Edited by ***Kevin Jost***

Lexus LS 600h

Alfa Romeo 8C Competizione

Lexus hybridizes LS

The purpose of developing the LS 600h according to **Lexus** was to create a car that explores the outer reaches of performance, design, safety, and efficiency. The company wanted to build upon its highest expression of "L-finesse" design with the world's most advanced safety technology and the highest possible standards in production, quality, and comfort.

Launched to the public at the 2006 Paris Motor Show, the LS 600h is the world's first production vehicle to feature a full-hybrid V8 powertrain, combining a 5.0-L gasoline engine with high-output electric motors; a new large-capacity nickel-metal hydride battery pack; a dual-stage continuously variable transmission, and permanent all-wheel drive. As with the Lexus RX and GS hybrid models, the LS's "600" suffix refers not to engine cubic capacity but comparable power output. A peak combined output rating of more than 330 kW (442 hp) offers the power and performance of a normally aspirated V12 engine, says Lexus, while still beating any other gasoline car in the segment in terms of fuel efficiency, which is below 9.5 L/100 km. In addition, CO_2 emissions of less than 220 g/km match the most frugal diesels in the segment. The inherent NVH improvements offered by a hybrid powertrain means the LS 600h sets a new standard for silent running in the premium segment.

The new V8 engine is the most technologically advanced internal-combustion engine ever developed by Lexus engineers. Highlights include high-rigidity components, optimum moving-part balance, minimization of friction, and unprecedented precision of assembly. To reduce weight of the engine, the cylinder block is die-cast from a high-strength aluminum alloy. The engine head is in a lightweight magnesium alloy.

The engine features a D-4S (Direct injection, 4-stroke Superior version) stoichiometric direct-injection system with two injectors per cylinder for optimum engine efficiency throughout the power band, 7.5% better torque across the rev range, and substantially reduced combustion fluctuations in comparison to a conventional direct or port injection system. The powerplant's Dual VVT-I variable intake and exhaust valve timing system incorporates VVT-iE, the world's first electric-motor-driven intake camshaft.

The Lexus Hybrid Drive employs a three-phase, permanent-magnet, ac synchronous type motor operating at 650 V and delivering more than 160 kW (215 hp). By changing magnet distribution, Lexus says it has achieved astonishing operating quietness.

As in the GS 450h, the electric motor, generator, power split planetary gear mechanism, and motor-speed reduction gearing are all housed in a compact transmission casing. The two-stage gearing of the E-CVT (electric continuously variable transmission) generates maximum low-gear torque for significantly enhanced acceleration as well as extended high-gear performance for high-speed cruising with improved fuel efficiency.

The LS 600h's air suspension uses new pneumatic springs operating in cooperation with an improved adaptive variable suspension system (AVS) that features a vehicle posture control to synchronize vehicle roll and pitch when cornering for maximum comfort. An enhanced pre-crash safety system offers assistance to the driver in collision avoidance by incorporating four world firsts: an advanced obstacle detection system, a driver monitoring system, emergency steering assist, and a rear pre-crash safety system. Other driver aids are adaptive cruise control (ACC), lane-departure warning, and lane-keeping assist.

Lexus will introduce an extended 5150-mm (202.8-in) version of the LS 600h with a 120 mm (4.7 in) longer wheelbase, with space dedicated entirely to increased rear-passenger legroom. This makes room for reclining seats with leg and foot rest, a Rear Seat Relaxation System, and a second DVD changer for individualized rear seat entertainment. In addition, the LS 600h L features unique innovations such as a rear seat cushion airbag and an IR body heat-sensing climate control system. Twenty individual outlets distribute warm or cold air through the cabin of the LS 600h L, with rear-seat passengers benefitting from the world's first roof climate diffusers.

The LS 600h will also feature the world's first application of low-beam LED headlight technology.

Kevin Jost

Limited-edition Alfa Romeo

The production version of the 8C Competizione concept from the 2003 Frankfurt Motor Show made its debut at the Paris Motor Show. The limited-edition model is designed by **Alfa Romeo** but benefits from the technical know-how of the Alfa-**Maserati** Sports Centre. The new car recalls the great sporting tradition of Alfa Romeo, the "8C" designation coming from racing and road cars of the '30s and '40s equipped with the revolutionary eight-cylinder engine produced by designer Vittorio Jano. The "Competizione" portion is intended as an homage to the 6C 2500 Competizione, a sports coupe driven in 1950 by Juan Manuel Fangio

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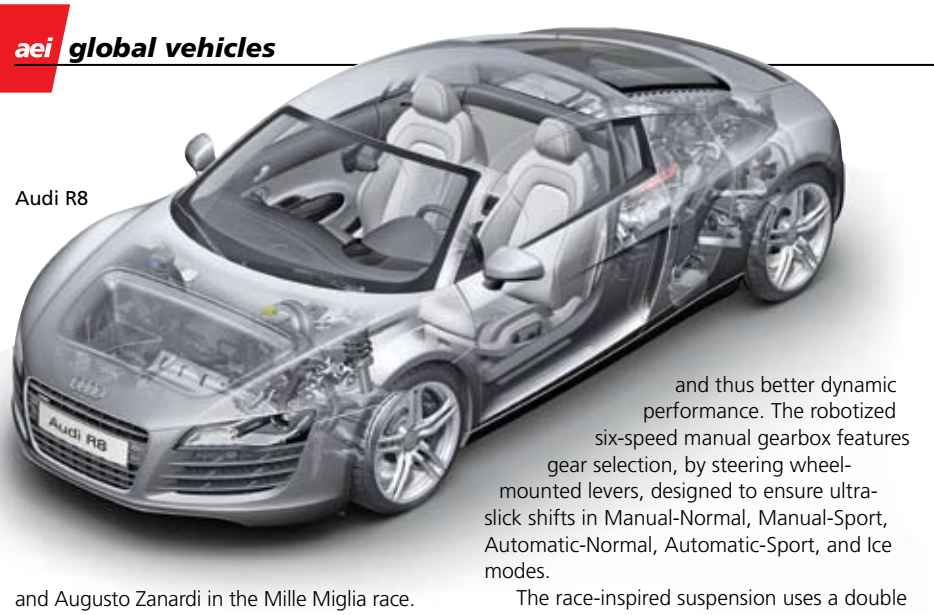

Audi R8

and Augusto Zanardi in the Mille Miglia race.

The designers have worked hard to ensure that aerodynamic and performance demands have not altered the car's original concept. The pillar and glass surfaces and profiles, along with the door mirror shape and position, have been optimized by mathematical modeling and wind-tunnel tests. Much attention has been devoted to downforce to help increase stability at high speed. The car's compact frame is rendered in steel and the body carbon fiber, choices motivated by the need to minimize weight while optimizing the car's center of gravity.

The car is powered by a new 4.7-L 90° V8 engine producing 450 hp (336 kW) at 7000 rpm and 470 N·m (347 lb·ft) at 4750 rpm, with maximum engine speed of 7500 rpm. Coolant flow within the engine is designed to maximize volumetric efficiency and engine performance. Coordination of the intake and exhaust geometries with the introduction of continuous variable valve timing on the intake camshafts and optimization of the combustion chamber and engine calibration means that 80% of torque is available from 2000 rpm.

Other engine highlights include a crankshaft, with counterweights at 90°, fully balanced through careful selection of connecting rods and pistons to ensure low vibration levels. The aluminum engine block has five main bearings to ensure a rigid structure. All water, oil, and secondary air ducts are cast directly into the engine to produce a unit that is extremely rigid, and along with the use of thick-walled components, ensures that less unwanted noise radiates from the engine and its components are more reliable. Longitudinal engine packaging required the introduction of a single chain timing system. Special attention was paid to the acoustic tuning of the intake and exhaust in the quest for a sports car sound. An exhaust system with electronically controlled valves enhances the car's sound while still meeting type approval and environmental constraints.

Due to the engine's short length and its integration within the frame, it can be housed well back to ensure good handling balance. A transaxle architecture with the gearbox at the rear allows for better vehicle weight balance and thus better dynamic performance. The robotized six-speed manual gearbox features gear selection, by steering wheel-mounted levers, designed to ensure ultra-slick shifts in Manual-Normal, Manual-Sport, Automatic-Normal, Automatic-Sport, and Ice modes.

The race-inspired suspension uses a double wishbone layout with forged aluminum axle carrier and arms and an extra strut for toe control. The braking system has ventilated discs with aluminum brake calipers. The car's 20-in tires in 245/35 front and 285/35 rear sizes are fitted on perforated rims in fluid molded aluminum. The latest Alfa Romeo VDC advanced stability and traction control system is also part of the spec.

Composite materials are used extensively for the interior. A choice of different interior environments is available. The anatomical seats made out of carbon fiber and other interior details can be customized to the driver's taste.

Kevin Jost

Audi gets mid-engine sports car

Audi grabbed the limelight at the Paris Show with the aggressively styled R8 two-seat coupe, which is based closely on its Le Mans quattro concept first seen three years ago. Powered by a mid-mounted 4.2-L V8 FSI (direct gasoline injection) engine (there are rumors of a **Lamborghini** Gallardo-derived V10 unit for the future), its technology includes quattro all-wheel drive and an Audi Space Frame (ASF) aluminum body. Build rate will be 15 per day, with production deliveries starting in the first half of next year.

Named after its five-time Le Mans winning racecar, the R8 is the first road-going mid-engine Audi sports car, a configuration that helps to achieve a front/rear weight bias of 44/56% and also facilitates a cab-forward stance. The engine is closely related to that fitted to the RS4 but uses dry-sump lubrication to achieve a lower center of gravity. The unit can be seen through the rear window, a typical feature for its genre, and from inside the car.

Power output is 309 kW (414 hp) at 7800 rpm, and peak torque of 430 N·m (317 lb·ft) is generated at 5500 rpm, with 90% available from 3500 to 7600 rpm. Maximum engine speed is a very high 8250 rpm. Side air intakes are positioned at the trailing edges of the doors. Performance figures issued in Paris include a 0-100 km/h (0-62 mph) time of 4.6 s and a top speed of 301 km/h (187 mph).

Transmission choice is six-speed manual or Audi's R tronic sequential system with automatic and paddle shift modes.

Suspension includes forged aluminum wishbones front and rear, the front triangulated while at the rear the upper is triangulated, the lower triangulated with a track rod. Audi magnetic ride is an option. Wheels are 18-in standard, 19-in optional. Tire sizes are 235/40 front, 285/35 rear.

The R8 is 4.43 m (14.5 ft) long, 1.9 m (6.2 ft) wide, and only 1.25 m (4.1 ft) tall, with a wheelbase of 2.65 m (8.7 ft). Styling detail includes Audi's now established large, trapezoidal front grille, although the company's quadruple ring badge is hood-mounted. A headlight option from late 2007 will be the use of LED technology for main, dipped, daylight running, and turn indicators—which Audi claims as a "first." The company's official description of the car incorporates some extraordinary information, including the fact that the internal reflectors of the main beam headlights are styled in a shape inspired by the architecture of the Sydney Opera House. A further option is the use of indirect LED lighting of the engine compartment, allowing those with sufficient curiosity to admire it at midnight.

Stuart Birch

Kia cee'd styled in Germany

Kia used the Paris Motor Show to debut its new European-designed C-segment car, which will share its platform with upcoming versions of the **Hyundai** Elantra in the U.S. market and the successor model to the Korean-market Cerrato. The cee'd arrives in five-door hatchback configuration, to be followed by a five-door wagon in August 2007 and a three-door hatchback in December 2007. Kia expects demand for this more competitive entry to reach 100,000 units in 2007 and with the additional body styles, 150,000 units in 2008. All of the cars will be assembled at Kia's plant in Zilina, Slovakia.

Kia will offer the cee'd in a dizzying array of alternatives. There will be three body styles, three trim levels, five engines, twelve exterior colors, four interior "concepts," five center stack styles, and seven different interior fabrics.

"The challenges we faced in the successful development of the cee'd were related to ensuring high performance of the vehicle in terms of factors such as safety and fuel consumption while securing a high level of perceived quality," said Product Manager Hyoung-Shik Park.

Toward that end, the body-in-white for the cee'd is 67% high-strength steel, contributing to a torsional rigidity that delivers a 42-Hz resonance. In comparison, that is 27% better than the (European) **Ford** Focus and competitors from **Opel** and **Renault** that score in the low- to mid-30 Hz range, according to Jun-Moo Her, a senior engineer.

The car stretches 166.7 in (4235 mm) on a 104.3-in (2650-mm) wheelbase. For rust protec-

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Kia cee'd

Mini Cooper S

tion, Kia employs a new rotational dipping painting procedure that sees the body perform a forward somersault through the dipping tank, ensuring equal coating thickness throughout. The front subframe is hydroformed, which trims mass by 5.5 lb (2.5 kg) compared to a stamped part, according to the company.

The cee'd's body was styled at Kia's Russelsheim, Germany, R&D center with the goal of appealing to European tastes. However, for aerodynamic development, the company relied on its wind tunnel at the Namyang R&D center in Korea, with a resulting 0.33 Cd and a 0.01 coefficient of lift. These numbers were achieved by lowering the car by 0.39 in (10 mm), installing a full-width bumper lip to keep air from getting under the car, and using an undertray behind the rear axle to clean up flow of the air that does get underneath. The car also wears air deflectors ahead of each wheel to steer air away from the spinning tires.

Thorough testing sought to optimize the interior sound, focusing on suppressing high-frequency noises while permitting low-frequency sounds under acceleration through the use of sound-proofing foam injected into the hollow roof pillars and isolation pads placed in key areas. Kia's goal is a "qualitative revolution" to improve its image, the company said.

Sound quality inside the cee'd also benefits from the standard inclusion of a radio data system and MP3 CD player by **Siemens** with four speakers from **Bosch**'s **Blaupunkt** division. Higher-level options add a CD changer, USB and auxiliary input, and additional speakers.

Interior luxury is enhanced by **Johnson Controls**-supplied seats that include adjustable lumbar support on all models, and offer three-level seat heaters, active head restraints, and leather surfaces on higher-level models. The view out of the cee'd is improved in wet weather by the use of water-repelling "hydrophobic" glass supplied by **Saint-Gobain Sekurit**.

Electronic stability control, traction control, and antilock brakes with brake assist boost the cee'd's active safety. Passive safety includes six airbags and the active head restraints for the front seats.

Kia is able to provide the cee'd lavish level of equipment despite the price sensitivity of the segment as the result of regular meetings throughout the development process by representatives from R&D, parts development, and design. "The task force held meetings every week throughout the development process with a focus on coming up with creative cost reduction measures," said Park.

Underneath, the cee'd rides on MacPherson struts in the front designed to use a broader lower arm for improved stability. Negative camber is increased to 0.5°, also to aid stability when cornering.

The multilink rear suspension was carefully designed to fit almost entirely within the rear wheels. The shock absorbers are mounted separate from the coil springs for improved ride, and rear-wheel camber is -1.0°. The suspension is tuned to work with **Michelin** tires.

Under the hood, Kia offers two diesel engine options and three gasoline engines. The company predicts nearly half of cee'd customers will choose a diesel engine, and 95% will opt for a manual transmission. Headlining the engine lineup for Europe is a new Slovakia-built 114-hp (85-kW) 1.6-L 16-valve engine equipped with second-generation common-rail fuel injection and variable geometry turbocharger. This engine, matched with a five-speed manual transmission, is expected to be the cee'd's most popular powertrain.

A more powerful Korean-built 138-hp (103-kW) 2.0-L 16-valve diesel carries similar technology as the 1.6 L. The three 16-valve, variable valve timing gasoline engines displace 1.4, 1.6, and 2.0 L and produce 108 hp (80 kW), 120 hp (90 kW), and 138 hp (103 kW). Four-speed automatic transmissions are available with the two larger gas engines only.

Dan Carney

Mini updates Cooper

BMW was long renowned as a champion of design evolution. Then came the Chris Bangle years and, quite literally, it all changed. BMW's Mini has not reached that stage yet, so the "all-new" Mini looks at first glance to be barely even an evolution of its predecessor. However, it is, although that difference is very difficult to see despite changes to every body panel. What is markedly different about the 2007MY Mini, general details of which have been released, is its technology—notably its 1.6-L gasoline engines, which are naturally aspirated for the Mini Cooper and turbocharged for the Mini Cooper S. The engines are the outcome of a joint BMW-**PSA Peugeot Citroën** collaboration, with BMW taking the main responsibility for design and the French company for purchasing. A six-speed auto (with paddle shift manual selection), updated rear suspension design, and a new electric power steering system also mark out the new version.

In the five years since the BMW Mini was launched, 800,000 have been manufactured. Although built on the floor structure of the 2001 car, the latest Mini, now being produced at BMW's Oxford plant in England, has been extensively redesigned and re-engineered. Engines are assembled at BMW's Hams Hall plant in the British Midlands.

The body looks very similar to that of the previous Mini and retains its distinctive short overhangs but is 60 mm (2.4 in) longer overall—Cooper S version 61 mm (2.4 in)—than the latter. The car has a more rounded rear with larger back lights. Headlights are fixed instead of being part of the hood, and turned slightly to the outside. The hood of the Cooper S rises some 20 mm (0.8 in) more than that of the regular car to provide added clearance for the turbochraged engine and to meet pedestrian impact legislation, which also avoids the complexity and cost of an "active" hood.

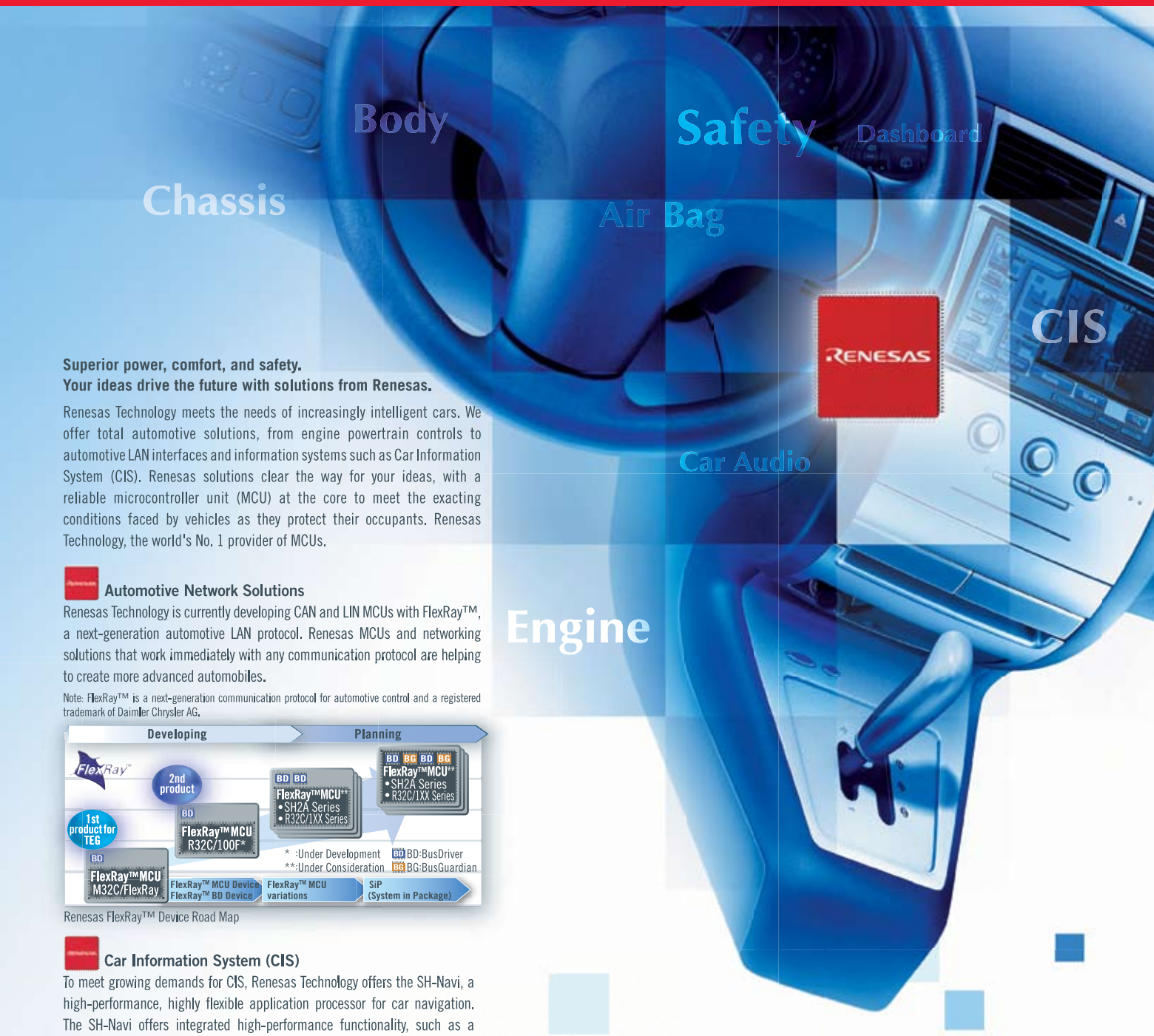
The new Mini has been given a higher shoulder line, some 18 mm (0.7 in) above that of its predecessor. Vertical airflow edges on the C-pillars and individual spoilers at the rear of the roof improve aerodynamic performance; the Mini Cooper version has a Cd of 0.33.

The interior of the Mini has been extensively redesigned and is slightly roomier, however it retains the distinctive, centrally positioned large speedometer and engine start is via a dashboard button. The original BMC (British Motor Corp.) Mini, which arrived in 1959, had a start button, too, but it was on the floor close to the driver's seat.

Interior lighting is unusual; the color of the roof lights and those used for the door storage compartments and grab handle recesses have four color settings.

The new Mini will be available with three gasoline engines and one diesel, all of 1.6-L capacity. Gasoline engines for the previous models (**Chrysler** designed) came from **Tritec** in Brazil. The Mini Cooper's engine produces 120 hp (90 kW) at 6000 rpm with 140 N·m (103 lb·ft) available from 2000 rpm, although peak torque of 160 N·m (118 lb·ft) is not achieved until a surprisingly high 4250 rpm. The four-valve engine has fully variable valve control based on BMW's Valvetronic system, which replaces the conventional butterfly used on most engines. Fuel consumption is improved by 12.5% compared to the previous Cooper.

The top Mini model is the Cooper S, but unlike the previous S engine which was supercharged, the new unit has a twin-scroll turbocharger and intercooler as well as direct fuel



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Renesas FlexRay™ Device Road Map

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Ford Mondeo


BMW X5

injection. With 175 hp (131 kW) produced at 5500 rpm, it is 5 hp (4 kW) more powerful than its predecessor. Torque of 240 N·m (177 lb·ft) is available from 1600 to 5000 rpm, but an overboost facility briefly produces 260 N·m (192 lb·ft) under hard acceleration. Performance figures include a 0-100 km/h (62 mph) time of 7.1 s and top speed of 225 km/h (140 mph). The camshaft on the intake side provides infinitely variable valve timing, and sodium-filled exhaust valves help to cope with the high temperatures of the turbocharged engine. Both Cooper and Cooper S engines feature a two-piece bedplate structure for the crankcase comprising cast aluminum cylinder block and bearing housing plus camshafts made from weight-saving composite material. A **Getrag** six-speed manual gearbox is used for all versions of the new Mini, and an **Aisin** six-speed auto will be an option. The continuously variable transmission gearbox previously offered on some Minis is no longer available.

The most significant chassis change is the use of a central-arm rear axle with aluminum longitudinal track control arms, which provides a weight saving of about 6 kg (13 lb). The front suspension uses MacPherson struts and an anti-roll bar. With added compliance, the new system has been designed to improve ride quality. A firmer sports setup is an option. Run-flat tires are standard on the Cooper S. BMW opted to use electrical power steering with two control maps complemented by improved accelerator pedal response; one map is used for regular driving and the second, which is driver selectable, provides for more direct input. Chassis electronics are comprehensive; the S getting Automatic Stability Control+Traction (ASC+T) with driver selection engagement. Dynamic Stability Control with Hill Assist (to prevent roll-back) is an option. Six airbags are standard on both Coopers.

Stuart Birch

'Kinetic look' for Mondeo

Ford had two stars at Paris: the (almost) production version of the next Mondeo and the full production version of the Focus Coupe Cabriolet (CC). The Mondeo was shown only as a station wagon (a four-door sedan and five-door hatchback will complete the range of body styles), with its very strongly styled front end bearing a close relationship to the Iosis concept seen at last year's Frankfurt Motor Show. The Mondeo will go on sale in late spring 2007.

"The new Mondeo is critical to the FoE business," Ford of Europe (FoE) President and CEO John Fleming said. "The Mondeo has always been a major player in the European C/D segment, and with over 4 million owners looking for us to deliver something special, we have every intention of meeting their significant expectations with this all-new model."

The Mondeo, which incorporates some of the visual cues of Ford's most recent models, notably the S-Max, will be built at the company's Genk, Belgium, plant (together with S-Max and Galaxy) on which the company has spent around $700 million on modernization and extensive flexible manufacturing capability. Mondeo has been developed in line with the company's Product Sustainability Index (PSI), which is described as providing a basis for permanent evaluation and improved sustainability performance for new generations of vehicles across environmental, social, and economic areas.

Martin Smith, FoE's Director of Design, describes the Mondeo as having a "kinetic look" without compromising luggage space. "I believe the new Mondeo will challenge everyone's perceptions of a big Ford car and prove that we can once again deliver style with substance in a desirable form," he said. In fact, the company has claimed to be doing that since the Focus arrived in 1998.

Ford regards the key elements of "kinetic design" as including dynamic lines and three-plane plan front-end view; full surfaces; strong shoulders (particularly evidenced by **Volvo**); bold wheel lips; a rising belt line; and a distinctive kickup of the window graphic at the C-pillar.

In keeping with other marques (**Peugeot**, **Audi**), the Mondeo has a very bold front end with a large upper grille and inverted trapezoidal lower grille with triangular outer sections enhanced by brightwork.

Mondeo power units will include a wide range of gasoline and diesel engines, some of the latter developed in collaboration with **PSA Peugeot Citroën**.

Stuart Birch

BMW X5 adds third row

BMW's list of improvements for its 2007MY X5 is lengthy and includes most of the items that tick the boxes for technology and market expectations. The former covers adaptive suspension, active steering, run-flat tires, more-powerful engines, a faster-shifting auto gearbox and a head-up display (HUD); the latter, a third row of seats and a parking camera. But unlike other BMW arrivals of the past few years, the styling of the new X5 is relatively conservative and does not have the (often controversial) signatures of other models in the range. Although the front end is distinctly different from the outgoing X5, the overall impression is that changes to the vehicle's appearance are relatively modest.

One piece of technology that is absent is a hybrid version. Research X5s have been built and *AEI* has experienced one of these. At the Frankfurt Motor Show last year, BMW revealed a hybrid research version of the X3, the EfficientDynamics. Although no official information or comment was available at the time of the new X5 reveal, indications are that it would eventually be available as a hybrid, possibly for MY2008.

It is seven years since the X5 first appeared (580,000 now sold), with BMW's stated aim being to extrapolate its sedan car ride/handling assets into the SUV market—pointedly describing the then-new model not as an SUV but an SAV (Sports Activity Vehicle). It has continued that philosophy with the latest X5.

Engine choice includes the 3.0-L 231-hp (172-kW), 520 N·m (384 lb·ft), turbodiesel with piezo injection system. The unit also has an aluminum crankcase that is 25 kg (55 lb) lighter than that of the previous car's 3.0-L diesel. The engine installation is 7% more fuel-efficient and puts out 8% less CO_2—231g/km. Engine power is up by 6% and torque by 4%. But surprisingly, BMW confirmed that the unit only has a single turbocharger and is not yet available in the highly competent twin-turbo configuration fitted to other models in the BMW range. Performance figures for the X5 3.0d include a 0-100 km/h (0-62 mph) time of 8.3 s. The most powerful X5 at present is the gasoline 4.8-L 355-hp (265-kW) V8, which makes 100 km/h (62 mph) in 6.5 s; emissions are 299 g/km. All versions get the latest version of **ZF**'s six-speed auto gearbox, which has a different torque converter plus enhanced software designed to reduce gearshift time by 50%.

The car's xDrive four-wheel-drive system can be specified with Adaptive Drive—as used on two-wheel-drive BMWs—which uses active hydraulic antiroll bars and incorporates Electronic Damper Control, using sensors to continuously adjust damper settings. Active steering is also offered, again a cascade from the sedans. It has an electronically operated planetary gear intersecting the steering shaft that provides extra lock for parking maneuvers; at speed the opposite effect is achieved.

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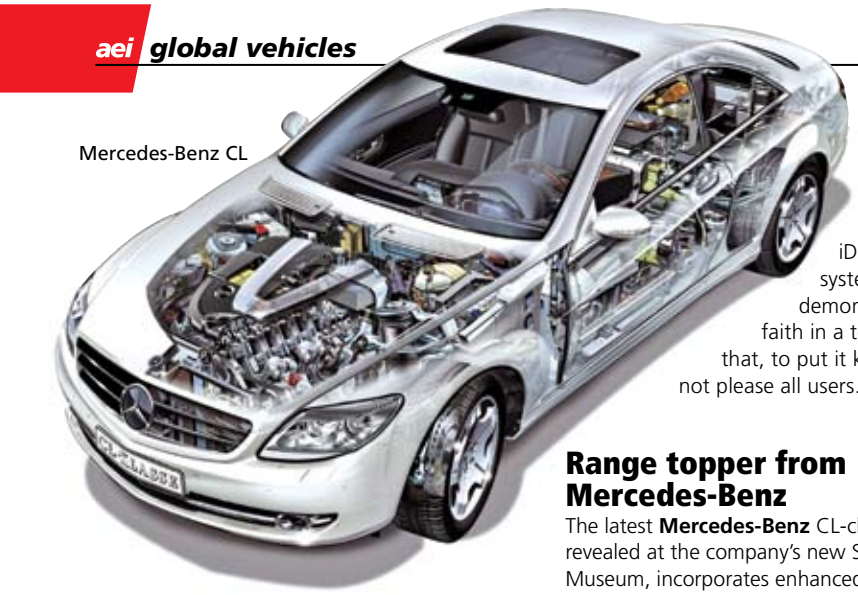

Mercedes-Benz CL

BMW continues with its iDrive control system, which demonstrates its faith in a technology that, to put it kindly, does not please all users.

Stuart Birch

Range topper from Mercedes-Benz

The latest **Mercedes-Benz** CL-class coupe, revealed at the company's new Stuttgart Museum, incorporates enhanced technology including a developed version of Active Body Control (ABC), Pre-Safe Brakes, IR imaging, and a choice of V8 or bi-turbo V12 engines.

The ABC has been modified to reduce body roll and pitch by some 60% compared to the previous model, but ride quality has been improved, said a Mercedes spokesperson. ABC is a sensor-linked, computer controlled electro-hydraulic system. Above 60 km/h (37 mph), it lowers the body by up to 10 mm (0.4 in) to further improve handling and reduce aerodynamic drag. The CL, which shares major elements with the S-class, is 75 mm (3.0 in) longer, 14 mm (0.6 in) wider, and 20 mm (0.8 in) taller than its predecessor to provide added space for its four occupants. Trunk capacity is up by 40 L (1.4 ft³) to 490 L (17.3 ft³).

Pre-Safe, Mercedes' anticipatory occupant protection system, is fitted to the CL. It now incorporates Pre-Safe Brakes, operating in tandem with Brake Assist PLUS (BAS PLUS), that will warn the driver, visually and audibly, of the danger of an impending collision with the car ahead and automatically calculate the required braking pressure to prevent a collision. If the driver is slow to react, the system will apply up to 40% brake pressure, therefore giving driver support but not taking full control.

The car's naturally aspirated 5.4-L V8 engine produces 285 kW (382 hp) at 6000 rpm, with 530 N·m (391 lb·ft) available from 2800 to 4800 rpm; the bi-turbo V12 achieves 380 kW (510 hp) at 5000 rpm, with maximum torque of 830 N·m (612 lb·ft) produced from 1900 to 3500 rpm. The V12's performance figures include 0-100 km/h (0-62 mph) in 4.6 s.

Optional equipment includes Night View Assist via IR headlamps. A reversing camera is also an option.

The seventh generation of a long line of Mercedes coupes, the first of which (the W188) appeared in 1952, the new CL combines elegance and sportiness but still manages to meet pedestrian safety legislation requirements without the necessity of an active hood. Instead, the hood is slightly higher than the front fenders, but the effect is aesthetically satisfactory. However, Mercedes has designed active hood systems that may be used in future models.

The CL has no B-pillar. The C-pillar is tapered towards its base, echoing the design cues of former coupes. A sliding glass sunroof has serrated wind deflectors with ridges to create longitudinal air turbulence to reduce heterodyning effects. It is a standard fit; Mercedes' market research has shown that 75% of buyers expect a sunroof.

Particular attention has been paid to the car's aerodynamics and reduction of wind noise. The design includes what a Mercedes spokesman described as "airflow-efficient A-pillars" plus a very rigid body shell and a new sealing concept for the doors, together with a "specially designed" rubber seal between rear windshield base and trunk lid. Side window glass thickness is 6 mm (0.2 in), to help reduce interior noise. When not in use, the windshield wipers are positioned very low and out of the airstream.

For aero-acoustic testing, Mercedes used an array of equipment including a newly designed system comprising a 3-m (9.8-ft) parabolic reflector equipped with microphones. From 5 m (16.4 ft), the microphones at the focal point of the reflector record the sound of the airstream over the body. In a statement, Mercedes explained: "While numerous individual measurements were formerly necessary for such analytical procedures, the new parabolic reflector process requires only a single measurement to examine complete areas of the vehicle's body, such as the A-pillars, exterior mirrors, side windows, and roof." Instrumented dummies have shown that at the driver's head level, while the car is travelling at 140 km/h (87 mph) recorded noise is less than 66 dB. The new CL has a Cd of 0.27, a 3.5% reduction compared to that of the outgoing model.

Stuart Birch

Volvo C30

Chassis electronics also include Dynamic Stability Control+ as standard. It incorporates Brake Pre-Tensioning, Brake Drying, Hill Start Assistant, and Brake Fade Compensation.

BMW is claiming a first with its offer of a HUD in a car of the X5's type, and also for its standard fitment of run-flat tires (from several suppliers) with a 145-km (90-mi) range at speeds up to 80 km/h (50 mph). Their use for the new X5 marks the fourth generation of run-flat tires on a BMW. The X5 comes in standard form on 18-in alloy wheels, with 19- and 20-in alloys as options.

The move to an optional seven-seat configuration is a significant development for BMW and meets market requirements for maximum seat options and flexibility. The new X5 is 19 cm (7.5 in) longer and 6 cm (2.4 in) wider than the old car. With the seven seats in place there is 200 L (7.1 ft³) of luggage space. The two rearmost seats can be stowed beneath the floor. If the extra seats are not specified, luggage space is 620 L (21.9 ft³)—155 L (5.5 ft³) more than the outgoing X5—and a 90-L (3.2-ft³) underfloor storage compartment is fitted. With all rear seats folded, luggage space is 1750 L (61.8 ft³).

SUVs are not noted for their aerodynamic efficiency, but BMW claims a best of Cd of 0.33 for the new X5, thanks partly to a near-flat underbody and a roof spoiler neatly integrated into the tailgate. Park Distance Control is standard, but a rear-view parking camera is an added option, presenting a wide-angle picture on the driver's central display.

Volvo adds three-door

For a company renowned for building cars that major on safety and solidity, creating a lithe sporty coupe is something of a challenge for **Volvo**. But it did it in the past with the P1800 and 1800ES and now it has done so again. The C30, which has a modern Volvo family front end but a rear hatch straight from the short-lived 1800ES of more than three decades ago, looks stylish and fresh.

A four-seater, it offers a wide choice of gasoline and diesel engines. Most powerful at present is a turbocharged 162-kW (217-hp) 2.5-L gasoline five cylinder, followed by a 132-kW (177 hp) 2.4-L turbocharged five-cylinder diesel.

The C30 is some 22 cm (8.7 in) shorter than its S40 sibling. Its chassis owes a lot to the agile **Ford** Focus, but the interior is very much Volvo and incorporates the floating center stack that has become a surrogate company badge. Four individual seats are fitted, the rear slightly centered.

Safety is, of course, a priority and a Blind Spot Information System (BLIS) is an option.

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