











Motorsport **Information**



2015 | Technology Information Package

FIA World Rally Championship (WRC)

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Warmed up

■ The new engine of the Polo R WRC was tested thoroughly before the start of the season



All good things ... Volkswagen all set for the 2015 World Rally Championship

Having won back to back World Championships with the first generation of the Polo R WRC in 2013 and 2014, Volkswagen now lines up with a new World Rally Car in 2015. We give you a run-down on this season's changes ...

“We have enjoyed a remarkable success story so far, and one that we are very proud of.”

Double world champions in the driver, co-driver and manufacturer competitions, Volkswagen can look back proudly upon two successful years in the FIA World Rally Championship (WRC) with the first generation of the Polo R WRC. In 2013 and 2014, every single WRC title went to the Volkswagen works team. The second generation of the 315-hp four-wheel drive powerhouse is now ready to take over in 2015, and features not only a spectacu-

lar new look but also a wealth of new technology under the chassis. The men behind the wheel remain unchanged, however: the dynamic duos of Sébastien Ogier/Julien Ingrassia (F/F), Jari-Matti Latvala/Miikka Anttila (FIN/FIN) and Andreas Mikkelsen/Ola Fløene (N/N). The three pairs that

finished first, second and third last season will face a total of 13 rallies on four continents, from the “Monte” to “Wales”.

“We have enjoyed a remarkable success story so far, and one that we are very proud of,” said Volkswagen Motorsport Director

Three, two, one –
Volkswagen’s
successful team





Film instead of paint – the new Polo R WRC design was created in the Volkswagen Motorsport workshop

Jost Capito. "In 2013 and 2014 we won every title on offer in the World Rally Championship at the first attempt with a newly developed car. That is an extraordinary achievement, but counts for nothing going into the next season. We now face a new challenge in 2015. All the manufacturers will line up this season with cars that have been further developed. Like Volkswagen, M-Sport-Ford, Citroën and Hyundai have taken the opportunity to regroup with optimised technology. We all start with no points to our name. Only after the first few rallies will we know exactly how

we compare in terms of technology and results."


The second generation Polo R WRC – complete with spectacular new look

The most striking change to the Polo R WRC for the 2015 season is its exterior. The white has given way to the blue of partner Red Bull. White and light-blue stripes see the dark-blue front merge into the white rear, which features a towering new rear wing. Also integrated in the new design are Volkswagen's other partners in the World Rally

Championship: lubricant partner Castrol, Volkswagen Financial Services, tyre partner Michelin, chassis and clutch specialist ZF, and supplier OMP.

The Volkswagen engineers have been hard at work applying new technology under the bonnet. The hydraulically activated gearbox, which is operated via a shift paddle on the steering column, represents the biggest innovation. Furthermore, three quarters of last year's components were checked and many of them optimised, with the aim of making everything "simpler, lighter, stronger".



 Celebrations all round – Sébastien Ogier and Julien Ingrassia celebrate the 2014 manufacturer's title with the Volkswagen team

Continuity the key to the Volkswagen driver/co-driver line-up

Volkswagen goes into its third year in the FIA World Rally Championship (WRC) with a tried-and-tested squad of drivers and co-drivers: two-time world champions Sébastien Ogier and Julien Ingrassia line up in their fourth season with the team, while last year's runners-up Jari-Matti Latvala and Miikka Anttila are looking forward to their

third year for the Wolfsburg-based manufacturer. Andreas Mikkelsen will contest his second full season with the Polo R WRC, and will once again be navigated by Ola Fløene in 2015. "We have the top three rally crews at present under contract," said Volkswagen Motorsport Director Jost Capito. "We are delighted to have such continuity in our driver line-up, with Sébastien Ogier, Jari-Matti Latvala and Andreas Mikkelsen. This trio is accustomed to success, and I am

confident that we will be celebrating many more victories."

Four continents, 13 rallies in 15 countries – the 2015 World Rally Championship

Another feature of the 2015 season that remains unchanged is the WRC calendar. This year's host countries are the same as in 2014, with the only slight change being the order of the rounds. The sea-

son kicks off with the iconic Rally Monte Carlo. The other European rounds on the schedule are the rallies in Sweden, Portugal, Italy, Poland, Finland, Germany, France, Spain and the finale in Great Britain. Mexico, Argentina and Australia will host the three overseas rallies in North America, South America and on the fifth continent.

Starting order and split times: new sporting regulations in the World Rally Championship

New sporting regulations will come into play in the World Rally

Championship as of the Rally Monte Carlo. Whereas the world championship leader has previously had to open the route on the first of the three days of rallying, this now applies to the first two days in 2015, with the order for the final day the reverse of the overall standings after the opening two days. At the “Monte”, the order for the first two days of the rally will be determined according to the final standings at the end of the 2014 World Championship. There has also been a change to the rules governing communication between the teams and their drivers and co-drivers: it was

previously permitted to convey split times during special stages. This is now forbidden in 2015.

The Polo in the WRC – the best success record in the history of the World Championship

22 wins from 26 rallies – never in the history of the World Rally Championship has any other car achieved such an impressive win ratio as the Volkswagen Polo. Not even such legendary cars as the Audi quattro or the Lancia Delta. The Polo R WRC has won 85 per cent of the WRC events since making its debut at the Rally Monte Carlo in 2013. The statistics show just what an achiever the first generation of the Polo R WRC was: the four-wheel drive powerhouse from Wolfsburg has 41 podiums to its name, and has won 345 of the 486 individual special stages. The Volkswagen duos covered 24,428.09 kilometres against the clock over the past two seasons. During this time, 25 Power Stages were held, with Ogier, Latvala and Mikkelsen finishing in the top three to pick up valuable bonus points on 44 occasions. //



▀ Cordially yours, Jari-Matti:
Volkswagen works driver Latvala was runner-up to champion Ogier in 2014

2015 Calendar, FIA World Rally Championship (WRC)

22/01–25/01/2015		Rally Monte Carlo	Asphalt/snow
12/02–15/02/2015		Rally Sweden	Ice & snow
05/03–08/03/2015		Rally Mexico	Gravel
23/04–26/04/2015		Rally Argentina	Gravel
21/05–24/05/2015		Rally Portugal	Gravel
11/06–14/06/2015		Rally Italy	Gravel
02/07–05/07/2015		Rally Poland	Gravel
30/07–02/08/2015		Rally Finland	Gravel
20/08–23/08/2015		Rally Germany	Asphalt
10/09–13/09/2015		Rally Australia	Gravel
01/10–04/10/2015		Rally France	Asphalt
22/10–25/10/2015		Rally Spain	Gravel/asphalt
12/11–15/11/2015		Rally Great Britain	Gravel



News from the Volkswagen team

Presented

Dr. Heinz-Jakob Neußer gets WRC campaign underway

The new Polo R WRC was presented in Wolfsburg shortly before the Rally Monte Carlo week. Volkswagen board member Dr. Heinz-Jakob Neußer opened the new season. "The new Polo R WRC has undergone intensive development both inside and out," said Dr. Neußer. "It not only looks much more dynamic and sporty than ever before, our engineers have also worked meticulously on technical innovations under the bonnet and improved many details of the package that has been so successful in the past two years."



Dr. Heinz-Jakob Neußer

Titled

Special stickers for newly delivered Polos

Volkswagen has a new marketing boss. No, no, not Robbie Williams, It's actually Xavier Chardon. "The World Rally Championship sparks interest around the world," said Chardon. "Surveys have shown a significant increase in interest for Volkswagen in our relevant markets since we started competing in the World Rally Championship." That's not the only reason that every Polo that comes off the production line at Volkswagen proudly sports "World Rally Champion" at the rear.

Award-Winning

Honours for the World Rally Champions

Success and honours galore: Volkswagen Motorsport and double world champions Sébastien Ogier/Julien Ingrassia received quite a few awards after the 2014 season. Trade journal Autosprint's (Italy) "Golden Helmet" award for the rally driver of the year went to Ogier, Autobild Motorsport (Germany) crowned Ogier and Ingrassia driver and co-driver of the year, and Autosport (Great Britain) not only bestowed "Rally Driver of the Year," on Ogier, they also awarded the Polo R WRC the "Rally Car of the Year". The Volkswagen works team were also presented with the "SPORTBEST" award by Autobest in Romania.

The evolution of the car of champions: the Polo R WRC, Version 2.0

New technology, new design – the second generation of the Polo R WRC has been consistently further developed in preparation for the start of the 2015 World Rally Championship



■ New inside and outside –
the second generation Polo R WRC

T

he World
Championship
winning Polo

has a younger brother: the new Volkswagen Polo R WRC for the 2015 FIA World Rally Championship (WRC) shares the same genes as its predecessor, but has been painstakingly further developed in many areas. While the new blue, blue, white appearance of the production-based shell represents a visual revolution, the optimisation process under the bonnet was at the heart of the precise evolution. The Volkswagen engineers meticulously inspected 75 per cent of the car that won the championship in 2013 and 2014, seeking out any potential for improvement and gradually pushing ahead with its further development. As well as the complete optimisation of larger modules – such as the sequential gearbox with shift paddles, which is permitted again in 2015 – the chassis and engine of the Polo R WRC have also taken another step forward technologically, thanks to the sum of many detailed improvements made ahead of the 2015 season.



Subtle change – the aerodynamics of the Polo R WRC have changed only slightly on the mudguards. However, the rear wing is completely new

“When developing the first Polo R WRC, our priority was first to develop a fast car, which we then gradually improved until it was also reliable,” said Volkswagen Motorsport Director Jost Capito. “This philosophy proved its worth, and has also been applied to the evolutionary further development of the second generation of the Polo R WRC. When we started to improve our World Championship winning car, we did so from an outstanding basis. Our engineers went about their work meticulously and with absolute commitment, and the result makes a perfect impression. We are excited to see how our World Rally Car fares against the opposition.”

Getting a shift on – new shift-paddle gearbox makes the driver’s job easier

Like its predecessor, the 2015 version of the Polo R WRC is based on the same basic car – the roadworthy Polo R WRC. While the principle idea behind the development process was one of evolution, one component was very much the exception: the shift-paddle gearbox, which is permitted again in 2015. This represents a new development in every sense. In the future, the driver will no longer exert energy shifting gear by pushing and pulling the gear lever. From now on, he will change gear using a shift paddle, which is permanently

incorporated in the steering column and electronically conveys the gear change to the hydraulic gearbox.

The major benefit: from now on, the driver can always have both hands on the steering wheel. "The new gearbox is operated hydraulically and is far more complex than the system we have used previously," said François-Xavier Demaison, Technical Project Leader for the WRC at Volkswagen Motorsport, and thus the father of both Polo R WRCs. "For this reason, we dedicated a lot of attention to

this component. The hydraulics system had to be adjusted and made larger accordingly. Furthermore, we also developed a completely new gearbox casing. We started work on this back at the start of 2014."

Greater possibilities for drivers and engineers, and more set-up options

Another development goal for the 2015 version of the Polo R WRC was to achieve a wider range of set-up options for the drivers and engineers. The three Volkswagen

drivers have different driving styles, and adjusting the chassis components allowed the Volkswagen engineers to achieve greater freedom when it comes to the set-up for their respective driver. In doing this, the technicians also overhauled the chassis of the Polo R WRC, in order to increase aerodynamic efficiency. The result might not be obvious at first glance, but it is extremely effective: as well as the re-shaped trailing edges on the front wings, which are about two centimetres higher, the most striking change to the new Polo R WRC is the new rear spoiler.

Attention to detail: under the bonnet the Volkswagen engineers analysed 75 per cent of the components and optimised many of them




About 5,000 kilometres of tests with the Polo R WRC, Version 2.0

A new, complex gearbox, greater possibilities when selecting the set-up of the car, fine-tuning on the aerodynamics – the Volkswagen works drivers have been carrying out intense tests on the latest version of the Polo R WRC chassis since July 2014. The primary goal of this was to test the stability of the overall concept. Ogier, Latvala and Mikkelsen completed about 5,000 kilometres on gravel, asphalt, ice and snow in Finland, France, Great Britain, Sweden

and around Monte Carlo. The majority of the test work was performed by Dieter Depping, test and development driver for Volkswagen Motorsport, and also the man who completed the lion's share of the testing on the first generation of the Polo R WRC.

Simpler, lighter, stronger – the “SLS” principle behind the optimisation of the Polo R WRC

It is the core principle for engineers in motorsport: “simpler, lighter, stronger”. And it was in line with this principle that the Volkswagen technicians reviewed 75 per cent of the existing com-

 Handy innovation: the gearbox with paddle shift



That's all it takes – service times

Change tyres:

1 minute per tyre

Change gearbox:

12 minutes

Change shock absorbers:

3 minutes per damper/spring unit

Adjust steering:

1 minute 30 seconds

Change front skirt:

1 minute

Change rear skirt:

1 minute 30 seconds

Attach additional headlights (“night face”):

2 minutes

Replace headlight:

1 minute

Replace wishbone:

4 minutes

Replace brake pads and discs:

3 minutes

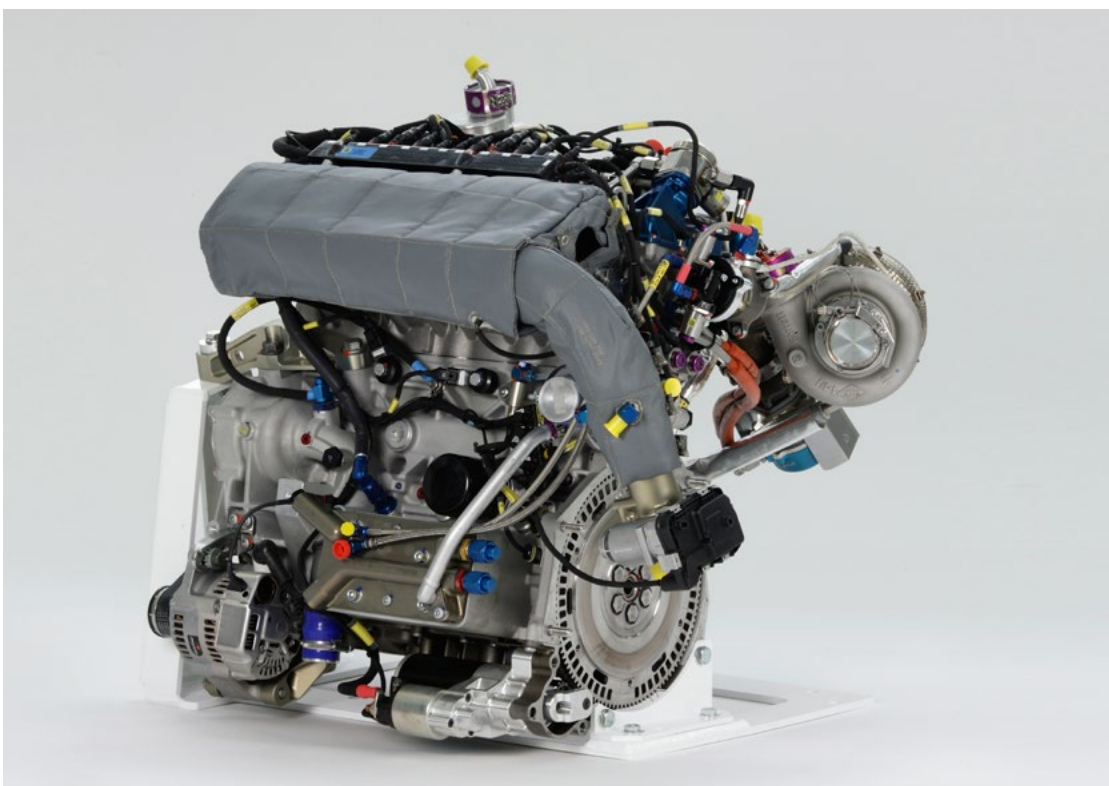
ponents, altering a number of them according to centre of gravity, load and function. Particular attention was paid to the strength and stability of the Polo R WRC. Requests and suggestions from the mechanics were taken into consideration, in order to make it easier to access the components during services, which are subject to strict time restraints in the World Rally Championship – for example, by using the same-sized screws wherever possible.

Designed to be right on the limit: the engine driving the Polo R WRC

Weight plays a major role when making detailed improvements to the engine: the 315-hp drive train now weighs exactly the 81.5 kilograms specified in the regulations. On the one hand, the FIA's rule-makers reduced the minimum weight of the engine by one kilogram. At the same time, the engineers discovered potential to save more weight

in the previous version of the engine, which has now been fully exhausted thanks to the revised design. "When developing an engine, performance, drivability and weight are always at the very top of the specifications," said Dr. Donatus Wichelhaus, head of engine development at Volkswagen Motorsport. "In the case of the first two areas, we were pretty close to the limit with the first version for the 2013 and 2014 seasons. The main focus of the re-homologation of the engine was on ensuring that we were right on the limit when it came to the weight. We achieved precisely that." Like the engineers on the chassis side, the engine developers also consistently applied what they learned from the past two years, thus enabling them to make life easier during services, for example. //

"When developing an engine, performance, drivability and weight are always at the very top of the specifications."



More torque, more power, while at the same time the weight of the engine has been reduced

Volkswagen Polo R WRC – Technical specifications

Engine	
Type	Straight-four engine with turbocharger and intercooling, transversally mounted in front of the front axle
Displacement	1,600 cc
Power output	234 kW (318 hp) at 6,250 rpm
Torque	430 Nm at 5,000 rpm
Bore/stroke	83.0 mm/73.8 mm
Air restrictor	33 mm (FIA regulation)
Power transmission	
Gearbox	Sequential, six-speed racing gear box, transversally mounted, hydraulically activated, paddle on the steering
Final drive	Permanent four-wheel drive with equal torque split between the front and rear axles, multi-plate limited-slip differentials, front and rear
Clutch	Hydraulically actuated double-disk sintered metal clutch by ZF
Chassis/suspension	
Front/rear	McPherson struts, dampers from ZF
Suspension travel	approx. 180 mm on asphalt, approx. 275 mm on gravel
Steering	Servo-assisted rack and pinion steering
Braking system	Ventilated disc brakes (front Ø 355 mm and rear Ø 350 mm on asphalt; front and rear Ø 300 mm on gravel), aluminium brake callipers (four callipers, front and rear)
Wheels	Size 8 x 18 inch for asphalt, 7 x 15 inch for gravel
Chassis/bodywork	
Length/width/height	3,976/1,820/1,356 mm
Track width/wheelbase	1,610/2,480 mm
Minimum weight	1,200 kg
Performance	
Acceleration	0–100 km/h in approx. 3.9 seconds
Top speed	200 km/h

The changes at a glance

■ **Aerodynamics:** Small changes improve efficiency, for example, the modified mudguards with a spoiler lip that is two centimetres higher

■ **Rear wing:** The most striking change to the aerodynamics is the new rear wing. The aim is to improve aerodynamic efficiency

■ **Detailed work:** The Polo R WRC was developed further using the "SLS" principle, simpler/lighter/stronger



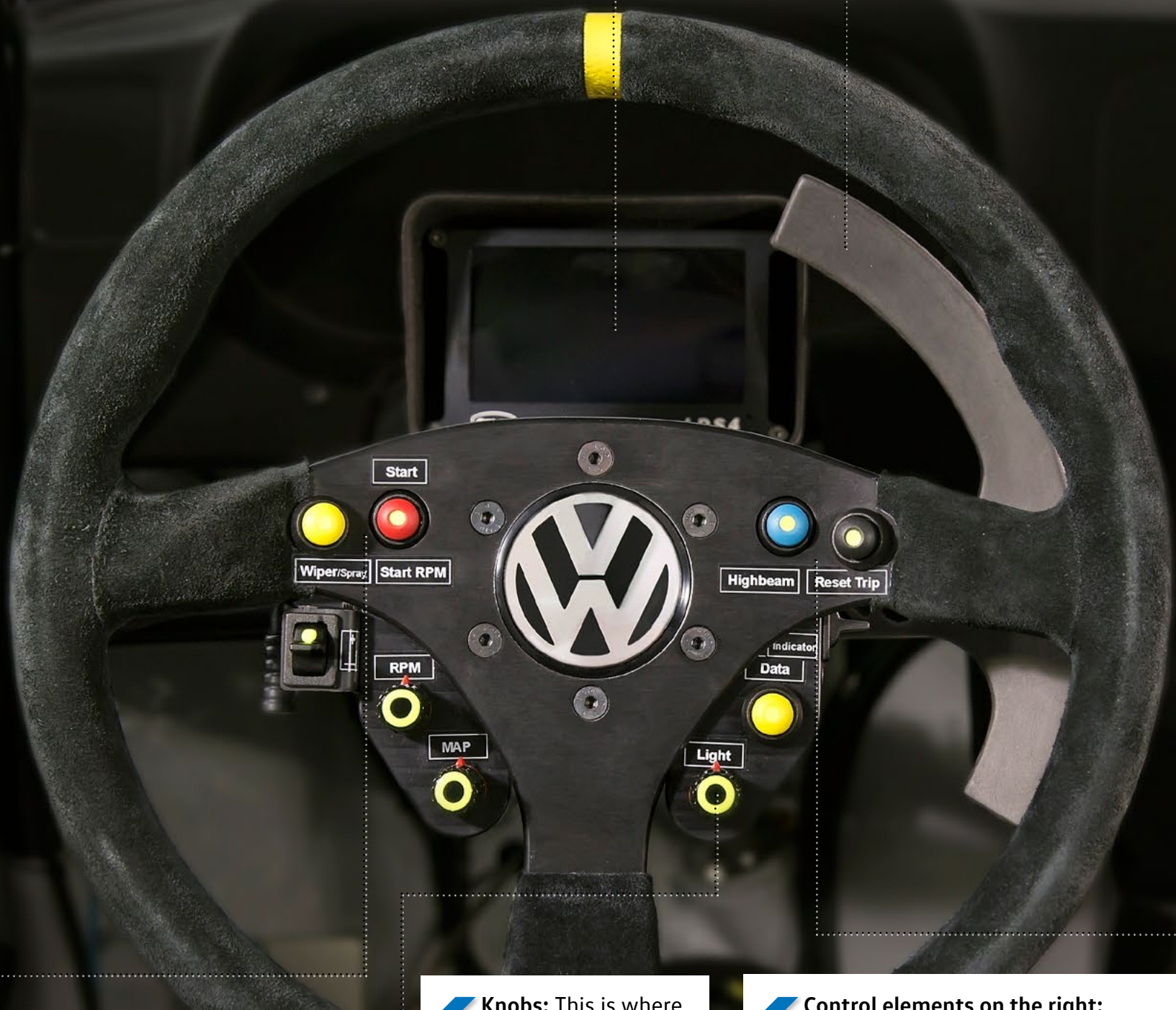
■ **Engine:** Is now at the weight limit of 81.5 kilos and is 3 hp more powerful

■ **Gearbox:** Allowed again for 2015; the paddle shift gearbox. Gear changes are transferred electronically to the system controlled hydraulically

The Cockpit

▀ **Display:** This shows the driver all information needed on the state of the Polo R WRC, for example, pressure and temperatures

▀ **Paddle shift:** Gear changes are triggered by pushing and pulling the paddle shift. The advantage is that the driver always has both hands on the steering wheel



▀ **Control elements on the left:**
Yellow: windscreen wipers
Red: start engine/start control

▀ **Knobs:** This is where programmed mappings for rpm, engine control and light are set

▀ **Control elements on the right:**
Blue: full beam
Black: reset odometer
Yellow: select for data logging

The man for 100-per cent solutions

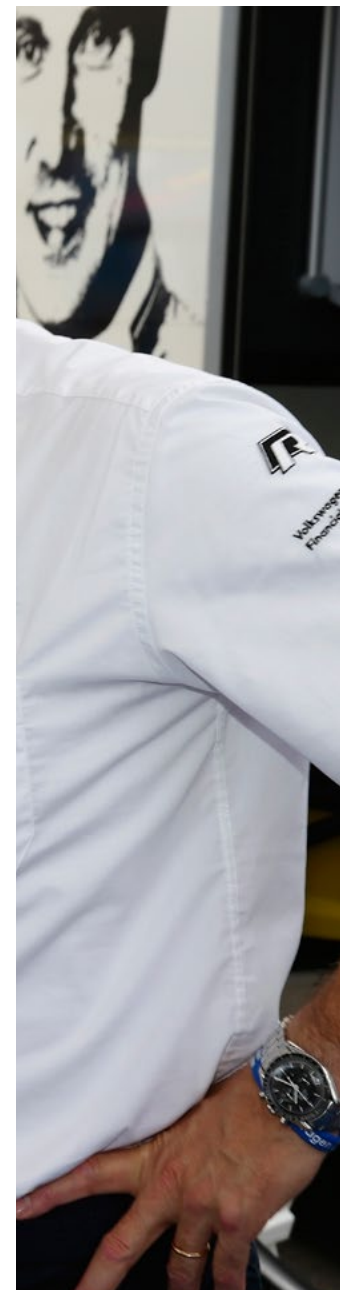
Willy Rampf has been the technical director at Volkswagen Motorsport since 2011. Why he loves the challenges and what his key to success is – a portrait



There aren't many people who claim to look forward to problems. Willy Rampf is one of those people who is particularly motivated when something doesn't go according to plan. This is what really motivates the technical director of

Volkswagen Motorsport to look for solutions, which then leads to progress and improvements. And particularly in motorsport, development and optimisation can never be fast enough. This makes Rampf with his love for 100 per cent solutions the perfect man for the job. And his success proves this.

▀ The right direction – Willy Rampf and Dr. Heinz-Jakob Neußer, Volkswagen brand manager for technical development

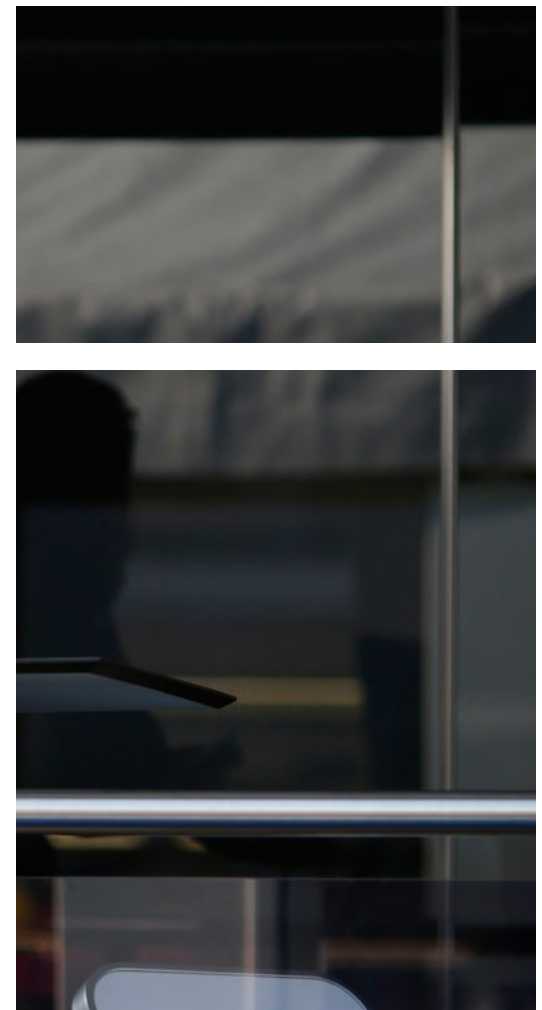


In 2011 Rampf took on the role of technical director at Volkswagen, to enter the Wolfsburg-based company in the FIA World Rally Championship (WRC) with the Volkswagen Polo R WRC. Just 20 months later the Frenchman Sébastien Ogier celebrated winning the world championship in the Polo R WRC. Volkswagen's dream of having the best World Rally Car in the world came true – although there were a number of challenges along the way. "The major challenge of the project was building the ideal car for all road conditions," said Rampf, who has many years of experience, both as a race engineer and a technical director, in touring car sport, sports car programmes and Formula 1. "It's easy when you're racing on a circuit. If it rains, the car comes into the pit, you change the set-up,

put wet tyres on – it's quickly done. In the WRC, with its sporting procedure and many different track surfaces and profiles, it's much more complex, there a car needs to keep working in unexpected conditions."

Driving experience beats simulation

Also, it's almost impossible to realistically simulate the conditions of the international rally tracks on a computer. Another characteristic that makes it more difficult to develop a successful World Rally Car than a race car for circuit racing. "For a race car you can use the simulation to say exactly which changes you need to make to the car to improve it,





and the driver then needs to apply this to the car on the track," said Rampf. "In rallying it's the other way round. Here the majority of development is based on driver feedback. The driver says what is good or not quite so good about the car's performance. The vehicle is then modified accordingly." It goes without saying that this trial and error principle requires a certain tolerance of setbacks. But that's exactly what Rampf loves about his job. Having to change course time and again, go in a new direction, and with this improving the product – the Volkswagen Polo R WRC.

**Key to success: errors that you don't solve
100 per cent, return 100 per cent of the time**

Rampf's philosophy: problems that you don't resolve 100 per cent, return 100 per cent of the time. "Only partially solving a problem only gets rid of it temporarily. It's not a solution," he said. Permanent solutions are the key. With this attitude, Rampf embodies one of the basic values of the Volkswagen brand perfectly. "I look forward to every problem," said the man born in Bavaria. "Of course this doesn't mean that I hope that some-

thing goes wrong with the Polo R WRC during a rally. But every problem that occurs requires solutions, which in turn leads to an improvement overall." And even if everything runs smoothly, Rampf can't sit back. "You need to be permanently dissatisfied," he said. For Rampf, there's no question of resting on his laurels. He says that this is the only

way to not only keep up with the fast pace of technical developments successfully in motorsport, but to always stay one step ahead. Things have to keep moving – for Rampf and for Volkswagen. Stagnation would be the first ever problem that not even Willy Rampf would enjoy. But there's no doubt that he would have a solution for that too. //

Winner – at the 2013 Rally Great Britain, Rampf received the award for the victorious manufacturer

For Rampf, there's no question of resting on his laurels.



Facts and figures about the Polo R WRC

66

Only **66 different tools** – from the impact wrench to the wire brush, from the replacement blades for the cutter knife to the torque wrench, from the screwdriver to the tape measure – are needed to service the Polo R WRC. A further 15 are needed for the initial construction and to prepare for the rallies.

20

The three Polo R WRCs inhale the equivalent of around **20 hot-air balloons in a rally season. The 315-hp engines “breathe” 75,840 cubic metres of air through the air restrictors during the 13 rallies.**

The Polo R WRC recorded an air pressure of **742.1 millibars** at the 2014 Rally Mexico. The special stage “El Chocolate” was at 2,781 metres above sea level. When the altitude increases, the air pressure decreases – in the case of “El Chocolate” to about 70% of normal pressure. In light of the reduced options due to the lower concentration of oxygen, high temperatures and lower cooling efficiency, the skill is in calibrating the engine control perfectly for the circumstances, thereby ensuring the maximum performance possible. As a comparison: whereas the Polo R WRC performs at 315 hp in rallies in Sweden, it only manages 220 hp at 2,781 metres.

742.1

350

The entire construction of a new Polo R WRC, from the unpainted base unit without a roof to the World Rally Car ready to race takes around **350 hours**.

Did you know that ...

... the rear wing improves flying capabilities in long-reaching jumps? The three kilo aerodynamic fixture made of carbon provides downforce in bends and, in particular, better flying capabilities in long-reaching jumps. If there wasn't a rear wing, the Polo R WRC would take a nosedive after long-reaching jumps.

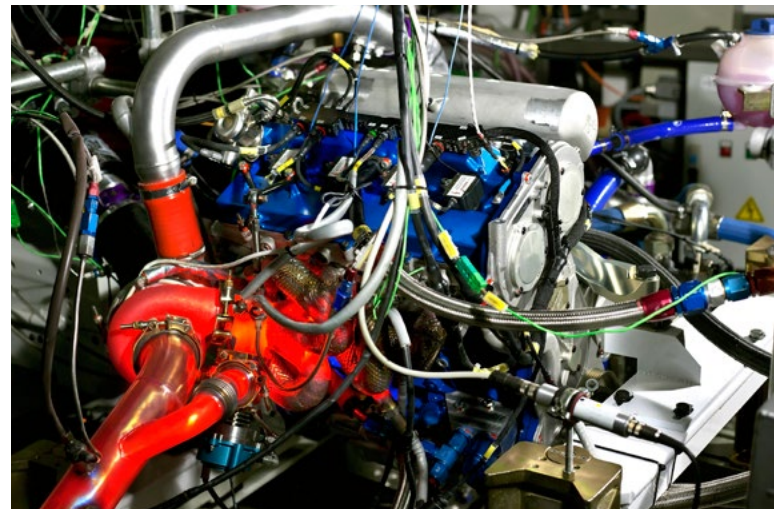
... a side door weighs less than half of a side door on a series Polo? Because electronic components such as window regulators are left out, a WRC door weighs about 12 kilos. In comparison, a series door is around 25 kilos.

... the brake calipers of a World Rally Car are cooled by water? In a series car, and even in a Formula 1 car, only air is used for cooling. Compared with Formula 1, rally cars don't reach high enough speeds to be able to use the air-stream to cool the brake disks.

... the disk brakes of a Polo R WRC can withstand temperatures of up to 900 degrees Celsius? In the WRC, internally ventilated disk brakes made of steel are used. Alcon, a company based in England, builds the high-performance brakes with a diameter (at the front) of 355 millimetres.

... an engine completes an average of five rallies? The driving mechanism is sealed during this time and monitored by the FIA. After this period it's time for the inspection. The engine is then dismantled into 300 individual components; each part and screw is checked by the

scrutineers, down to a 1000th of a millimetre (1 μm). In comparison, that's 500 times smaller than a grain of salt or 150 times finer than a human hair.



... the maximum brake pressure measured in the Polo R WRC in 2014 was 74.8 bar? To experience the same pressure you would need to dive 748 metres. Warning: not all submarines can withstand that.

... Volkswagen Motorsport travels to European rallies with a total of seven trucks? These contain all three Polo R WRCs, all of the recce equipment, the office for the engineers and team management, all replacement parts, tools, rims, tyre racks, a cleaning unit for parts and the structures that are needed for the service area. On top of this are another three trucks for structuring the team and media hospitality and a truck with toilets.

... Volkswagen's service area at a European rally is like a workshop? Altogether there are 16 cupboards for replacement parts and tools, around

Did you know that ...

40 aluminium boxes filled with additional parts and special tools, and 15 steel racks for equipment and replacement parts. At the overseas rallies, the additional pieces of equipment and replacement parts that are transported as air cargo fit into around 40 flight cases.

... Nicolas Vouilloz, who is part of Sébastien Ogier's gravel crew, is credited as the "inventor of crossed tyres"? When weather conditions are uncertain or changeable, the rally drivers increasingly opt for mixed, criss-crossed tyres.

... almost half of the team members planned to be on site in 2014 were involved in Volkswagen's three "Dakar" victories? To be precise, 48.35 per cent of the team – comprising full-time mechanics, logisticians and engineers – were also behind the victories in Argentina and Chile, achieved with the Race Touareg in 2009, 2010 and 2011.

... the Polo R WRC has been exposed to an external temperature range of 46 degrees Celsius in the 26 WRC rallies it has competed in to date? The lowest temperature in which the four-wheel drive from Wolfsburg has started since 2013 was minus 12 degrees at the 2013 Rally Sweden. The warmest conditions the Polo has competed in were at the Rally Italy in 2014 – at 34 degrees in the scarce shade.

... the chassis with the internal number 17 is very special? It brought Ogier/Ingrassia to victory and the world championship title at the

2013 Rally France. "The 17" was also used in 2014. If you look at the bodywork in the right light, you can just about see the small dents in the roof that the two Frenchmen danced into it celebrating the world championship victory at the finish line.


... the "Sweden spikes" are seven millimetres long? This special model of the Michelin Alpin is only used once a year in the WRC, in Sweden. The 380 nails per tyre are made of tungsten. These dig into the frozen surface on the special stages and provide more grip than at gravel rallies.

... Volkswagen Motorsport can convert the Polo R WRC from the gravel to asphalt specification in about 60 minutes? The schedule allows a maximum service time of 75 minutes for this transformation. The remaining 15 minutes would be more than enough time to change the gearbox quickly.

... the Volkswagen engineers have plenty to read? Each rally year they evaluate around 17.5 gigabytes of data – this is the equivalent of around 3.1 million pages of pure text.

Two heads, one baby

Is the chassis or the engine the star? A joint interview with François-Xavier "FX" Demaison and Dr. Donatus Wichelhaus on the Polo R WRC, Generation 2015

 Perspective – Dr. Donatus Wichelhaus is behind the development of many successful Volkswagen engines in motorsport

FX" Demaison
is regarded as
the father of

the first and second generation of the Polo R WRC; Dr. Donatus Wichelhaus is the brains behind many successful Volkswagen engines – for example, at the Rally Dakar, in Formula 3 and in the WRC. In conversation, the two technicians give insight into what goes on behind the scenes in development.

The Polo R WRC is the most dominant car in the history of the WRC. But what is its best feature? The chassis? Or the engine?

Demaïson: "Since it's only ever the wheels that touch the ground, can it be the engine ...?" (laughs)

Dr. Wichelhaus: "And what powers the wheels?" (laughs)

Demaïson: "Of course, the serious answer is the whole package. The chassis is no good without the engine, and vice versa. And neither of them are any good without a good driver."

Dr. Wichelhaus: "There's no doubt about it, our success is based on teamwork. We've had the best chassis in the WRC for the past two years. What 'FX' has achieved in that area is fantastic, I have the utmost respect for that. And our engine wasn't the worst either."

Do you have an example of why the cooperation between the departments works so well?

Dr. Wichelhaus: "The best example is our chassis-engine meetings, which define the interfaces. They never last more than half an hour. We know what makes each other tick and have grown as a team over the years, a team into which new faces such as 'FX' have integrated perfectly. The engine department sees itself as a service provider for the chassis colleagues; providing them with the best possible solution. And together we see ourselves as a service provider for the drivers and co-drivers, to provide an optimum piece of sports equipment – for the best possible success."

"Together we see ourselves as a service provider for the drivers and co-drivers, to provide an optimum piece of sports equipment – for the best possible success."

Six world championship titles in two years – was there any need to keep developing the Polo R WRC?

Demaïson: "That's a very good question, and one we asked ourselves with regard to many details. The general rule of thumb is that maintaining the status quo is taking a step back in motorsport. Our goal for development was to maintain the stability, while giving the drivers and engineers more tuning options. Here and there the regulations also made new solutions possible – for example, the new gearbox."

Dr. Wichelhaus: "With regard to the engine, we are always looking to increase the performance and improve driveability. But we were already very close to the optimum with our first attempt. Naturally you implement what you have learned over the past two years, you know which parts work well and don't change them. But you want to make the structures even better and more efficient here and there."

Before a new homologation do you look at each individual component, or do some components not even come into question?

Dr. Wichelhaus: "The dimensions and weight of many engine components are specified in the regulations – and if they work perfectly, then there's no need to change them. You use resources where you

"Sooner or later you would start to scrutinise every detail, every screw, and possibly start to redevelop if you were able to."

think there is the most potential to make improvements."

Demaïson: "Often a development process is also a matter of time. Sooner or later you would start to scrutinise every detail, every screw, and possibly start to redevelop if you were able to. For the homologation of the second generation of the Polo R WRC we looked at and examined about three quarters of the components – but we didn't change all of these."

The new paddle shift gearbox is the biggest change for the upcoming season. And will affect both the chassis and the engine. What did this mean for the development of the Polo R WRC?

Demaïson: "The new semi-automatic gearbox is a complex hydraulic system. We needed to increase the dimensions of the hydraulics accordingly. The whole gearbox is a completely new development, which we worked on with Xtrac. We had to consider a lot of parameters."

Dr. Wichelhaus: "In the first instance, from a mechanical perspective the way that the gears are changed doesn't really make any difference to the engine. Therefore, the new gearbox was mainly complex for the software application. The regulations also set strict limits here, such that there wasn't much room to manoeuvre. The trick was to use the little that is permitted to get the maximum out of the gear-changing performance. And it took a few iterations before we technicians and the drivers were satisfied. After all the gearbox also needs to suit each driver's driving style."

During the development of the first generation Polo R WRC there was intense exchange with the

colleagues from the series development of the Polo. What role did the cooperation play in the development of the 2015 version of the car?

Dr. Wichelhaus: "Our sharpest development tool is the central laboratory in Wolfsburg. When something breaks, tears or is faulty, we would often be stabbing in the dark trying to find the real reasons without the colleagues from Wolfsburg. Instead, when something goes wrong we usually know why very quickly. Then there are the research colleagues in the engine department, who provided a lot of support with optimisation. In engine development there is a great deal of exchange from series to motorsport, but also from motorsport back to

series. In recent years Volkswagen has become a very homogenous team between the headquarters in Wolfsburg and the motorsport department in Hannover."

Demaïson: "The central laboratory is also the heart for us in chassis development. That's for sure. However, our cooperation with Wolfsburg focusses much more on the body in white, for which our requests have been considered in series development. There wasn't much exchange for the 2015 version of the car since the base vehicle is the same. But we are already involved in the coming model change to the Polo."

Mr. Chassis – "FX" Demaïson
is on site at all WRC events



The Polo R WRC won the first special stage on its very first start at the “Monte” in 2013. What’s your prediction for the 2015 version?

Demaïson: “Well, the goal is always to win. Naturally we hope that this will be the case once again and that this will continue to the same extent. But no doubt the competition has also worked hard on the development of their cars. The first special stage, the first rally is always an exciting moment when you compete with a new car.”

Dr. Wichelhaus: “The first special stage in 2013 was an enormous relief for us. The first stage was a dry asphalt special stage. And on dry asphalt is where the engine really plays a part. And when you win the first special stage straight away, you know that you must have done something right. Even though a bit of polishing or a few corrections may have been necessary, we had an inkling that we had fielded a competitive design. Which proved to be the case as the season went on. We hope that this will be the case once again in 2015.” //

Dr. Engine – Dr. Wichelhaus has good memories of the WRC debut in 2013



Typical Volkswagen

Volkswagen and their worldwide motorsport commitment with production-based technology



Talent development with
tradition – Formula 3



specialists Andretti Autosport to form the Volkswagen Andretti Rallycross Team. The Rallycross Beetle with four-wheel drive, a TSI engine generating more than 560 hp (412 kW) is driven by Tanner Foust and Scott Speed, who finished third overall in the 2014 season. Excitement and pure racing are guaranteed.

2015 season with more battles, drifts and rock 'n' roll – powered by Volkswagen.

Success bred through tradition: Volkswagen and Formula 3

Not only in Formula V but also later as engine supplier in Formula 3 from 1979 until nowadays, Volkswagen always focusses on supporting young drivers leading towards big careers in Formula One, Le Mans or DTM. Motorsport legends like Michael Schumacher, Tom Kristensen or Bernd Schneider are among the big names. Also current talents as Felipe Nasr, Daniel Ricciardo, Carlos Sainz junior, Jean-Eric Vergne or Max Verstappen took their first steps in a Volkswagen powered single-seater in the FIA Formula 3 European Championship or British Formula 3 Championship. //

T

he World Rally
Championship
commitment

sees Volkswagen come full circle: the FIA World Rally Championship is the most important and highest-ranked racing series, in which production-based cars are used. Maintaining a close association with production products has always been an integral part of Volkswagen's motorsport strategy.

Beetle goes America

In 2014, Volkswagen of America has joined forces with US racing

Battles, drifts and rock 'n' roll

Since the 2014 season, Volkswagen Motorsport has an exclusive three-year partnership with Swedish rallycross team Marklund Motorsport in the World Rallycross Championship. It was a successful debut season for the Volkswagen Polo RX Supercar: number one driver Toomas "Topi" Heikkinen finished second, his Swedish team mate Anton Marklund sixth in the overall classification. Next stop: the

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Links

- Volkswagen Motorsport  www.volkswagen-motorsport.com (public motorsport website and Content & Media Pool)
-  www.facebook.com/VolkswagenMotorsport (Facebook fan page)
-  www.twitter.com/VolkswagenRally (Twitter channel for the WRC)
-  www.youtube.com/VolkswagenRally (Youtube channel for the WRC)
-  www.adac-formel-masters.de (ADAC Formula Masters)
-  www.fiaf3europe.com,  www.formel3.de,  www.formula3.co (official F3 websites)
-  www.wrc.com (official website of the FIA World Rally Championship)

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