Volkswagen presenteert innovatieve 1.5 TSI benzinemotor

- **Nieuwe generatie TSI-motor aanzienlijk efficiënter**
- **Miller verbrandingscyclus in combinatie met hogere compressieverhouding voor verdere reductie van brandstofverbruik**
- **VTG-turbo voor het eerst toegepast in op grote schaal geproduceerde benzinemotoren**

Leusden, 29 april 2016 – Volkswagen heeft tijdens het 37e International Vienna Motor Symposium de volledige nieuwe EA211 TSI evo-motorengeneratie gepresenteerd. De eerste uitvoering van deze toekomstige generatie benzinemotoren is de 1.5-liter TSI. Deze TSI-motor biedt tegelijkertijd een laag verbruik en een hoog koppel. De lancering zal eind 2016 plaatsvinden. In eerste instantie wordt hij leverbaar met vermogens van 96 kW en 110 kW. Eén van de vele highlights van de nieuwe motor is de turbo met variabele turbine-geometrie, die voor het eerst is toegepast bij een op grote schaal geproduceerde benzinemotor.

De primaire doelstelling bij het ontwikkelen van deze innovatieve motor was het verder verlagen van het brandstofverbruik, de CO_2–uitstoot en emissies. Om dit ambitieuze doel te halen, is de nieuwe EA211 TSI evo voorzien van een groot aantal innovatieve technologieën. Deze nieuwe motor heeft een compleet ander verbrandingsproces. Het resultaat is een hoog koppel dat al bij een extreem laag toerental (1.300 tpm) en over een breed toerenbereik beschikbaar is. Dit zorgt in de praktijk voor een aanzienlijke verlaging van het brandstofverbruik van maximaal 1 liter per honderd kilometer.

Al meer dan tien jaar lang levert Volkswagen de TSI-motoren met directe inspuiting en turbotechniek. In de loop der jaren hebben tal van innovaties hun intrede gedaan. Dankzij een- en tweetraps turbo's, geïntegreerde drukkoeling en een geïntegreerd uitlaatspruitstuk met thermodynamische voordelen alsmede de cilinderuitschakeling die voor het eerst werd toegepast bij een viercilindermotor, is deze benzinemotor langzaam geëvolueerd tot een zuinigheidswonder.

Met de nieuwste generatie motoren gaat Volkswagen een stap verder: de technologische features van de nieuwe EA211 TSI evo zorgen voor een verbruik dat maximaal 10 procent lager ligt dan bij de 1.4-liter TSI met 92 kW die hij vervangt. Belangrijk hierbij is dat de reducties op verbruiksgebied over een groot toerenbereik worden gerealiseerd. Zodoende levert het niet alleen op de rollenbank winst op, maar tevens in de praktijk van alledag.

De belangrijkste technologische features:

- Miller verbrandingscyclus in combinatie met een hogere compressieverhouding van 12.5:1
- Turbo met variabele turbinegeometrie (VTG).
- Common-rail injectiesysteem met een druk van maximaal 350 bar
- Innovatieve warmtehuishouding
- Cilinderuitschakeling (ACT)
- Cilinderwanden met APS-coating (‘atmospheric plasma spray’)

Onderstaand vindt u meer details omtrent de innovatieve technologie die Volkswagen heeft toegepast in de nieuwe EA211 TSI evo-motor.

Dit persbericht is ook te vinden op nieuws.volkswagen.nl.

Voor meer informatie kunt u contact opnemen met:

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With the latest generation of engines, Volkswagen is going one step further: the main technology elements of the new EA211 TSI evo result in efficiency benefits of up to 10 per cent compared with the previous 1.4l TSI (92 kW). An important aspect here is that the improvements in fuel economy take effect across a wide range of the engine map. Consequently, they do not merely apply under test bench conditions but also have a distinct impact on the customer's everyday driving. Details of the new/revised technologies featured are as follows:

- Miller combustion cycle with a high compression ratio of 12.5:1
- Turbocharger with variable turbine geometry (VTG).
- Common-rail injection system with up to 350 bar pressure
- Innovative thermal management
- Cylinder deactivation (ACT)
- APS-coated cylinder walls (atmospheric plasma spray)

In detail this means: the cylinder liners in the aluminium crankcase for the 110 kW power variant are coated using the APS process (atmospheric plasma spray). Fine-grain spray powders combined with a specifically optimised grinding process lead to the creation of tiny lubrication pockets, which ensure that the piston rings glide smoothly with low friction and little wear. Further benefits of this solution are the increased heat dissipation compared with cast iron, the

resulting improvement in antiknock properties during combustion and improved corrosion resistance in respect of poor-quality fuels on global markets.

APS technology has also demonstrated particularly good wear resistance in hybrid applications, whereby the cold engine is often started under higher loads.

The cylinder head has been extensively re-engineered. Initiatives include optimisation of the water jacket for improved heat dissipation and adaptation of the valve angle and combustion chamber for the best possible execution of the Miller combustion process. The proven concept of the exhaust manifold integrated into the cylinder head has been retained. In contrast to the EA211, the intake camshaft is adjusted using a high-speed hydraulic camshaft actuator with a central control valve. The adjustment speed of up to 300° of crank angle (CA) per second enhances the dynamics of the cylinder-fill control.

The cylinder deactivation, another subassembly from the EA211 engine assembly kit, has been improved and is entering volume production with the TSI evo. This, too, benefits engine efficiency and is an important feature when it comes to the customer experience. It closes off the intake and exhaust valves of cylinders two and three up to the mid-load range, while at the same time deactivating fuel injection.

The new map-controlled cooling module provides the engine with efficient thermal management. Among other things, the cooling module ensures the water in the crankcase and the engine as a whole remains stationary during the warm-up phase. The resulting rapid engine warming improves heating in the car's interior and reduces engine friction during the warm-up process. A further benefit of the map-controlled cooling module is that the engine can be cooled in close correlation with its requirements across the entire operating range.

Other features of the TSI evo include an extensive friction package. This encompasses a map-controlled, fully variable oil pump, polymer coating of the first main crankshaft bearing and a switch to low-viscosity 0W20 oil.

The Miller combustion cycle is a key innovation in the new EA211 TSI evo. The resulting improvement in thermodynamic efficiency has been systematically implemented through four main development targets:

- Increase in the geometric compression ratio to improve efficiency in customer-relevant operation
- Reduction of the final compression temperature through early intake valve closing and resulting expansion cooling in the intake stroke.
- Optimisation of the charge motion in the interests of rapid flame propagation to reduce knock tendencies at high specific loads
- Increase in charge density through efficient exhaust gas turbocharging

A world first for the TSI evo is the use of an exhaust gas turbocharger with electrically actuated variable turbine geometry (VTG). Due to early intake valve closing in the Miller combustion cycle, volumetric efficiency is lower than for an engine with standard valve timing. Under partial load, the resulting de-throttling leads to a fuel-consumption benefit for the TSI evo. High charge

pressure balances out the effect of the inherently lower effective stroke volume to create high low-end torque. At low engine speeds in particular, this places very high demands on the turbocharging system. Through adaptation of turbine flow characteristics to match the operating points, an exhaust-gas turbocharger with variable turbine geometry presents the opportunity to provide very high turbine output and thus high charge pressure from low engine speeds. The increased accumulation effect on the VTG turbine, in combination with a reduced moment of inertia in the turbocharger, additionally results in very spontaneous response characteristics. Compared with a 1.4l TSI (92 kW), the step change in load to the maximum torque takes place some 35 per cent faster. Overall, VTG technology forms an integral part of the TSI evo combustion process.

The indirect charge-air cooling has also been modified. In contrast to the EA211, the cooler is located in the pressure pipe, downstream of the compressor outlet and before the throttle valve, meaning it, too, is cooled. The new installation position made it possible to increase the size and performance of the cooler, while maintaining a very compact overall package. It is now able to reduce the temperature of the charge air to 15 Kelvin above that of the ambient air.

The injection system is the first application of the fourth-generation Volkswagen direct- injection system. Optimisation of the overall system and its components facilitated an increase in injection pressure to 350 bar. The resulting smaller droplet size improves mixture formation, leading to benefits such as a substantial reduction in particulate emissions.

The innovation of reducing the diameter of the injector tip to 6 mm, which is beneficial for integration into the combustion chamber, improves stiffness and reduces temperatures at the injector plate.