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Audi Show cars

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The Audi urban concept

Audi is breaking new ground: The Audi urban concept technology study is a 1+1 vehicle for urban and metropolitan areas. The electric powered show car has four wheels, but does not fit into any current automobile category. Weighing just 480 kilograms *(1,058.22 lb)*, the Audi urban concept combines elements of a racecar, a roadster, a fun car and a city car into a radical new concept. It has the potential to become the trendsetter for a new form of mobility.

Concept

“How much car is necessary to deliver driving pleasure and urban mobility in an entirely new way?” This question was the starting point for the Audi urban concept. A model of a sailplane was in the studio during the development process as an example of lightweight construction, efficiency and reduction – of the principle of “less is more.”

The result is a vehicle that cannot be pigeonholed, a vehicle that redefines the term “driving pleasure” and is completely unencumbered by the baggage of conventional concepts. The Audi urban concept concentrates on the pure essence of driving and conveys freedom at the premium level. At the same time, it offers the comfort and safety of a closed automobile, making it far superior to any motor scooter. With its sleek body and free-standing wheels, the technology study is progressive and highly dramatic while at the same time extremely sporty, yet surprisingly comfortable.

The cabin of the Audi urban concept offers slightly offset seating for two. The roof slides back for entry. This innovative solution makes the Audi urban concept even more fun to drive because the canopy can remain open in good weather. It also allows the cabin to be aired out very quickly. The fit and finish of the show car is characterized by the obligatory Audi perfection. The car’s technology is reflective of the brand’s wide-ranging competence, particularly in ultra-lightweight construction.

The brand with the four rings has created an entirely new class of vehicle with the Audi urban concept, and that on the premium level. It also marks the new entry point to Audi's future range of electric vehicles, which is crowned by the R8 e-tron high-performance sports car. The Audi urban concept quite literally makes it easy to get into electric mobility.

The technology study is targeted toward people who are interested in technology and are enthusiastic about new approaches to mobility, independent of their age and status. In particular, it addresses an urban public whose lifestyle both reflects the car's modern concept and the driving pleasure associated with it and is a good fit for a possible innovative leasing system.

Exterior design

The Audi urban concept features an all-new design that still has certain historical roots in the Auto Union racecars of the 1930s. They were well ahead of their time conceptually: they were extremely lightweight and their engines were mounted in the rear. Their large, open wheels also stood out from the chassis – another parallel with the modern show car.

Painted in Electric White, pearl effect, today's technology study – 3,219 millimeters *(126.73 in)* long, 1,678 millimeters *(66.06 in)* wide, but just 1,189 millimeters *(46.81 in)* high – has a body on which all the lines are surging forward. The greenhouse is extremely flat. The roofline drops down like a wedge while the side window rises upward. The typical Audi tornado line gives the urban concept a strong shoulder.

An upright, forward-leaning blade in front of the rear wheel accentuates the side view. The Speed Red contour gives the appearance of a roll bar and evokes the Audi R8 high-performance sports car. The flanks of the body flare outward toward the bottom to enlarge the floor. This serves two purposes: It generates downforce at higher speeds and it can be used to charge the battery via induction – a particularly convenient method.

The characteristic Audi single-frame grill, which sports the four rings, appears as a closed surface on the Audi urban concept. It tilts forward to provide access to the charging socket. The narrow LED headlights project three-dimensionally from the body.

The turn signals are LED strips running along the fenders. These closely encircle the free-standing wheels, and the front fenders turn with the wheels when steering. The three-dimensional rear lights with the tail light and brake light are integrated into the vehicle body and wrap around the top of the rear window. At the back of the car is a small luggage compartment that pulls out like a drawer.
The front segment of the greenhouse is movable – another innovative idea that is unique to the Audi urban concept. Mounted on rails, it can be slid back by hand over the fixed rear segment.

It is up to the driver to decide whether to close the canopy or leave it open. The technology study is a roadster-on-demand that has neither roll-down windows nor a heavy air conditioner. When closed, the canopy provides protection against rain and cool air. Audi has also developed a second body variant as an alternative to the urban concept: a Spyder with a flat window strip wrapping around the cockpit and doors that open upward at an angle.

Interior

Entry to the Audi urban concept is via the slide-back canopy. The driver and passenger step over the edge of the vehicle as if they were stepping into the bathtub – there are no doors. This does not require any great flexibility; a handle on the windshield frame and special cutouts on the seating surfaces facilitate entry.

The show car offers room for two. The driver and passenger sit next to one another, with the right seat offset by 30 centimeters *(11.81 in)* to the rear to provide sufficient shoulder and elbow room. The seats are fixed, integral components of the monocoque, which provides for significant weight savings. They are covered with foam seating surfaces custom-fabricated to the measurements of the customer, just like in a racecar. The seat belts run through cutouts in the seat backs.

Sitting in the Audi urban concept is somewhat like sitting in an airplane cockpit. The seating position is very sporty. The driver can precisely adjust the positions of the aluminum pedals and the steering column. Both components are telescoping. The pedals can be moved a total of 22 centimeters *(8.66 in)*, while the steering column can be moved 14 centimeters *(5.51 in)* for easier entry and additional 6 centimeters *(2.36 in*) for a custom driving position.

The steering column is exposed – a thick, elegantly designed section, open in the center and mounted virtually horizontally. At the far end of the steering column is a display for the most important information. The small, hexagonal steering wheel includes buttons and roller switches for controlling various systems, including selecting the Audi drive select modes for the electric drive system.

The entire interior of the technology study is subjugated to the strict dictates of ultra-lightweight construction. Running below the windshield across the entire cabin is a wing-shaped section that is also open in the middle. This new style of dashboard includes satellite controls for the heater and two large air vents.

Rather than carpeting, an innovative mat covers parts of the floor. This is made from a technical textile originally developed for athletic shoes that is water repellant and very durable. The seats are covered with cloth, with the edges of the foam pads framed in kangaroo leather. Aluminum applications accentuate the dashboard.

Technology

The Audi urban concept is also without peer with respect to the technical concept. The outer skin of the show car is made of carbon fiber-reinforced polymer (CFRP); the occupant cell is a mix of CFRP monocoque and an aluminum structure. This ultra-lightweight construction is the foundation for the technology study's extremely low curb weight of just 480 kilograms *(1,058.22 lb)*.

The sophisticated chassis underscores the distinctively sporty personality of the Audi urban concept. Wishbones made from a combination of aluminum and CFRP locate the free-standing, 21-inch wheels.

Manufactured using cladding technology, the wheels are very light and feature a variant of the blade design from the Audi e-tron models. The tire sizes are as unusual as the car as a whole – 125/60 up front and 145/50 in the rear.

The Audi urban concept uses pushrod technology borrowed from motorsports. As in a racecar, the struts mounted in the interior of the monocoque are nearly horizontal. Four disc brakes provide the stopping power. The turning circle measures less than nine meters *(29.53 ft)* – ideal for a city car. Thanks to the vehicle's low weight, the rack-and-pinion steering does not require any power assistance. Crumple zones in the front and rear plus two airbags provide for a high degree of passive safety. An innovative assistance system helps the driver to avoid collisions with pedestrians.

The battery is mounted transversely behind the seats. The lithium-ion battery, which weighs around 90 kilograms *(198.42 lb)*, stores 7.1 kWh of usable energy. The study's two electric motors together produce 15 kW (20 hp) of continuous power and 47 Nm *(34.67 lb-ft)* of torque. The motors are mounted between the rear wheels, which they drive via a single-speed transmission.

The Audi urban concept accelerates from 0 to 100 km/h *(62.14 mph)* in 16.9 seconds. It reaches 60 km/h *(37.28 mph)* in around six seconds. The show car steps off from traffic lights smartly thanks to the torque of the electric motors, which is fully available from standstill. Top speed is governed at 100 km/h *(62.14 mph)*.

The action radius in the European driving cycle is 73 km *(45.36 miles)*. The battery recharges completely in about 20 minutes with 400 volt three-phase current, and in approximately one hour with 230 volt household current.

Audi Wireless Charging

Audi is hard at work on the future of charging technology as an alternative to the charging at a power outlet. Audi Wireless Charging (AWC) refers to contactless induction charging. The infrastructure side, comprising a coil and an inverter (AC/AC converter), is placed on the normal parking spot of the Audi urban concept and connected to the power grid. The 3.6 kW primary coil set into the plate generates a high-frequency alternating field.

The charging process begins automatically when the urban concept drives onto the plate. The alternating magnetic field of the infrastructure side induces an alternating current across the air gap in the secondary coil, which is integrated into the vehicle. This current is rectified and fed into the vehicle's electrical system, where it charges the battery or powers consumers such as the heater. The alternating field is only generated if the vehicle is standing over the plate and thus poses no danger to people or animals.

Charging stops automatically when the battery is fully charged. The driver can interrupt charging at any time. The efficiency of AWC is comparable to that of other charging technologies. It is not affected by rain, snow or ice. The new technology makes charging electric vehicles easy and extremely convenient. A later version of the technology will be able to be integrated into the transportation infrastructure as a retrofit for parking garages or residential streets, for example.

The Audi A2 concept

With the A2 concept technology study, Audi is offering a peek at electric driving in the megacities of the future. The purely electric powered A2 concept is a classic space concept: a premium vehicle for metropolitan areas featuring generous amounts of space and composed road manners.

The technology study is packed full with attractive, intelligent technologies. An innovative body technology – a further development of Audi's ultra-lightweight construction – limits its weight to just 1,150 kilograms *(2,535.32 lb)*. Audi connect technologies provide an Internet connection; the steering and brakes are purely electric (by-wire) systems.

Exterior design

The Audi A2 concept demonstrates the complete skill set of the Audi designers in a compact space. It is just 3,804 millimeters *(149.76 in)* long, 1,693 millimeters *(66.65 in)* wide and 1,494 millimeters *(58.82 in*) high; even so, it makes it makes and elegant, powerful and sporty impression on the road. As is typical for Audi, its clean appearance concentrates fully on the essentials.

The opaque glass roof of the show car finished in flat Electric White becomes transparent at the push of a button. When an electric voltage is applied, small particles integrated into the glass align so that the light can pass through the glazing unhindered. When the glass roof is darkened, however, it blocks the infrared component of the sunlight almost completely, effectively shadowing the interior. This is a further contribution to efficient temperature management in the purely electric powered Audi A2 concept.

As with every Audi, the front of the technology study is dominated by the single-frame grill, in this case, in a special version tailored to electrical operation. The upper two-thirds are designed as a closed, folding surface, behind which are the charging socket and the cooling water connection. The four Audi rings are intensively sculpted; the engine hood is permanently bolted to the body.

Mounted in the lower section of the single-frame grille, which acts as an air inlet, are highly efficient cooling elements made of graphite foam. The lightweight mineral is an excellent conductor of heat from the water to the ambient air. Eight blocks with six graphite elements each are located in the central air inlet.

Another highlight of the A2 concept are the matrix beam LED headlights. An entire bundle of small light-emitting diodes arranged one above the other produce the low beam and high beam light. Microreflectors enable the precise positioning of the light. The LEDs can be switched on and off independently to illuminate the road perfectly in any situation. Numerous mini-LEDs set in the lower section of the headlight like a pearl necklace produce the daytime running light.

The side view of the technology study is also typical Audi, with brawny wheel wells, a low greenhouse and an early-sloping roof line that ends in a long rear spoiler. Sharp lines frame tautly arched sheet metal surfaces. The dynamic line above the sills rises distinctly; the tornado line below the windows runs slightly upward. Just below the tornado line is a characteristic feature of the Audi A2 concept – the Audi dynamic light: a band of light that connects the headlights with the tail lights.

Light-emitting diodes and light guides produce the Audi dynamic light. When in standby-mode, the several centimeter-wide band appears black. When the owner of the Audi A2 concept approaches, it lights up blue in welcome and focuses on the door handles, which are inset into the band and extend when the driver swipes a hand over them.

The dynamic light shines bright orange when the A2 concept is driving. It pulses on the corresponding side when indicating a turn, and when braking, a red pulse of light runs along the flank as a warning for other road users.

The tail lights also use matrix beam technology. They are adaptive: The system uses a sensor to detect how good visibility is and adjusts the brightness accordingly.

Five laser diodes produce the rear fog light. When visibility is good, their light is invisible. In the fog or rain, however, it strikes the water particles in the air and becomes clearly visible as a floating triangle.

Interior

The interior also reflects the philosophy behind the Audi A2 concept. It is light, clean, open, and spacious with intuitive controls. The dashboard is split into two sections, with the semi-circular left section enclosing the driver's area. The Audi dynamic light runs along the edges in two separate arcs from the doors to the cockpit. It welcomes the passengers in a manner similar to the light band on the exterior.

The architecture of the interior takes advantage of the possibilities afforded by the electric drive system. There is no center tunnel; the console between the front seats can be lowered to allow free passage through the vehicle. Heating and cooling air flows indirectly and draft-free through a perforated surface beneath the windshield.

The steering wheel of the Audi A2 concept is flattened at the top and bottom, with a single spoke connecting the ring to the impact absorber. The two large horns pointing inward have touch-sensitive surfaces used to control key functions, with only the turn signals and windshield wipers still controlled via the traditional steering column stalks.

If both touchpads are touched at the same time, the A2 concept switches into a semi-autonomous driving mode. This convenience feature is a welcome relief in slow-moving traffic, for example. The driver maintains full control of the vehicle at all times, exactly like with today's ACC stop & go system on which the new technology is based.

An open, shell-like section serves as the steering column and extends horizontally into the cockpit. On the far end is a seven-inch display flanked by two secondary displays with the speedometer and the power meter.

When the driver pushes the button to activate the electric drive, an animated band of light encircles the driver and passenger, and two touchpads fold up to the right of the steering wheel. The small touchsurface on the left is for shifting gears (shift-by-wire); the larger one on the right is reserved for the air conditioning and media functions.

The retractable console between the seats includes an additional touchpad for entering letters and numbers and for secondary functions – a further development of today's MMI touch. A docking station for the iPhone rounds out the control concept.

The show car has all of the Audi connect technologies on board. The Bluetooth online car phone connects it to the Internet via a UTMS module, a WLAN hotspot lets the passengers surf and e-mail from their mobile devices. The fast data connection delivers specially prepared news and information to the vehicle. The services currently offered by Audi are available for navigation: the map with images from Google Earth, Audi traffic information online, Google POI search via voice control and Google Street View.

Cutouts in the backrests of the four individual seats in the Audi A2 concept give them a sporty look and make them incredibly light. They have an aluminum chassis and the developers used a polymer blow-molding process for the shells. Three struts connect the seats with the floor for more foot room in the back, and there are storage bins beneath the fold-up seat cushions.

A console with storage bins is located between the rear seats. Folding these seats forward reveals a fixture for the fork of a special city bicycle. The luggage compartment of the Audi A2 concept has a sandwich floor. A fold-up frame with two solid, high-load nets covers the lower load level.

The colors and materials in the interior support the impression of lightness and functionality. The large areas from the door top shoulders to the floor are covered in a tough material with a neoprene surface feel. A ribbed material made from recycled polyester covers the central floor area. Aluminum elements accentuate the cockpit.

Technology

The Audi A2 concept is a purely electric vehicle. The lithium-ion battery mounted in the sandwich floor stores 31 kWh of energy, 24 kWh of which are usable. The electric motor is transversely mounted in the front of the vehicle. It delivers 85 kW (116 hp) of peak power (60 kW continuous) and 270 Nm *(199.14 lb-ft)* of torque (160 Nm *(118.01 lb-ft continuous)* to the front wheels via a single-speed transmission.

The Audi technology study has a range of 200 km *(124.27 miles)* in the European driving cycle. It takes roughly 1.5 hours to fully recharge the battery with 400 volt three-phase current and approximately four hours with 230 volt household current. The Audi A2 concept is also designed for the new contactless charging technology (Audi Wireless Charging).

The show car weighs less than 1,150 kilograms *(2,535.32 lb)*. This is due primarily to its body, which features the most advanced state of Audi's ultra-lightweight construction. The A2 concept marks the first time that the ASF has been combined with hybrid multimaterial construction, in which very different materials are combined with one another. In this case, the superstructure is made largely of aluminum components and is complemented by add-on parts of carbon fiber-reinforced polymer (CFRP).

The Audi A2 concept is an agile vehicle. It accelerates from 0 to 100 km/h *(62.14 mph)* in 9.3 seconds; top speed is limited to 150 km/h *(93.21 mph)* in the interest of range. A McPherson strut front suspension and a torsion beam axle in the back provide for agile handling. The steering and brake systems are purely electric (steer-by-wire and brake-by-wire), requiring no mechanical or hydraulic connection to the steering wheel or the pedals, respectively.

The 18-inch wheels are fabricated using cladding technology. The alloy base wheel and the cladding are manufactured separately and bonded together, greatly reducing the amount of material used. The new hybrid technology, which Audi already uses in some production models, saves roughly two kilograms *(4.41 lb)* per wheel. The wheels of the A2 concept combine the blade look of the e-tron family with Audi's classic spoke design.