead. Whenever it senses traffic, the system lowers the headlights, providing a soft transition from high to low beam and, when the way is clear, back to high beam.

Night View Assist PLUS

Night View Assist debuted on the S-Class and is an available option on the 2010 E-Class sedan. An active night-vision system, Night View Assist can extend the driver's ability to see ahead to nearly 500 feet without potentially distracting high beams. In contrast to competitors' passive systems that rely on thermal imaging, this innovative active system bathes the road ahead with infra-red light - invisible to the human eye - from two infra-red projector beams mounted in the headlight assemblies.

An infra-red camera discreetly mounted in the windshield receives the reflected images and displays them on the high-resolution display in the COMAND screen, which appears similar to a highly detailed black-and-white video image.

Night View Assist has been improved to create Night View Assist PLUS, which is now available as an option in the new E-Class Sedan. This new system features a special pedestrian detection function - as soon as Night View Assist PLUS detects pedestrians ahead of the car, they are highlighted in the onboard display, thus significantly improving the warning effect.

PRE-SAFE® - Now with Automatic Emergency Braking

Standard equipment for the new E-Class includes PRE-SAFE®, a revolutionary system that made its industry debut in 2002 on the S-Class. When it's networked with the optional DISTRONIC PLUS system, PRE-SAFE now also comes with the ability to initiate partial braking automatically in certain situations as well as full-power emergency braking.

Mercedes-Benz safety engineers felt that cars could be equipped to take preventive action in the valuable seconds before the actual impact when sensing an imminent crash. As a result, they designed the innovative PRE-SAFE system to tension the seatbelts if the car senses an impending collision (through the sensors for ESC stability control that are networked with PRE-SAFE). In addition, if the front passenger seat is overly reclined or forward, and if the seat cushion angle is too shallow, PRE-SAFE moves it to a more favorable crash

position. Finally, if the vehicle skids (sometimes a precursor to rollover), the system automatically closes the sunroof. Side windows also close to provide better support for the window curtain air bags and to prevent occupants' heads or arms from swinging outside the vehicle.

The system uses electric tensioners in addition to the existing pyrotechnic belt tensioners that deploy in some crashes. If a crash is averted, the electric belt tensioners unwind and are ready