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Volkswagen

The XL1

February / March 2013

Notes:

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XL1

The XL1

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Conceptually, the **XL1** represents the third evolutionary stage of the 1-litre car strategy by Volkswagen.

When the new millennium was ushered in, Prof. Dr. Ferdinand Piëch – who is today Chairman of the Supervisory Board of Volkswagen AG

– formulated the visionary goal of bringing a production car to market that was practical for everyday use yet offered a low fuel consumption of one litre per 100 km. In the two-seat **XL1**, this vision has become reality.



Launch of the 1-litre fuel economy car from Volkswagen: **XL1 is a vehicle of the future that is being built today**

0.9 litre combined fuel consumption was a vision; now it is a reality

Volkswagen to produce XL1 by handcrafting-like production methods at its Osnabrück plant in Germany

To the point.



Wolfsburg, February/March 2013. The XL1 from Volkswagen is the most fuel-efficient production car in the world, with a fuel consumption value of 0.9 l/100 km. Thanks to its plug-in hybrid system, the two-seater can also cover a distance of up to 50 km in all-electric mode and therefore with zero local emissions.

Most aerodynamic car ever

› **Efficiency of pure design principles.** The XL1 is an automotive hero that follows pure sports car design principles: low weight (795 kg), perfect aerodynamics (Cd 0.189) and a low centre of gravity (1,153 mm high). This gives the efficient Volkswagen the ability to cruise on the road at a constant speed of 100 km/h using just 6.2 kW/8.4 PS. In all-electric mode, the XL1 requires less than 0.1 kWh to cover a driving distance of over one kilometre.

Efficiency and driving fun

› **Electronically limited to 160 km/h.** High-tech lightweight design, perfect aerodynamics and a plug-in hybrid system – consisting of a two-cylinder TDI engine (35 kW/48 PS), E-motor (20 kW/27 PS), 7-speed dual clutch gearbox (DSG) and lithium-ion battery – all make it possible

for the new Volkswagen XL1 to emit just 21 g/km of CO₂. If necessary, the XL1, with a top speed of 160 km/h, can accelerate to 100 km/h in just 12.7 seconds. Clearly, 0.9 l/100 km fuel consumption is a record figure that has not been achieved by any other vehicle to date, and it illustrates how Volkswagen is redefining what is technically feasible in carmaking.

Third evolutionary stage of a vision

- › **2002, 2009, 2013.** Conceptually, the XL1 represents the third evolutionary stage of Volkswagen's 1-litre car strategy. When the new millennium was ushered in, Prof. Dr. Ferdinand Piëch, who is today Chairman of the Supervisory Board of Volkswagen AG, formulated the visionary goal of bringing to market a production car that was practical in everyday use with fuel consumption of one litre per 100 km. In the two-seat XL1, this vision has become reality. Despite the tremendous efficiency of the XL1, developers successfully came up with a body concept, which delivers more everyday utility than in the two previous prototypes. While the driver and passenger sat in a tandem arrangement for optimal aerodynamics in the L1, the 1-litre car presented in 2002 and in 2009, in the XL1 two occupants sit slightly offset, side by side, nearly as in a conventional vehicle.

Shorter than a Polo, lower than a Porsche Boxster

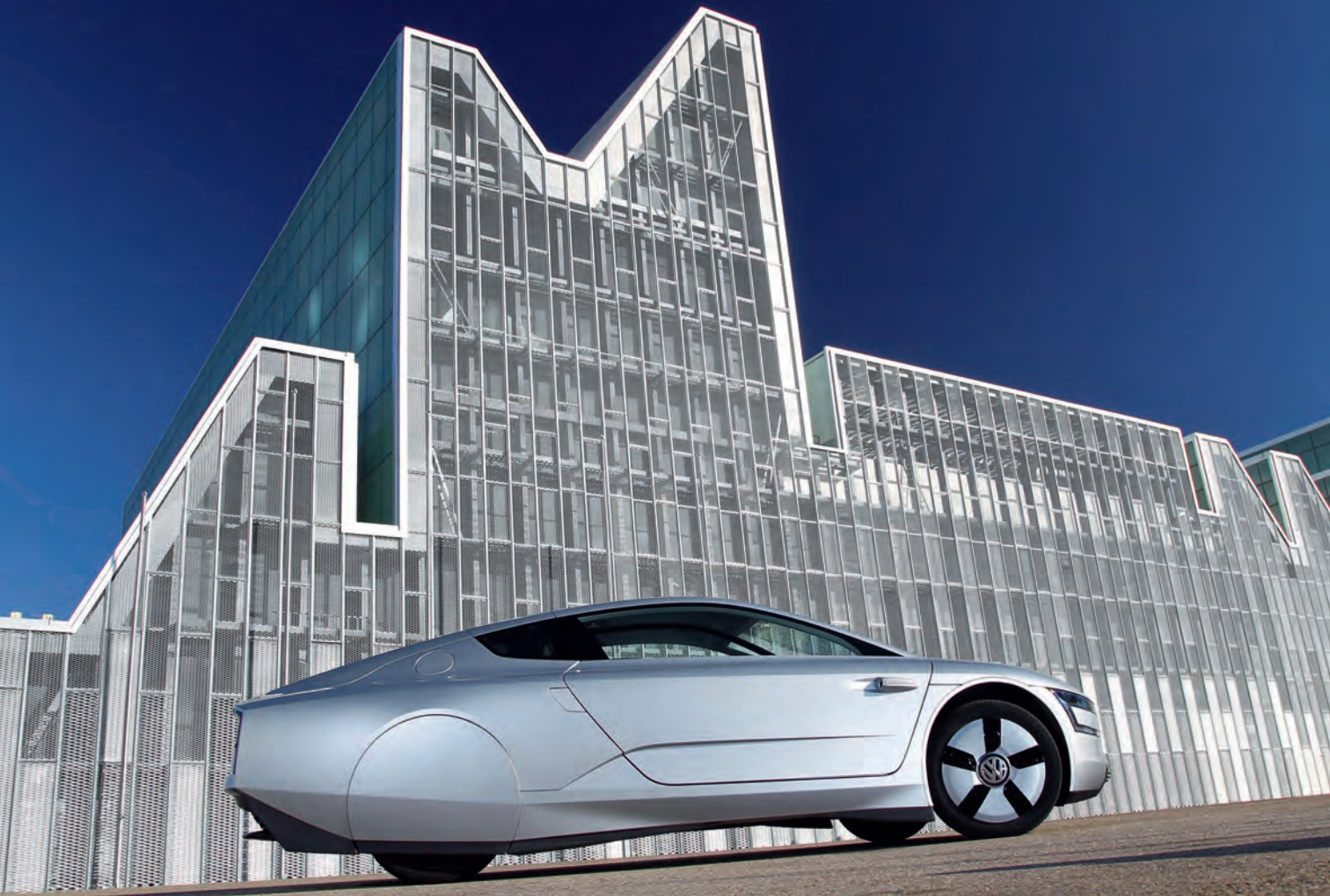
- › **Future in the present.** The XL1 is 3,888 mm long, 1,665 mm wide and just 1,153 mm tall. By usual automotive standards these are extreme dimensions. For comparison: a Polo has a similar length (3,970 mm) and width (1,682 mm) but is significantly taller (1,462 mm). Even a purebred sports car like today's Porsche Boxster is 129 mm taller (1,282 mm). So, the XL1 will make a spectacular appearance – a car of the future, built today.



High-tech manufacturing: Body of new XL1 weighs just 230 kg

Monocoque and exterior parts are produced from lightweight CFRP

Volkswagen has set up handcrafting-like manufacturing for the XL1 in Osnabrück



Wolfsburg, February / March 2013. The XL1 is a car of the future that is being built today. Not only are its technologies pioneering, but also the fact that Volkswagen is producing large parts of the XL1 in lightweight and strong carbon fibre reinforced polymer (CFRP). The monocoque with its slightly offset seats for driver and front passenger, all exterior body parts as well as functional elements such as the anti-roll bars are all made of CFRP. The preferred process for producing CFRP components at Volkswagen is the RTM process (Resin Transfer Moulding). The density of this material or its specific gravity is only around 20 per cent that of a comparable steel exterior skin. The CFRP parts exhibit a level of stiffness and strength that is by no means inferior to that of comparable steel or aluminium parts, yet the exterior skin of the XL1 is just 1.2 mm thick.

Innovative RTM process

Compared to other methods such as manufacturing CFRP in a prepreg process, CFRP production via RTM is more economical – with lower costs at higher part volumes – because it can be automated. The RTM parts are produced in multi-shell, heated and vacuum-sealed tools. This involves injecting liquid resin at high pressure into the tool containing the semi-finished carbon material whose interior has the shape of the part to be produced. The part cures afterwards in the mould.

CFRP paves the way to the future

A look at the scales shows why CFRP is the ideal material for the body of the XL1. The Volkswagen weighs just 795 kg. Of this figure, 227 kg represents the entire drive unit including the battery, 153 kg the running gear, 80 kg the equipment and 105 kg the electrical system. That leaves 230 kg, which is precisely the weight of the body – produced largely of CFRP – including wing doors, front windscreen with thin-glass technology and the highly safe monocoque. A total of 21.3 percent of the new XL1, or 169 kg, consists of CFRP. In addition, Volkswagen uses lightweight metals for 22.5 percent of all parts (179 kg). Only 23.2 percent (184 kg) of the new XL1 is constructed from steel and iron. The rest of its weight is distributed among various other polymers (e.g. polycarbonate side windows), metals, natural fibres, process materials and electronics.

Thanks to CFRP, the XL1 is not only light in weight, but very safe as well. This is due in part to the high-strength CFRP monocoque that is also lightweight. In a crash, it provides the necessary survival space for the driver and passenger. This is achieved by intelligent design of load paths, including the use of sandwich structures in the monocoque. In addition, the front and rear aluminium car structures absorb a large share of the crash energy. These principles were also implemented in the design of the CFRP

doors, where an aluminium impact beam is used to absorb crash energy; a stiff CFRP door frame also minimises intrusions into the CFRP safety cell. Much attention was given to the rescue of occupants as well. If the XL1 is resting upside down on its roof after a rollover accident, pyrotechnic separating screws simplify opening of the doors (swing doors).

XL1 embodies what is feasible today

The new XL1 is currently the most fuel efficient and eco-friendly automobile in the world. The only reason that this vehicle could be built is because it redefined the limits of what is feasible both in terms of the technologies it utilises and its manufacturing method. Consider XL1 technologies: Volkswagen is implementing highly innovative systems and materials that offer the highest efficiency possible today. Consider XL1 manufacturing: In Northern Germany, Europe's largest carmaker has set up a completely new handcrafting-like manufacturing for the XL1, which consists largely of CFRP.

Manufacturing in Osnabrück

The XL1 is manufactured by Volkswagen Osnabrück GmbH. In the former Karmann plants there, around 1,800 employees produce such cars as the Golf Cabriolet and the new Porsche Boxster.

As is usual in the framework of mass produced vehicles like the Golf Cabriolet, many components – such as the monocoque, engine, motor, suspensions and battery – are supplied by other plants and external suppliers. However, in the small production series for the XL1, the specialists from Osnabrück are not pursuing the classic path of large-scale production, rather they are practicing automotive handcrafting. Nonetheless, the XL1 production processes implemented in Osnabrück are highly innovative and unique. There were no previous examples of the individual production steps anywhere in the world, because no other car has been produced so thoroughly in a similar composite material. Over the long term, other Group brands will also benefit from the numerous innovations implemented in the XL1. The production process for the new XL1 in detail:

Production stage I – bodyshell frame

Production of the XL1 begins with delivery of the CFRP monocoque, which is produced by a supplier in Austria using the RTM process. The manufacturing process itself was developed over several years in close cooperation with Volkswagen. In Osnabrück, the monocoque is mounted to an assembly support plate; this is where the body is built – but without doors or lids. This first body production stage is

referred to as the “bodyshell frame”. At this station, all parts are moved to their prescribed design positions by special fixtures. This approach is necessary to maintain the tight manufacturing tolerances.

The various interior and exterior surfaces of the monocoque itself are pretreated in advance. This pretreatment is necessary to attain tight gaps and smooth surfaces. Background: In the interior of the XL1, many of these CFRP surfaces were intentionally left uncovered by trim panels, and so the high-tech material remains visible. The individual CFRP components are joined to one another in the bodyshell frame by gluing – a highly complex and unique process in manufacturing technology. The operation of mounting the roof section to the monocoque illustrates just how complex this process is:

Unlike welded metal parts, the roof of the XL1 cannot simply be placed on the monocoque. Rather the strength of the adhesive material must compensate for all fit gaps of the monocoque-roof side member structure and the different material thicknesses of the laminated roof. Therefore, this part is made to hover over the monocoque before gluing. The gluing process itself is performed according to a precisely defined sequence with precisely defined curing times.



Over the further course of production stage I, the boot pan is brought into position with the water channel, and it is glued and screw fastened. In addition, all structural and exterior skin parts (rear crossmembers, rear termination part, side panels front and rear) are positioned and screwed via a sled fixture. Last but not least, employees check and document the dimensional tolerances of the entire assembly as the final step of every production stage. Each individual part of the XL1 is also documented with a serial number and its production history.

Production stage II – door assembly

In parallel to production stage I, the two wing doors are produced in a separate production stage, including their crash reinforcements. Volkswagen developed its own tool for this, which is used to fit the doors to adjoining body parts with millimetre precision to satisfy the extremely tight production tolerances – even before it is placed in the monocoque. This is the only way to assure that all requirements are fulfilled in the installed state, such as the defined joint seam dimension and uniform transitions between the surfaces. Unlike sheet metal parts, carbon elements cannot be reshaped afterwards.

Production stage III – body assembly

At the third production station, the bodyshell frame is placed on a new fixture. Here, all body parts are assembled to achieve the specified gap dimensions and flush mounting precisions. These parts include the wing doors, bonnet, boot lid, front bumper and various small parts. Adjustment of the wing doors is a special challenge, because a precise fit must be assured to the roof and side body surfaces.

Production stage IV – painting

A total of 32 exterior skin parts are painted on the XL1; six of them are visible carbon parts. The CFRP parts are specially prepared for painting in the framework of XL1 production. Background: To fulfil the quality standard of a Class A paint job despite a minimally thin and therefore lightweight paint layer, in the RTM process a special fleece layer or resin film is added to the parts as a cover coat. Compared to conventional CFRP paints used in the industry, this yields a weight reduction of over 50 per cent. This innovative CFRP painting process owes its implementation to intensive fundamental work by the Volkswagen Technical Development Centre in Wolfsburg and an associated series of tests by paint experts at the Osnabrück plant.



The **XL1** from Volkswagen is the most fuel-efficient production car in the world with a fuel consumption value of 0.9 l/100 km.

The paint itself consists of three layers. The primer with a filler material is followed by the base paint – the coloured layer. Then the final layer or clearcoat is applied, which provides a high level of scratch resistance and UV resistance. In the interior, on the other hand, a decorative “matt pearl grey” paint is applied, or – on visible carbon parts such as the sills – a matt clearcoat. The same applies to the roof structure on which Volkswagen omitted trim parts in the interest of attaining optimal weight and maximising open space for the occupants.

Production stage V – front car section

Following painting, all components are transported to final assembly. The first step here is to join the front body section to the prefabricated floor pan. The module of this floor plan consists of components such as the double wishbone front suspension with swivel bearing (produced from die-cast aluminium), anti-roll bar (produced from CFRP), a small 12-Volt battery for the vehicle electrical system and the front ceramic brake discs. Also integrated in front is the high-voltage battery for the plug-in hybrid drive. Another special aspect is the mounting position of the air conditioner: the unit is typically mounted in the vehicle interior. For packaging reasons, however, this is not possible in the XL1. Therefore, the air

conditioner is installed in a special insulated capsule in the car’s front section. Automatic testing of the vehicle’s electrical system and preliminary startup of all electronic components are also performed at the ITC (Startup and Test Centre) in this production stage.

Production stage VI – rear section and interior

The classic merging of the drive unit with the body occurs after assembly of the front end. The entire drive unit (two-cylinder TDI engine, E-motor and 7-speed DSG) is installed in the rear section of the XL1. The rear axle produced from die-cast aluminium together with final drive shafts and ceramic brake discs, as well as the CFRP anti-roll bar, complete the components integrated at the rear.

In parallel, the cockpit is installed at this station via its magnesium supports. Unlike in mass production, no provisions were made for preassembling the XL1 cockpit due to the small production volume. Instead, all individual cockpit parts are mounted inside the vehicle superstructure. The dashboard itself consists of a moulded wood fibre material, which is just 1.4 mm thick and is produced in a special pressing process.

Production stage VII – windscreen, doors and wheels

The XL1 now takes on more of its final shape. After assembly of the drive unit, the laminated glass windscreen is installed, which is only 3.2 mm thick. The wing doors (including outside door mechanisms) are reinstalled; their exact positions and alignments were already set in production stage II. The bonnet is also mounted on the monocoque with centering pins. Last but not least, the XL1 gets its magnesium wheels. They are fitted with low rolling resistance tyres sized 115/80 R15 (front) and 145/55 R16 (rear).

Production stage VIII – final assembly of the doors

The wing doors are the most complex add-on components of the XL1 body. After installing the painted door and integrating the window mechanisms, special assembly fixtures are used to glue the polymer side windows into place. The larger part of the windows is permanently joined to the exterior door skin for packaging reasons, while a segment of the lower area of the side windows can be opened. Finally, the reversing cameras are placed in their housings, and the e-mirrors that serve as digital door mirrors are mounted to the exterior CFRP of the door.

Production stage IX – startup

In the context of quality assurance, all electronic control modules and their individual software and wire harness are checked. At the same time, the control modules are interconnected with the vehicle's specific wire harness. Now, final startup of the XL1 is performed. First, the entire high-voltage system is checked. For this purpose, "simulated" isolation faults are introduced to test the system's emergency shutoff functionality. The next step is to start up the internal combustion engine; all actuators and sensors of the TDI engine are checked, and parameter values at its first startup are compared to target values. In parallel, employees adjust the camera-based door mirror (e-Mirror); the correct visual field of the e-Mirror is optimally tuned using a special computer program.

After all systems have been started up, a check is made of all electrical equipment; this too is done according to a precisely observed checklist. Only then is the production of the XL1 completed with a test drive to check dynamic vehicle functions. Now the world's most efficient car can be delivered!

A car of the future, built today.





**XL1 – the most fuel-efficient car in the world:
New XL1 from Volkswagen consumes
just 0.9 l/100 km**

World's first 1-litre fuel economy car to be produced now

Two-seat XL1 brings vision of 1-litre car to production maturity

The car.



Wolfsburg, February / March 2013. Future mobility is one of the most stimulating topics of our time. The key question here: By how much could the energy consumption of cars be reduced if all the stops were pulled out for efficiency? There is now an answer to this question from Volkswagen. It is the new XL1, with combined fuel consumption of 0.9 l/100 km. No other production car with a diesel plug-in hybrid is more fuel-efficient.

Lightweight construction (monocoque and add-on parts made of carbon fibre), very low aerodynamic drag (Cd 0.189) and a plug-in hybrid system – consisting of a two-cylinder TDI engine (35 kW / 48 PS), E-motor (20 kW / 27 PS), 7-speed dual-clutch transmission (DSG) and lithium-ion battery – enable a fuel consumption of 0.9 l/100 km, the new Volkswagen XL1 only emits 21 g/km CO₂. Since it is designed as a plug-in hybrid, the XL1 can also be driven for up to 50 kilometres in pure electric mode, i.e. with zero emissions at point of use. The battery can be charged from a conventional household electric outlet. Naturally, battery regeneration is also employed to recover energy while slowing down and store as much of it as possible in the battery for re-use. In this case, the electric motor acts as an electric generator.

Despite the very high levels of efficiency, developers were able to design a body layout that offers greater everyday practicality than in the two previous prototypes: the XL1 now incorporates the comfort of slightly offset side-by-side seating, nearly as in conventional vehicles, rather than the tandem arrangement seen in both the first 1-litre car presented in 2002 and the L1 presented in 2009 for optimal aerodynamics. In the new XL1, wing doors make it easier to enter and exit the car.

Most efficient car in the world

The new XL1 shows the way forward for extreme economy vehicles and clean technologies. It also demonstrates that such cars can also be fun. The feeling when driving the XL1 is truly dynamic – not based on pure power, rather on its pure efficiency, as illustrated by two examples. First, to travel at a constant speed of 100 km/h, the XL1 only needs 6.2 kW/8.4 PS – a fraction of the performance necessary from today's cars. Second, in electric mode, the XL1 needs less than 0.1 kWh to complete a one kilometre driving course. These are sensational values that have not been attained by any other production vehicle in the world.

When the full power of the hybrid system is engaged, the Volkswagen accelerates from 0 to 100 km/h in just 12.7 seconds, and its top speed is 160 km/h (electronically limited). Yet these numbers alone do

not tell the whole story. Since the XL1 weighs just 795 kg, the drive system has an easy job of propelling the car. When full power is needed, the electric motor, which can deliver 140 Newton metres of torque from a standstill, works as a booster to support the TDI engine (120 Newton metres of torque). Together, the TDI and E-motor deliver a maximum torque of 140 Newton metres and 51 kW in boosting mode.

Plug-in hybrid concept

With the XL1, Volkswagen is implementing a plug-in hybrid concept, which utilises the fuel-efficient technology of the common rail turbodiesel (TDI) and the dual clutch transmission (DSG). The TDI generates its stated maximum power of 35 kW/48 PS from just 0.8 litre displacement. The entire hybrid unit is housed above the vehicle's driven rear axle. The actual hybrid module with electric motor and clutch is positioned between the TDI and the 7-speed DSG; this module was integrated in the DSG transmission case in place of the usual flywheel. The lithium-ion battery (capacity: 5.5 kWh) which is integrated in the front section supplies the E-motor with energy. Operating at 220 Volts, the power electronics manages the flow of high voltage energy from and to the battery or E-motor and converts direct current to alternating current. The body electrical system of the XL1 is supplied with the necessary 12 Volts via a DC/DC converter and a small auxiliary battery.

The E-motor supports the TDI in acceleration (boosting), but as described it can also power the XL1 on its own for a distance of up to 50 km. In this mode, the TDI is decoupled from the drivetrain by disengaging a clutch, and it is shut down. Meanwhile, the clutch on the gearbox side remains closed, so the DSG is fully engaged with the electric motor. Important: The driver can choose to drive the XL1 in pure electric mode (provided that the battery is sufficiently charged). As soon as the electric mode button on the instrument panel is pressed, the car is propelled exclusively by electrical power. Restarting of the TDI is a very smooth and comfortable process: In what is known as “pulse starting” of the TDI engine while driving, the electric motor’s rotor is sped up and is very quickly coupled to the engine clutch. This accelerates the TDI to the required speed and starts it. The entire process takes place without any jolts, so the driver hardly notices the TDI engine restarting.

When the XL1 is braked, the E-motor operates as a generator that utilises the braking energy to charge the battery (battery regeneration). In certain operating conditions, the load of the TDI engine can be shifted so that it operates at its most favourable efficiency level. The gears of the automatically shifting 7-speed DSG are also always selected with the aim of minimising energy usage. The engine controller regulates all energy flow and drive management tasks, taking into account the power

demanding at any given moment by the driver. Some of the parameters used to realise the optimum propulsion mode for the given conditions are: accelerator pedal position and demanded engine load, as well as the energy supply and mix of kinetic and electrical energy at any given time.

The two-cylinder TDI (0.8 litre displacement) was derived from a four-cylinder TDI (1.6 litre displacement), and so the 0.8 TDI exhibits a cylinder spacing of 88 mm, its cylinder bore is 81.0 mm, and its stroke is 80.5 mm. The 0.8 TDI of the XL1 also shares key internal modifications for reducing emissions with the 1.6 TDI. They include specially formed piston recesses for multiple injection and individual orientation of the individual injection jets. The excellent, smooth running properties of the common rail engines were transferred to the two-cylinder engine. In addition, a balancer shaft that is driven by the crankshaft turning at the same speed optimises smooth engine running.

Meanwhile, the TDI’s aluminium crankcase was constructed to achieve high dimensional precision, which in turn leads to very low friction losses. With the goal of reducing emissions, exhaust gas recirculation and an oxidation catalytic converter as well as a diesel particulate filter are used. Equipped in this way, the 0.8 TDI already fulfils the limits of the Euro-6 emissions standard.



Also designed for efficiency is the vehicle's cooling system. Engine management only cools the TDI by activating the regulated mechanical water pump when engine operating conditions require it. This cooling system includes an automatically controlled air intake system at the front of the vehicle to reduce cooling system drag. This thermal management strategy also contributes towards reduced fuel consumption. A second electric water pump, which is also used only as needed, circulates a separate lower temperature coolant loop to cool the starter generator and power electronics.

Design for a new era

The XL1 is 3,888 mm long, 1,665 mm wide and just 1,153 mm tall. These are extreme dimensions. The Polo has a similar length (3,970 mm) and width (1,682 mm), but it is significantly taller (1,462 mm). The wing doors of the XL1 are reminiscent of those of a high-end sports car. They are hinged at two points: low on the A-pillars and just above the windscreen in the roof frame, so they do not just swivel upwards, but slightly forwards as well. The doors also extend far into the roof. When they are opened, they create an exceptionally large amount of entry and exit space.

Visually, the XL1 also adopts the styling lines of the L1 presented in 2009. However, the XL1 has a more dynamic appearance thanks to its greater width. The body design was uncompromisingly subjected to the laws of aerodynamics. In front, the XL1 exhibits the greatest width; the car then narrows towards the rear. Viewed from above, the form of the XL1 resembles that of a dolphin; especially at the rear, where the lines optimally conform to the air flow over the car body to reduce the Volkswagen's aerodynamic drag.

In side profile, the roofline traces an arc from the A-pillar back to the rear. The rear wheels are fully covered to prevent air turbulence; the air flows here are also optimised by small spoilers in front of and behind the wheels. Observers will look for door mirrors in vain; replacing them are small cameras integrated in the wing doors known as e-Mirrors (digital outside mirrors) that send images of the surroundings behind the car to two displays inside the vehicle.

The front of the XL1 no longer exhibits the typical radiator grille; however, it still reflects the styling of the current Volkswagen "design DNA" with a predominance of horizontal lines. Specifically, there is a black cross-stripe that combines with the energy-efficient dual LED headlights to form a continuous

band. The actual air intake for cooling the TDI engine, battery and interior is located in the lower front end section and has electrically controlled louvres. The narrow turn indicators are also designed in LED technology; these form an “L” shape which vertically follows the wheel housing and horizontally a line beneath the headlights. This creates a front end, which – although it is completely redesigned and extreme in its dimensions – can immediately be recognised as a Volkswagen design by its clean lines.

At the rear, however, the design takes an entirely new path, but the brand values of precision and quality are clearly evident. The XL1 represents a new dimension of Volkswagen design. Four characteristics are discernible: First, there is the characteristic dolphin body form, once again, that narrows towards the rear with very precise trailing edges for perfect aerodynamics. Second, there is the coupé-shaped roofline without rear windscreen. Merging into the roofline is the large rear boot lid that covers the drive unit and 120-litre luggage space. Third, there is a strip of red LEDs that frames the rear section at the top and on the sides. Integrated in this LED strip are the reversing lights, rear lights, rear fog lights and brake lights. Fourth, is a black diffuser, which exhibits nearly seamless transitions to the completely covered underbody.

Running gear with high-tech materials

The running gear is characterised by lightweight construction with maximum safety. In front, a double wishbone suspension is used, while a semi-trailing link system is employed at the rear. The front and rear suspension are both very compact in construction and offer a high level of driving comfort. The running gear components mount directly to the CFRP monocoque in key areas.

Running gear weight is reduced by the use of aluminium parts (including suspension components, brake callipers, dampers, steering gear housing), CFRP (anti-roll bars), ceramics (brake discs) magnesium (wheels) and plastics (steering wheel body). Friction-optimised wheel bearings and drive shafts, as well as optimised low rolling resistance tyres from Michelin (front: 115/80 R 15; rear: 145/55 R 16), contribute to the low energy consumption of the new XL1. Safety gains are realised by an anti-lock braking system (ABS) and an electronic stabilisation programme. That is because sustainability without maximum safety would not really be a step forward. The new XL1 shows how these two parameters can be brought into harmony.

If necessary, the **XL1** – whose top speed is 160 km/h – can accelerate to 100 km/h in just 12.7 seconds.





Body	
Construction method	CFRP monocoque and add-on parts
Length / width / height	3,888 mm / 1,665 mm / 1,153 mm
Wheelbase	2,224 mm
Drive system	
Type	Plug-in hybrid, rear wheel drive
Internal combustion engine	TDI, two cylinder, 800 cc, 35 kW/48 PS, 120 Nm
Electric motor	20 kW/27 PS, 140 Nm
System power (during boosting)	51 kW
System torque (during boosting)	140 Nm
Gearbox	7-speed DSG
Battery type	Lithium-ion
Battery energy capacity	5.5 kWh
Emissions class	Euro 6
Weight data	
Unladen weight	795 kg
Performance / fuel economy	
V/max	160 km/h (electronically limited)
0–100 km/h	12.7 s
Fuel consump. (NEDC, combined)	0.9 l/100 km
CO ₂ emissions (NEDC, combined)	21 g/km
Range: E-drive	50 km
Range: TDI + E-drive	> 500 km (10 litre fuel tank)

XL1

IMAGE SOURCES

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Brieffach 1971
D-38436 Wolfsburg

