

MPULSE

MAHLE

Mobility
magazine
for the
workshop

01 // 2019
EURO 4.50

360° **FUTURE PROOF**

Into the future—worry-free

FIRST DIGITAL CALIBRATION FOR DRIVER ASSISTANCE SYSTEMS

TechPRO® Digital ADAS

FORMULA FUTURE

Entry into
Formula E

A REAL LOVE OF CARS

Interview with Lina Van de Mars





From professional to professional

The future belongs to those who are well prepared. Whether you use gasoline or diesel, electric drive or hybrid—with MAHLE Aftermarket, you can drive into the future with confidence. When it comes to e-mobility, you'll also benefit from our thermal management activities. Following the complete takeover of BEHR Hella Service on January 1, 2020, our aftersales team will be able to offer you the full product range in OEM quality from a single source from 2020! And MAHLE is a trendsetter on the racetrack too—as the new partner and sponsor of HWA RACELAB, one of the twelve Formula E racing teams.

The new TechPRO® Digital ADAS is also a winner. It's the first digital calibration tool on the market, and it allows you to calibrate driver assistance systems from almost all manufacturers and vehicle types faster and more easily than ever before—no longer using panels, but digitally on a screen. We'll also be on the move digitally from mid-2019 when we launch our new customer portal MAHLE CustomerCare, with lots of features for wholesalers and workshops.

Of course, we've also got many interesting interviews and reports in this issue: from Lina van de Mars as well as Uwe Rosenau, an engine repair expert, and Paul Bracq, designer of the legendary "Pagoda SL."

Thanks for taking part in our reader survey and giving us such great feedback. We hope you enjoy this issue!

Olaf Henning
Corporate Executive Vice President and
General Manager MAHLE Aftermarket

CONTENTS

DO IT & GET IT

- 04** 360° FUTURE PROOF Into the future—worry-free
- 10** FIRST DIGITAL CALIBRATION FOR DRIVER ASSISTANCE SYSTEMS TechPRO® Digital ADAS
- 14** TAKE A DEEP BREATH The impressive CareMetix® cabin air filter
- 20** SMART WORKSHOP ASSISTANTS Tools that make your life easier
- 24** EXPERT TIPS For replacing pistons/engine repair

SWEAT & GASOLINE

- 16** A REAL LOVE OF CARS Interview with Lina Van de Mars
- 22** FORMULA FUTURE Entry into Formula E
- 32** MAKER OF LEGENDS A visit to Paul Bracq's workshop

MAHLE INSIDE

- 12** COOL! BEHR Hella Service becomes MAHLE
- 18** ANYTIME. ANYWHERE. INSTANTLY. MAHLE CustomerCare Portal
- 28** BIG BUSINESS Full range for trucks
- 36** NEW ON THE MARKET More selection, more quality, more efficiency
- 38** AFTERBURNER Winners of the online reader survey and latest news

NEW ON THE MARKET

04

360° FUTURE PROOF



10

FIRST DIGITAL CALIBRATION FOR DRIVER ASSISTANCE SYSTEMS



12

COOL! BEHR HELLA SERVICE BECOMES MAHLE



16

A REAL LOVE OF CARS



22

FORMULA FUTURE





360° FUTURE PROOF

Digitalization, e-mobility, hybrid drives—and soon, perhaps, fuel cells and e-fuels—often go hand in hand with the question: is there still a future for the gasoline engine and its diesel counterpart in the automotive world? The drive mix of the future is diverse, and no one knows exactly what it will look like. One thing's certain, however: with MAHLE, you and your workshop will stay on track. How? This is the subject of our “360° MAHLE” series.





360° MAHLE

WORRY-FREE

To get his eight-year-old son Ben to school, Frank is making increasing use of an electric vehicle from a car sharing provider. Where Frank lives, driving isn't always a lot of fun. Too many building sites for the Stuttgart 21 project. Too many traffic jams. Not enough parking spaces for Frank's SUV. His wife, who works outside Stuttgart and drives "against the flow" in both the morning and the evening, uses the SUV. Thanks to a smartphone app, Frank can always rapidly locate an electric vehicle for getting around the city. And when his son isn't at school, Frank likes to hop on his pedelec and cycle to work. The main thing is to get from A to B quickly. Despite all the new possibilities, Frank doesn't have anything against cars. Quite the opposite in fact: he loves cars and makes his living from them. Frank is the owner of an independent vehicle workshop. He has a very calm outlook on the future of the automobile and mobility. Thanks to MAHLE, Frank's business is open to everyone.



Nothing's impossible! MAHLE Aftermarket offers Frank—and you—a range that includes the right solution for every application and requirement. All in original equipment quality! Almost all automobile and engine manufacturers work with MAHLE when dealing with piston systems, cylinder components, valve trains, and air and thermal management systems.

With MAHLE Aftermarket, you can put together your individual worry-free package.

That's the idea behind 360° MAHLE.

WHICH DRIVE WILL WIN THE RACE?

35% 65%

The figures show where things are heading: at the start of 2012, there were 4,500 electric cars on Germany's roads. In 2018, this figure was over 53,000. According to industry forecasts, the mobility of tomorrow is developing toward a diversified drive mix: in 2040, more than 35 percent of all vehicles will have alternative drives. Almost 65 percent will still have combustion engines under the hood. That's why MAHLE is pursuing a dual strategy and continuing to develop both drive concepts.



360° MAHLE ONE FOR ALL

360° MAHLE gives you 100 % workshop performance—whether things are humming or buzzing under the hood.

Currently, the biggest challenge for vehicle workshops is hybrid drives, although we're seeing a slow shift toward electric vehicles in Germany. This trend is only going to increase, which means that over the next few decades, day-to-day workshop tasks will involve several types of drive. That's because vehicles with combustion engines will still be on our roads for years to come and continue to give your workshop plenty to do.

Whether they're electric or hybrid or have a combustion engine, all cars have one thing in common: they have all sorts of parts that need to be serviced, replaced, and repaired, or that can be tuned. And this is exactly where MAHLE 360° comes in!

Take a look under the hood: MAHLE Aftermarket stocks products for you in a number of areas—filters, engine parts, starter motors & alternators, thermal management for the cabin and powertrain, and turbochargers. We're also well-equipped when it comes to electric vehicles. Our range includes electric motors, thermal management products, electric drives, power electronics, and cabin air filters. With our CLASSIC LINE, we also have a first-class range of spare parts for modern classic and vintage cars. MAHLE Service Solutions also offers practical workshop equipment and services in the areas of maintenance, servicing, and diagnostics.

360° SPARE PARTS & SERVICE SOLUTIONS





REVOLUTION

ALL SENSES HEIGHTENED

The number of passenger cars and trucks fitted with driver assistance systems (ADAS) is growing steadily and, like the number of sensors and cameras per vehicle, will only increase in the future. This means a lot of calibration work for workshops. The better equipped you are for this, the greater your sales opportunities. The new TechPRO® Digital ADAS makes it all possible.

FAST, INTUITIVE, DIGITAL—TECHPRO® DIGITAL ADAS IS THE FIRST DIGITAL CALIBRATION TOOL ON THE MARKET. IT CAN POSITION THE VEHICLE IN HALF THE TIME TAKEN BY CONVENTIONAL ADAS SYSTEMS.

- › Electric height adjustment
- › Alignment with the vehicle using laser measuring instruments
- › Digital target projection for camera calibration
- › Automatic image correction for correct alignment
- › Integration with diagnostics software

Available in the MAHLE and BRAIN BEE brands

With the new TechPRO® Digital ADAS, you can calibrate driver assistance systems from almost all manufacturers and vehicle types faster and more easily. One thing in particular sets this tool apart from the others available on the market: instead of several different calibration panels, TechPRO® Digital ADAS requires just one digital calibration panel, thereby allowing you to adjust all sensors and cameras precisely. This saves you the time and effort needed to replace the calibration panels, significantly reducing the processing time. Thanks to continual updates, TechPRO® Digital ADAS is always up to date with the latest ADAS technology. This opens up additional potential for your workshop to repair many different brands.

TECHPRO® DIGITAL ADAS: SO EASY TO USE

- › To calibrate a driver assistance system, simply connect the TechPRO® diagnostic tool to the appropriate control units using the onboard diagnostics.
- › The digital calibration panel is set up according to the manufacturer's directions and adjusted automatically.
- › Next, the diagnostic tool guides you through each of the process steps.
- › The system's database updates automatically and can therefore also be used for vehicles with the latest assistance systems.





THERMAL MANAGEMENT

—COOL! BEHR HELLA SERVICE BECOMES MAHLE

Thermal management is becoming increasingly important. With combustion engines, the challenge is to reduce fuel consumption and emissions while also minimizing wear and tear. In electric vehicles, the management of hot and cold currents forms the basis for a long cruising range and long service life of the battery and power electronics. Precise and robust thermal management is a prerequisite for the reliability of electric vehicles and therefore a growing business area for your workshop. With MAHLE, you'll be even better positioned to handle all tasks relating to thermal management from 2020.

Perhaps you've already heard that MAHLE Aftermarket will take over BEHR Hella Service on January 1, 2020. This means that from 2020, you'll be able to get the entire thermal management product range in OEM quality, all from MAHLE Aftermarket: spare parts, training, repair and maintenance information, workshop equipment, service hotline, and diagnostics. All of this makes your workshop even better equipped for the future, in terms of service and solution capabilities.

What will change?

Nothing will change during 2019. BEHR Hella Service will continue as before until the end of 2019. Sales up to December 31, 2019, will also be handled by BEHR Hella Service and their sales partners. This transition phase is important, as it will allow MAHLE to offer you flawless service from day one without any teething problems. We will inform you personally when the time comes—most likely by mid-2019.

How will things continue in 2020 and beyond?

The name "BEHR Hella Service GmbH" will no longer exist after January 1, 2020. Even after this date, however, you'll still be able to order from BEHR Hella Service using the existing part numbers. The most important thing is that all products will remain available as usual, thanks to MAHLE Aftermarket's experienced and efficient logistics teams. The popular compressor warranty plus will also continue—never change a winning formula!

THEMAL MANAGEMENT IN OEM QUALITY FROM A SINGLE SOURCE

➤ Available from MAHLE Aftermarket as of 2020:
thermostats, switches, sensors, air conditioning
compressors, radiators, heaters, heat exchangers,
condensers, and water pumps.

TAKE A DEEP BREATH

It's getting increasingly polluted on the roads, but at the same time a growing number of people want to live healthily—eating more organic food and doing more physical activities. What can you and your workshop do to help? Clean air in the cabin! Ideally now, in spring! After all, spring is the flowering season—and therefore pollen season—which means it's time to change the filter. We recommend that you use our most effective product to do this: CareMetix®.

CareMetix® is MAHLE's innovative cabin air filter. It not only devours dust, soot, pollen, bacteria, and mold spores but also absorbs odors and toxic nitrogen. CareMetix® filters reliably for up to 15,000 kilometers.

We can guarantee this thanks to extensive tests under real-life conditions—on the busy four-lane thoroughfare directly outside MAHLE's research and development center in the Stuttgart cauldron in Germany, as well as in tunnels, alongside freshly manured fields, and close to water treatment plants. The result? CareMetix® filters make a real difference!

FINE PARTICULATES ALERT

In these cities, the fine particulates pollution is particularly high (is your city on the list?)

- Moscow
- Izmir
- Stuttgart
- Grenoble
- Johannesburg
- Abu Dhabi
- Sheffield
- Philadelphia
- Kraków
- Barcelona



Omnivorous

CareMetix® is a truly innovative cabin air filter. It devours pollen, dust, soot, and mold, and absorbs penetrating odors. CareMetix® is available in the MAHLE and KNECHT FILTER brands!

Five times more thorough: the innovative CareMetix® S5 broadband technology

- 1) High-performance particulate filter layer
- 2) Molecular layer
- 3) Engineered activated carbon layer
- 4) Biofunctional layer with activated carbon
- 5) Protective layer

All about CareMetix® online: carmetix.mahle.com

A REAL LOVE OF CARS



"MY MESSAGE TO ALL FEMALE CAR FANATICS: STAY TRUE TO YOUR PASSION. IF YOUR HEART BEATS A LITTLE FASTER WHEN YOU SEE A CAR OR MOTORCYCLE, YOU'RE ON THE RIGHT PATH. THERE ARE SO MANY GREAT CAREERS IN THE FIELD OF MOBILITY—JUST FOLLOW YOUR HEART!"

#usethebestparts

Interview with Lina Van de Mars, vehicle mechatronics specialist, motorsports racer, presenter, and PASSIONATE mechanic
www.linavandemars.com

MAHLE: Lina, you've helped restore more than 100 vehicles. Which was your favorite project?

Lina Van de Mars: You know what it's like ... another car's ready to leave your workshop, and you've put lots of time and love into finishing it ... and you think THAT was your favorite project ever. And boom, the next order's in already, and it's so exciting it could become my favorite project ever. That often happens to me.

MAHLE: One of your passions is off-road vehicles. What do you like about them?

Lina Van de Mars: Off-roaders let you get away from civilization, where nature becomes a lot more rugged and you meet obstacles you wouldn't see every day. For me, it's really exciting to get a vehicle ready for this: moving the engine's air intake upward, fitting a more robust chassis, and installing an underbody panel as well as brackets for things like blades, fire extinguishers, and other emergency devices—it's a lot of fun.

MAHLE: You're also passionate about classic vehicles. What's so special about them?

Lina Van de Mars: The smell. The design. The stylish details that have given way to practicality in modern vehicles. In many classic cars, you can discover the seeds of forward-looking ideas that we take for granted nowadays. For example, I'm thinking about the cornering light on the DS.

MAHLE: Had you come into contact with MAHLE before?

Lina Van de Mars: Yeah, when I purchased spare parts for my classic car, I was definitely a frequent MAHLE customer. But we also met in Formula E.

MAHLE: Speaking of Formula E, how do you feel about electric cars?

Lina Van de Mars: It's all about balance. If there were only electric cars, I'd miss the passion. But once you've driven a couple of hundred kilometers in an electric car,

you soon become a fan of instant acceleration. Especially because, from an ecological perspective, things are going in the right direction.

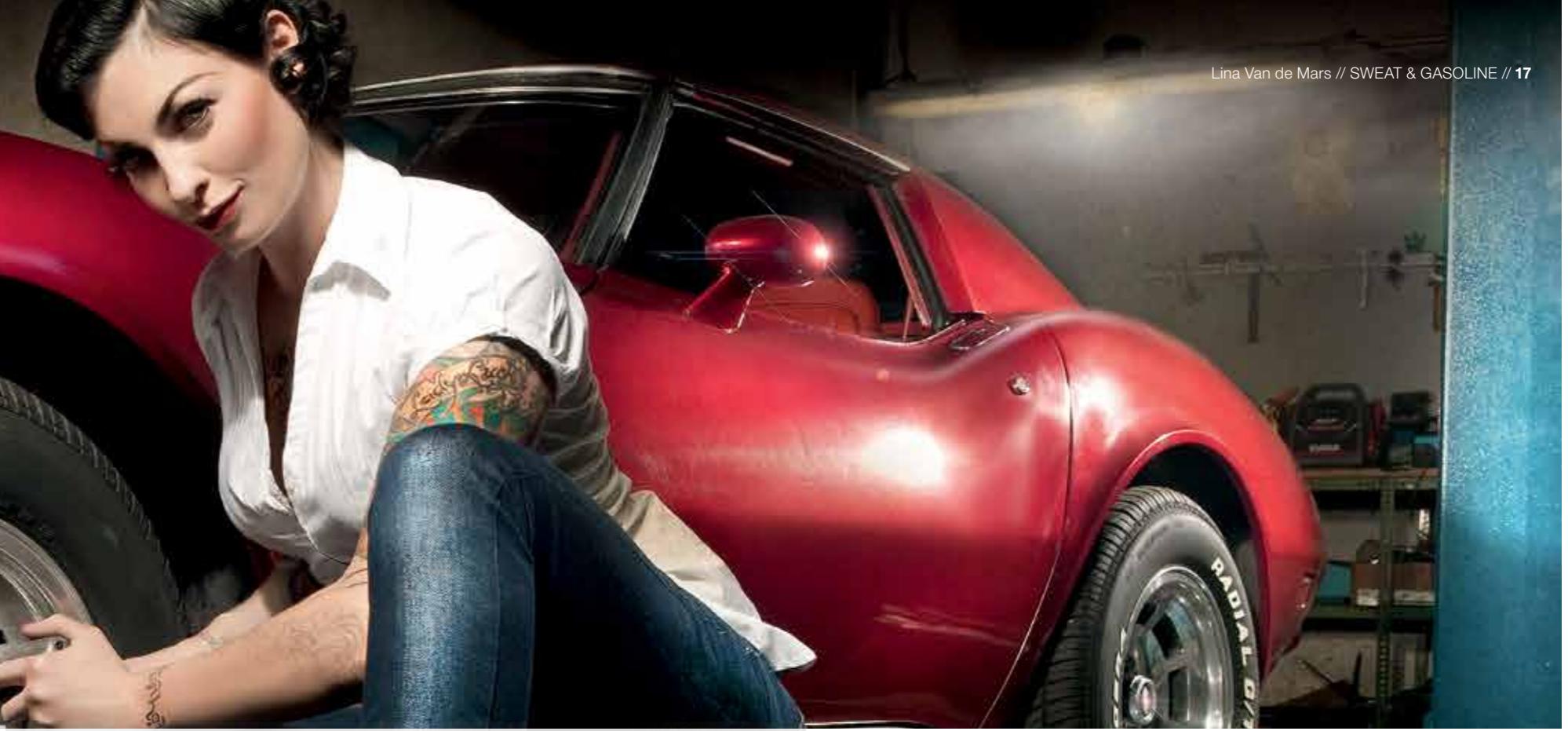
MAHLE: In your opinion, what does the future of the automotive industry look like? What are the opportunities? What are the risks?

Lina Van de Mars: The vehicle trade will redefine itself. I'm sure that vintage car enthusiasts and car body makers will move more and more into their own field. Classic mechatronics engineers will either specialize as service technicians and on components such as brake systems or focus on areas such as power current, computer technology, and sustainable technology. As a fan of gasoline engines, I hope that this technology will be around for a while yet, of course. Unfortunately, e-mobility isn't quite the finished article in terms of a clean solution. You can see that just from electricity procurement.

Nevertheless, we've now got a better chance than ever of creating a clean future and clearing up some of the mess

we've made in the past few decades. However, I think there's a risk of settling on a solution too quickly without really scrutinizing it properly.

MAHLE: Many thanks for the great interview, Lina Van de Mars.



You can find the complete interview with Lina Van de Mars at mpulse.mahle.com.

THE DIGITAL MAHLE CUSTOMER PORTAL

ANYWHERE. ANYTIME. INSTANTLY.

In the last issue of MPULSE, we addressed the topic of digitalization and presented a few of MAHLE's digital activities. One of these was our digital customer portal "MAHLE CustomerCare," your direct access to the world of MAHLE Aftermarket. MAHLE CustomerCare brings together all the products, services, and information that are important for you and your work.

In your day-to-day work, there are always questions that crop up: about original parts, engineering, installation, or workshop equipment. At MAHLE CustomerCare, you'll find answers to these questions as well as useful documents, all at the touch of a button. You can also submit your requests directly to the MAHLE experts using a ticketing system. When you send your questions via the input form, processing starts immediately. This allows us to respond much more quickly.

With MAHLE CustomerCare, you also get direct access to product information, installation videos, technical documents and marketing materials, a booking facility for training courses, guided troubleshooting, and much more. MAHLE CustomerCare makes your work, and your life, so much easier.

THIS IS HOW MAHLE CUSTOMERCARE WORKS:

› ... for you

You have round-the-clock access to MAHLE CustomerCare on your tablet, smartphone, PC, or laptop. After registering and logging in, you can see an overview of your activities.

› ... and for your wholesaler

The new portal also allows your wholesaler to view the delivery status of orders as well as sales to MAHLE on their own personal dashboard. Wholesalers can also enter your complaints in the handy ticketing system, saving them a great deal of time. This ensures you get a faster response in the event of complaints and reduces delivery times so that you can get back to your actual work as quickly as possible.



WITH MAHLE CUSTOMERCARE, WE'RE TAKING A LOGICAL STEP INTO THE DIGITAL FUTURE OF THE AFTERMARKET AND CUSTOMER SUPPORT. COME WITH US—AT WWW.CUSTOMERCARE.MAHLE.COM. THERE FOR YOU FROM MID-2019.

LOOKING BEYOND OUR OWN BACKYARD

MAHLE isn't the only company with ingenious solutions in its range: there are other fantastic ideas out there. We've taken a look beyond our own backyard and spotted some interesting things for you.

Do you have a useful tool we can showcase here? Send it to us at mpulse@mahle.com. We'll publish the best submissions in the next issue.



BETTER SAFE THAN SORRY PISTON RING PLIERS

The ideal tool for the safe and correct removal and fitting of piston rings with a thickness of 1.2 to 6.3 mm.
[Seen at www.gedore-automotive.com]



GETTING TO GRIPS REVERSIBLE RATCHET WITH TWIST HANDLE

The perfect solution for loosening and tightening nuts and bolts, even in the smallest of spaces.

[Seen at www.sauerlaender-hv.de]



- › Handy and compact
- › Ergonomic, two-component handle
- › Fine-tooth ratchet mechanism with 72 teeth
- › Reversible
- › Chromium-vanadium
- › In a robust plastic case

[Seen at www.sauerlaender-hv.de]

MORE BANG FOR THE BUCK HAND RATCHET SET



CORRECTLY FILLED RADIATOR VACUUM FILLING UNIT

- › Universal tool for filling the cooling system of all common vehicles
- › New cooling fluid is sucked into the system automatically through the creation of a vacuum within the cooling circuit
- › During the vacuum process, the cooling system is leak tested
- › Bubble-free filling prevents air from becoming trapped in the cooling system
- › For universal use, thanks to the conical rubber connecting socket
- › In a robust plastic case
- › Various cooling adapters available

[Seen at www.leitenberger.de]



AN ATTRACTIVE TOOL MAGNETIC WRISTBAND

Keeper nails and screws on your wrist.
The perfect tool for when you need an extra hand!

[Seen at www.magnogrip.com]

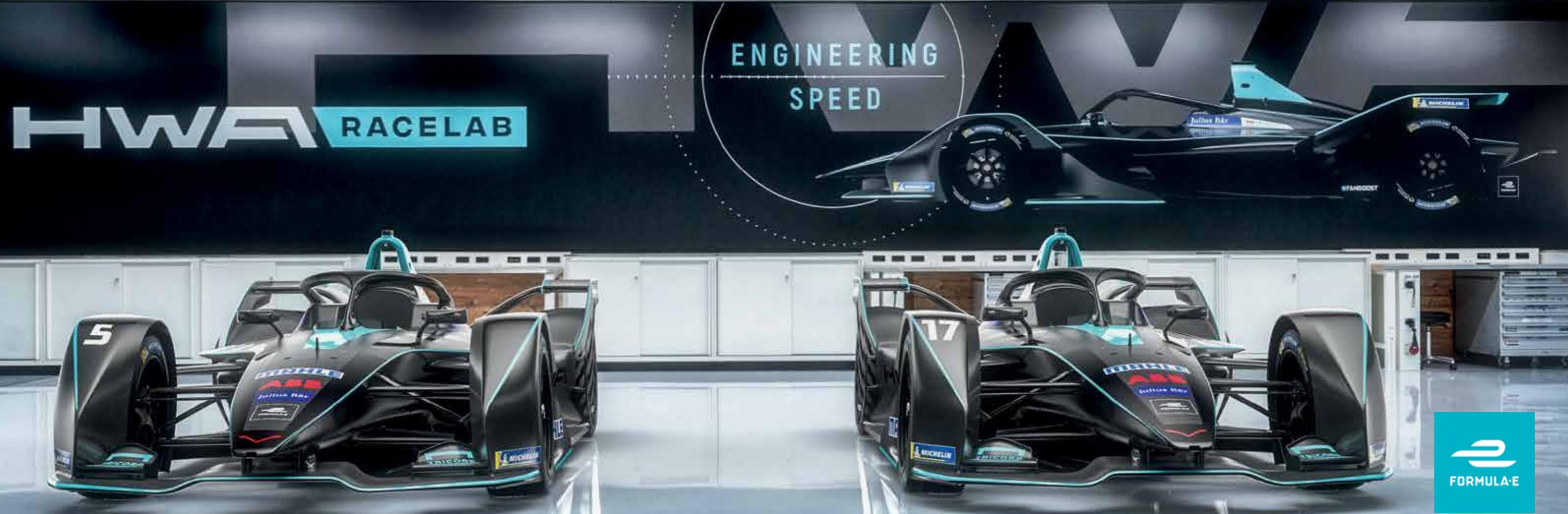
LET THERE BE LIGHT 3-IN-1 COMPACT LAMP

- › 3-in-1: inspection lamp, work lamp, and flashlight in one
- › Extremely strong illumination of up to 500 lumens and a powerful flashlight function
- › Ultra-slim, compact design
- › Powerful built-in magnet and hook for flexible positioning
- › Two lighting levels (50 % or 100 %) for maximum service life

[Seen at www.sauerlaender-hv.de]



FORMULA FUTURE



Motorsports can be exciting even without the engine noise and smell of race fuel. In Formula E, you can experience the future live in the fast lane. That's why MAHLE's involved: as an official partner and sponsor of HWA RACELAB, one of the twelve Formula E racing teams, and as the driving force behind the success of the Mercedes AMG at the DTM. Two-time DTM champion Gary Paffet and Stoffel Vandoorne from Formula 1 sit in the cockpits of the fully electric HWA racers.

Ongoing development! That's what it's all about—in motorsports in general and specifically in **Formula E**. Nowhere else are vehicle components and systems subjected to such extreme loads.

That's why the battle on the racetrack is just part of the race for the mobility of the future. Whether in Formula 1, Le Mans, DTM, MotoGP, or NASCAR—MAHLE Motorsports has played an active role as a developer and systems partner for many decades. MAHLE is now continuing this success story with its entry into Formula E.



ENGINE REPAIR

THE ENGINE PROS

Interview with Uwe Rosenau,
owner of Rosenau engine repair shop
www.kfz-rosenau.de

"Resurrecting a dead engine is fascinating!" says Uwe Rosenau. Together with his son Florian, the engine repair specialist fixes anything that moves—from a lawnmower to a 1,000 hp machine. One of their most frequent tasks is replacing pistons.

MAHLE: Why do many workshops no longer want to work on engines?

Uwe Rosenau: It all started back in the 1970s. At that time, some manufacturers started offering replacement engines. Workshops took the easy route. If there was any engine damage, they simply installed the replacement engine. Moreover, independent workshops generally don't have the necessary equipment to carry out engine repairs: boring, honing, or grinding machines, etc.

MAHLE: To what extent is it still profitable to replace engine components?

Uwe Rosenau: It depends on the mileage. If it's very high, it's not worth replacing individual components. It's better to overhaul the engine completely or install a replacement.

MAHLE: How do vehicles differ when it comes to replacing pistons?

Uwe Rosenau: The work process for replacing pistons is actually always the same. You have to be careful with some engines because different pistons can be installed in cylinders 1 and 2 compared with cylinders 3 and 4. With some older engines, such as the DB OM 636, the pistons have to be installed from below. In situations like that, you have to remove the crankshaft.

MAHLE: What else should always be replaced at the same time as the pistons?

Uwe Rosenau: The complete piston with piston rings, piston pin, and safety clips. The connecting rod bearing and bolt. And—if there are antifatigue bolts—all exposed gaskets and the cylinder head bolts. The easiest way to identify antifatigue bolts is from the manufacturer's tightening values: torque plus angle of rotation. The connecting rods should be tested for bending. And with air-cooled engines, I recommend checking and replacing the rod bearings.

MAHLE: What assistance does MAHLE offer for piston assembly?

Uwe Rosenau: The first few pages in the piston catalog are extremely helpful. The



"THE HIGH QUALITY OF THE MAHLE PISTONS CAN BE SEEN IN OUR ULTRASONIC BATH."

Engine Parts and Filters brochure with damage scenarios, causes, and information on avoidance is also very good.

MAHLE: Which MAHLE products do you install?

Uwe Rosenau: MAHLE pistons including piston rings and piston pin, as well as valves, bearings, and liners. The high quality of the MAHLE pistons can be seen in our ultrasonic bath: even after 20 minutes of cleaning, the piston working surface coating is still perfectly preserved, as opposed to pistons from other manufact.

MAHLE: Many thanks for talking to us, Mr. Rosenau, and all the best for the future.

ENGINE REPAIR

THE HEART OF THE ENGINE



No need to be afraid of engine repair! With these ten tips for piston assembly, you can tackle the heart of the engine confidently and with a steady hand.

› **1. It's all about the right dimensions:** the piston diameter is indicated on the piston crown. This is then used, along with the fitting clearance, to determine the diameter of the cylinder. It's particularly important to know this if oversized pistons are installed and the cylinder needs to be bored to the next size.



› **2. A guide:** the installation direction is also indicated on the piston crown and shows how the piston should be installed according to the manufacturer. The marks and direction differ per manufacturer.



› **3. Painting by numbers:** ideally, the cylinder and position should be marked specifically when removing the parts. When reassembling, you need to put all the parts back where they belong. This is particularly important, for example, in the case of cracked conrods and main bearing caps.



› **4. Again, please:** in the case of new pistons, you also need to install new piston pins and circlips. The conrod bearings need to be replaced in this scenario too.



› **5. Mind the gap:** the gaps in the piston rings should not overlap but be offset. If there are three rings, the angle should be 120°.



› **6. The more, the better—** at least when it comes to oil during assembly. To prevent dry running when starting the engine for the first time, don't skimp on the lubricant.



› **7. Keep up the tension!** A tightening strap for piston rings makes assembly much easier. However, most importantly, the piston rings are protected against damage when they are inserted in the cylinder.



› **8. Hold tight!** Connecting rod bolts should be tightened with the prescribed torque. Depending on the specifications, the screws may also need to be replaced.



› **9. Higgledy-piggledy:** in diesel engines, piston protrusion and gap width need to be measured after replacing the pistons. A thicker cylinder head gasket may need to be installed, for example.

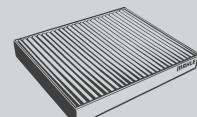


› **10. Crank it up:** before starting the engine for the first time, injection should be disabled, for example, so that the engine turns over without starting. This means that oil pressure builds up, but there is no engine load. This prevents dry running and serious damage to the new pistons.

BIG BUSINESS

MAHLE Aftermarket is a major player in the commercial vehicles segment: when it comes to starter motors and alternators, we cover more than 80 percent of all commercial vehicles. In terms of oil, fuel, air, and cabin air filters, we supply more than 90 percent of all filter types.* And we're also the aftersales market leader in turbochargers, with coverage of more than 50 percent. Get an overview of everything we can offer for your commercial vehicles activities.

#usethebestparts



Cabin air filter



Cabin air filter pad



Actuators and switches



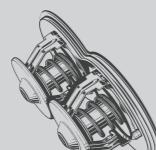
High-performance electronics



Integral thermostat



Sleeve valve thermostat



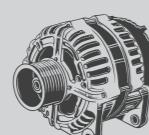
Thermostat insert



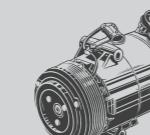
Turbocharger



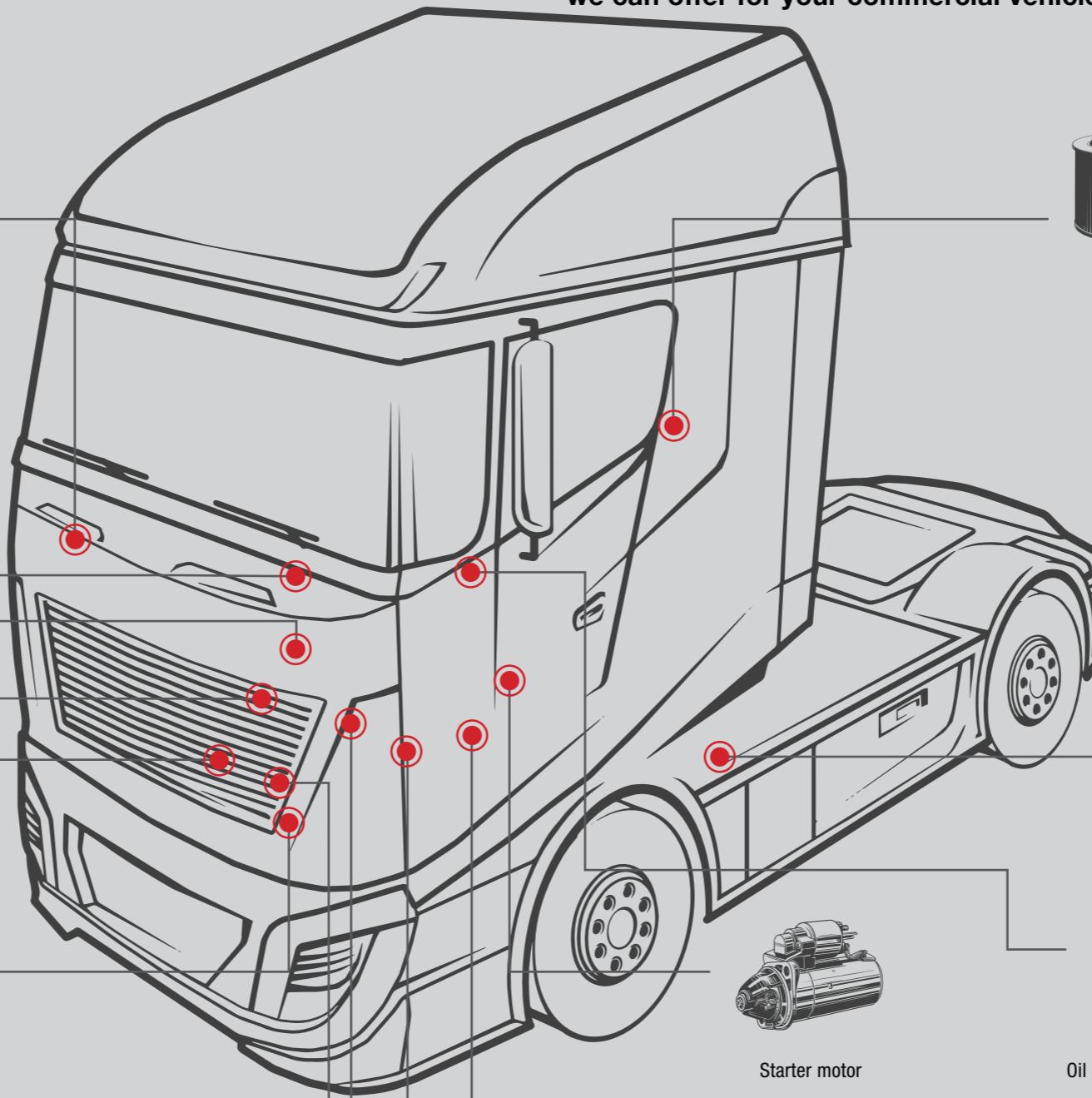
Turbocharger installation kit



Alternator



A/C compressor



Pistons



Bearings



Valve seat inserts



Cylinder liner



Valves



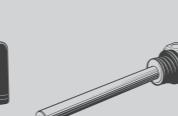
Valve guides



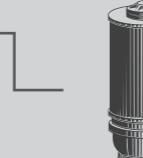
Piston rings



Electronics



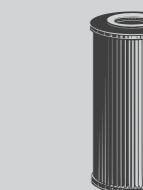
Sensors



Fuel filter



Spin-on fuel/oil filter



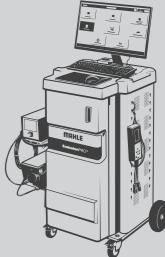
Oil filter insert



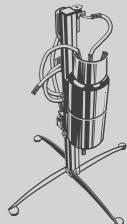
Air drier cartridge



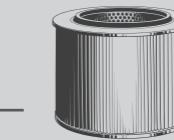
A/C service unit



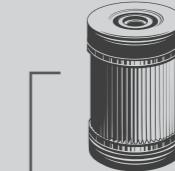
Emissions testing station



Rinsing unit



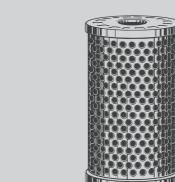
Air filter



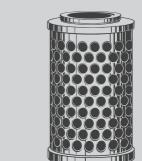
Urea filter element



Oil mist separator



Hydraulic filter



Fuel filter element



Coolant filter

TRUCK RANGE

EFFICIENT IN THE FUTURE

When it comes to commercial vehicles, costs are paramount. Rising fuel prices and increasingly stringent environmental regulations are putting the spotlight on solutions that reduce fuel consumption and CO₂ emissions. It isn't yet clear which drive mix will win through in the trucks segment. Current forecasts indicate a large proportion of diesel vehicles in long-distance hauling even after 2030, while battery electric vehicles will play a role in short-haul operations and in light commercial vehicles.

The fuel cell provides excellent prospects in long-distance hauling, and the first fleet with MAHLE thermal management on board will soon go into operation in the USA. That's why, at MAHLE, we're remaining open to all possibilities: we're continuing to optimize the conventional combustion engine, while developing solutions for the mobile future with battery electric hybrid and fuel cell drives.

› THERMAL PISTON COATINGS

These coatings decrease the heat input into the pistons and reduce the cooling performance requirement. This generates higher exhaust gas temperatures and quantities of energy that can be harnessed through waste heat recovery (WHR) systems. At the same time, the higher exhaust gas temperature allows faster heating of the exhaust gas after-treatment system following the cold start. Because the exhaust gas aftertreatment takes effect more quickly, it's easier to fulfill currently applicable as well as future regulations.

› REINFORCED TURBOCHARGERS

We now offer turbochargers with milled aluminum impellers worldwide. They're more robust and have a longer service life than models with cast aluminum impellers. In addition, they cost less than the variant with titanium alloy but offer a similarly high level of resilience.

› BOOST BOX

The MAHLE eWaste Heat Recovery (eWHR) system, also known as the "Boost Box," converts the heat from the exhaust flow into electrical energy. This energy can be used in a 48 V electrical system to supply auxiliary consumers, or be fed directly into the powertrain via an electric motor. However, this "mild hybrid" system can also recover energy when driving downhill or during braking, which is then stored in the buffer batteries. The Boost Box generates fuel savings of up to 5 percent.

› HYBRID

MAHLE is making cooling architectures for hybrid commercial vehicles more simple, durable, and efficient. Lithium-ion batteries, for example, must be kept within a constant temperature range. The power electronics in hybrid vehicles also require cooling in order to prevent damage. By the time the charging process takes place in plug-in hybrids, MAHLE's thermal management components have come into play, helping to avoid overheating during charging and allowing fast charging.

› FUEL CELLS

The number of passenger cars with fuel cell drives is rising slowly but steadily, and Japan in particular is a pioneer of this trend. However, battery packs for long-distance hauling would be too heavy and expensive, and the possible cruising ranges are also relatively low at present. MAHLE's portfolio for fuel cells makes us an innovative partner for manufacturers of fuel cell drives. We have custom solutions for air and thermal management, regulation of the water balance, cooling of fuel cells and power electronics, and monitoring during operation. Our optimized exhaust air pathway in a plastic design for fuel cell vehicles enables a weight saving of round 70 percent, for example. The compressor and filter from MAHLE provide clean air without admixtures of harmful gases, which is crucial for fuel cells, while our flat membrane humidifier ensures optimal humidity in the supply air—a dry fuel cell can be damaged in just seconds.



#usethebestparts

Paul Bracq is a name that brings a twinkle to the eye of many a classic car enthusiast. After all, he's none other than the designer of the "Pagoda SL" and other four-wheel legends. MPULSE met up with Paul Bracq and his son Boris in Bordeaux/France. Here's what happened ...

When we arrived in Rue Jacques Cartier, Bordeaux, in October 2018, it was clear just from the lettering on the gate that this was no ordinary workshop. Les Ateliers Paul Bracq made us feel like we were entering an artist's studio rather than a tradesman's workshop. The workshop is puristic yet charming in terms of its style and design. The passion of its owner Boris Bracq immediately rubs off on us. Original designs and vehicle drawings by his father Paul adorn the walls. The room contains only "Pagodas" in different states of restoration.

"A complete restoration takes one and a half to two years. The entire vehicle is rebuilt, from the engine to the seats. The end result is a Pagoda that looks like it just rolled off the conveyor belt."

Boris Bracq

Boris Bracq employs four people, who have been largely taught by Boris himself. "That's because today's automotive training no longer includes direct hands-on with the engine. So you don't end up with the basic prerequisites for working on these cars," Boris explains. After an hour packed full of exciting insights and growing admiration for Boris and his work, Paul Bracq and his wife enter the workshop. They greet us warmly and after just a short time we're chatting with Paul and his wife, who comes from Stuttgart like us and has kept her Swabian accent, as if we've known each other for years.



Paul and Boris Bracq show us around their workshop and talk about their passion for automobile design



BRACQ'S VEHICLE DESIGNS

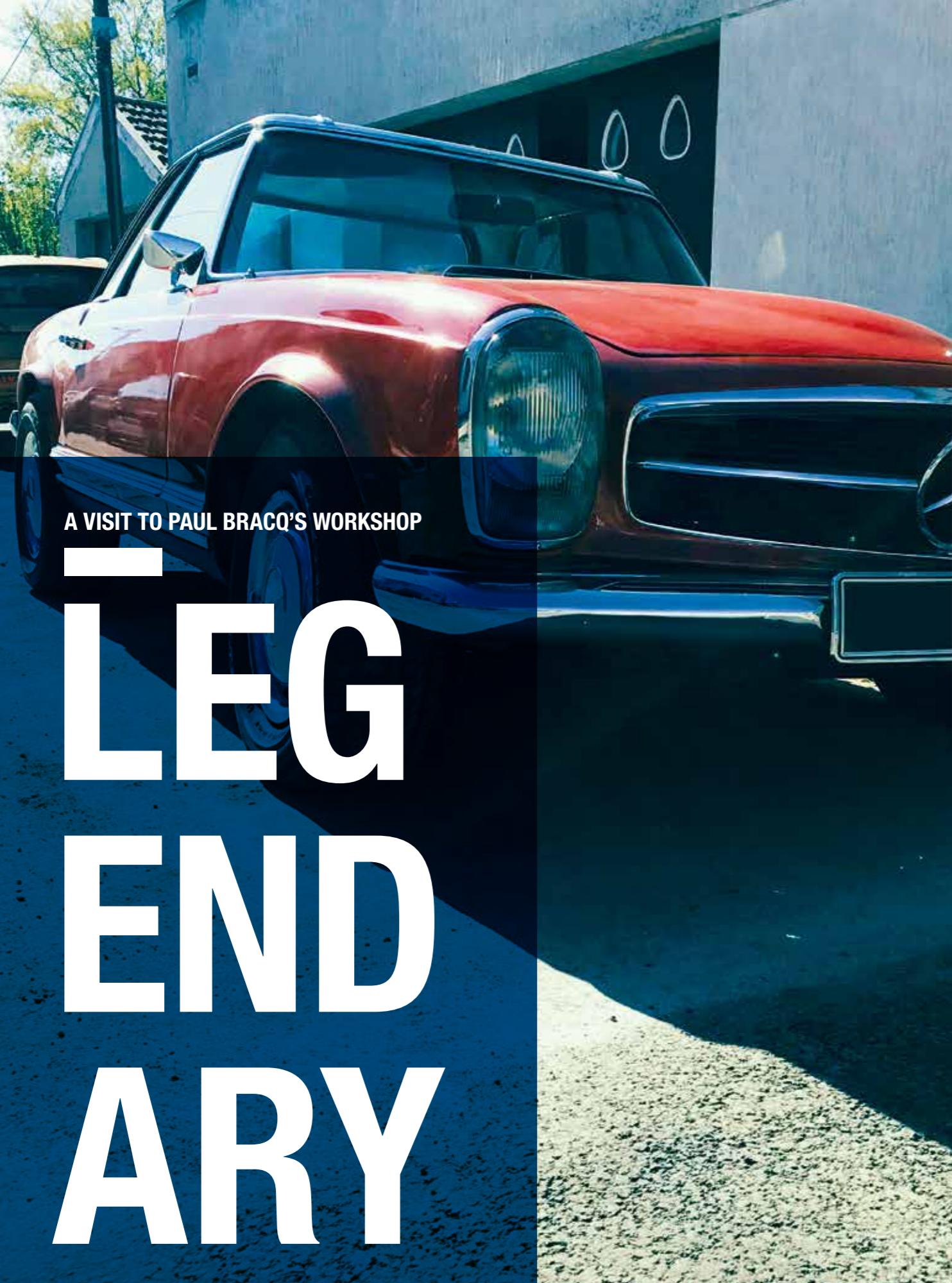
- Mercedes-Benz Pagoda W 113
- BMW 3 Series E21
- Mercedes-Benz W 114/115 (/8)
- BMW 5 Series E12
- Mercedes-Benz 600 W 100
- BMW 6 Series E24
- Mercedes-Benz W 108/109
- BMW 7 Series E23



www.paulbracq.com

LEGENDARY

A VISIT TO PAUL BRACQ'S WORKSHOP





Like chatting to old friends

Paul Bracq has an impressive presence and, with his excellent German and charming French accent, manages to cast a spell over the whole team. During the next two hours, the discussion covers topics relating to past and present requirements for automotive design. And, of course, the question of how Paul Bracq ended up writing automotive history, having taken over the design department of Mercedes-Benz, where he started in 1957, in his mid-twenties.

Paul Bracq: "During my military service, I was stationed in the Black Forest. When I brought my commanding officer's service vehicle to Stuttgart for servicing, I introduced myself to Mercedes right there and then. The head developer at the time, Karl Wilfert, was impressed by me and my portfolio and so, at the age of just 24, I was appointed head of the design department—albeit for a rather small salary."



EVEN IN PAUL BRACQ'S DAY, MAHLE SUPPLIED ENGINE PARTS FOR THE MERCEDES SL. TODAY, THE MAHLE CLASSIC LINE PROVIDES HIS SON BORIS WITH THE ORIGINAL SPARE PARTS FOR THE NOW CLASSIC PAGODA. CLASSICLINE.MAHLE.COM

First magical moment

"For a designer, building a car is a fantastic playground, and profit is just a secondary concern," he explains. The challenge in designing the 600 was the balancing act between showcasing luxury and keeping it understated. Undoubtedly, that's something Paul Bracq did with success. The period of almost 20 years in which these cars were built, with only a few visual changes during that time, shows that Mercedes-Benz was happy with the 600—like numerous heads of state and stars of stage and screen.

The masterpiece

Paul Bracq's showpiece is undeniably the 230 SL. The crowning glory, which gives the car its nickname, is the removable hardtop. The concave form is reminiscent of the curved roofs of Far Eastern temples. That's why the new SL became known as the "Pagoda."

Bracq for the masses

The famous *Strich Acht* (stroke eight) made "Design by Paul Bracq" accessible to middle-income motorists. With almost two million units built, it's clear that the practical model met with broad approval—as a saloon, coupé, estate, or taxi.

New times for BMW

In 1970 in Munich, Bracq began to undertake a full visual makeover of the BMW brand. During the Olympic Games hosted by the city, BMW wanted to present itself as a dynamic, sporty manufacturer. The groundbreaking way in which Paul Bracq achieved this is still evident when you look at the E12, which kicked off the 5 Series that remains popular today and now includes the E12's larger and smaller siblings.

At the end of the interview, Paul proudly shows us an exclusive gem: a picture book of all his vehicle designs. We then say our farewells to Monsieur and Madame Bracq, who make their way home—in a little Peugeot.

We are moved and grateful for this personal and interesting insight into automotive history. From MPULSE, all the best to the Bracq family. We hope to see them again soon!

Get up close and personal with Boris and Paul Bracq in our video on the MAHLE YouTube channel or at mpulse.mahle.com in the section "SWEAT & GASOLINE."

NEW ON THE MARKET

We've made more additions to our 360° range for workshops. Here is a small selection of our new products. More new products and info can be found at mpulse.mahle.com ("New on the market" section).

#usethebestparts

» THERMOSTAT

Vehicle type:
Commercial vehicles
Manufacturer:
Volvo
Vehicle models:
FE, FE-II, FL-II, FL-III series
Part no.:
THD 6 75



BEHR® MAHLE®

» DIESEL GLOW PLUG CONTROLLER

Vehicle type:
Passenger cars
Manufacturer:
Dacia, Mitsubishi, Nissan, Opel, Renault
Vehicle models:
Various
Characteristic features:
Old material no.: PDR/8-12,
developed in accordance with the
EURO 5 standard,
generally fitted together with the ME 7,
guarantees a reduction in emissions
Part no.:
MHG 13



MAHLE®

» AIR FILTER

Vehicle type:
Commercial vehicles
Manufacturer:
MAN, Neoplan
Vehicle models:
MAN Lion's City;
NG-, NÜ series,
Neoplan Controliner
Characteristic features:
Flame-retardant properties,
successor to LX 619;
MAHLE is an OE supplier.
Part no.:
LX 619/1



KNECHT FILTER® **MAHLE®**

» ELECTRONIC UNITS

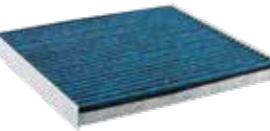
Vehicle type:
Passenger cars
Manufacturer:
Nissan, Opel, Renault
Vehicle models:
Various
Characteristic features:
Old material no.: RCS/8-12,
generally fitted together with the
MHG 13,
guarantees a reduction in
emissions
Part no.:
ME 7



MAHLE®

» CABIN AIR FILTER

Vehicle type:
Passenger cars
Manufacturer:
Toyota
Vehicle models:
Toyota Avensis, Toyota Corolla,
Toyota Corolla Verso
Characteristic features:
CareMetix®
Part no.:
LAO 157



MAHLE®

» DC MOTOR

Vehicle type:
NRMM (non-road mobile machinery)
EDS (electric drive systems)
Manufacturer:
HPI
Vehicle models:
HPI DC motor for hydraulic
applications in various vehicles
Characteristic features:
24 V 1.4 kW
Part no.:
MM 430



MAHLE®

» MAIN BEARING BUSHINGS

Vehicle type:
Commercial vehicles
Manufacturer:
MAN
Engines:
MAN D 0834, MAN D 0836
Characteristic features:
Euro 4-6
Part no.:
227 HL 21666 000



MAHLE®

» STARTER MOTOR

Vehicle type:
NRMM (non-road mobile machinery)
Manufacturer:
Deutz
Vehicle models:
Deutz motor for mobile and
agricultural machinery
Characteristic features:
24 V 6.5 kW
Part no.:
MS 821



MAHLE®

» VALVE

Vehicle type:
Commercial vehicles
Manufacturer:
Scania
Engines:
DC9 + DC13 series
Characteristic features:
Euro 5 & 6
Part no.:
061 VE 32006 000



MAHLE®

» TechPRO® DIGITAL ADAS

Vehicle type:
Passenger cars
Product characteristics:
1. Full camera calibration kit
1010601591XX
2. Full camera and radar calibration kit
1010601594XX
Calibration method:
Digital, patent-pending
Unit adjustment procedure:
Fully electrically controlled
Objective:
2017: 10% of the EU fleet
2020: 50% of the EU fleet
Coverage:
2019: up to 60%, 2020: up to 90%



BrainBee **MAHLE**
WORKSHOP SOLUTIONS

AFTER BURNER

**Latest reports, up-to-date news,
and other burning issues.**

"MAHLE Original" now known simply as "MAHLE"

There's always a MAHLE Original part on the inside if it says MAHLE on the outside. That's why, since January 1, 2019, our global sales brand has been known simply as MAHLE®.



E-bikes by MAHLE

At the end of 2018, MAHLE took over the pedelec specialist ebikemotion®. The strengths of ebikemotion® are the compact and lightweight rear wheel hub motors, as well as batteries and other components that can be integrated unobtrusively into the e-bike. You can find more information at ebikemotion.com.



New packaging: simple, clear, and compact

Bold colors and a clear design facilitate handling. Caution: During the transitional phase, there may be some overlap between the old and new MAHLE packaging. However, there's no danger of confusion: only MAHLE Original packaging will also have the MAHLE security label.



New automatic transmission oil service unit

With the ATX 150, MAHLE Aftermarket now offers a new entry-level model in the proven FluidPRO® line. The ATX 150 prevents mixing of different oil types. Using a specially developed hydraulic circuit linked to the software, you can safely transfer the ATX 150 with minimal fresh oil to a new transmission or a new type of oil.



**MPULSE ONLINE:
MPULSE.MAHLE.COM**

READER SURVEY THE WINNER IS ...

Thank you for taking part in the MPULSE reader survey! You've given us valuable information on how we can make MPULSE an even better read. We'd especially like to congratulate **Oskar Wilkowski** on winning the top prize in our competition! We hope you enjoy using the Sonos Play:1 multiroom smart speaker! Ten other readers will receive a MAHLE watch.



PRIZES, GAMES, INTERACTIVE STORIES

We've got a lot of great things in store for you this year at www.mpulse.mahle.com. You can look forward to a number of interactive campaigns, where you'll be able to put your own vehicle into the spotlight. Come and have a look or follow "mahlempulse" on Instagram to make sure you don't miss out.

IMPRINT

PUBLISHED BY:
MAHLE Aftermarket GmbH
Pragstraße 26–46
70376 Stuttgart/Germany
mahle-aftermarket.com

RESPONSIBLE FOR CONTENTS:
Olaf Henning

EDITORIAL MANAGEMENT:
Janika Ryssel

OTHER AUTHORS:
Jens Knorn, René Lehnert, Patrick Jennert,
Patricia Merl, Simone Boin, Tamara Schietinger,
Jan Reichenbach, Andrea Lupi, Filippo Ferrari,
Giovanni Martelli, Christian Küchlin

TEXT AND DESIGN:
FACT GmbH advertising agency | [www факт.агенсье](http://www факт.агенシー)

FOREIGN LANGUAGE MANAGEMENT:
Target Languages GmbH

PHOTOGRAPHS:
MAHLE Aftermarket GmbH, Stuttgart; title,
p. 3/16/17: VANDEMARS Entertainment, Berlin;
p. 3/22/23: HWA AG, Affalterbach; p. 14/15: Getty
Images/Science Photo Library RF; p. 26: Shutterstock/nd3000; p. 3: © Volker Wierzbäck/stock.adobe.
com; p. 10: © Cookie Studio/stock.adobe.com;
p. 12: © Volker Wierzbäck/stock.adobe.com; p. 19:
© deagone/stock.adobe.com; p. 26: © sveta/stock.
adobe.com; p. 31: © franz12/stock.adobe.com

PRINTING AND DISTRIBUTION:
studiodruck GmbH, Nürtingen

FREQUENCY OF PUBLICATION:
Semiyearly in March and September

Should you no longer wish to receive MPULSE, you can revoke your agreement concerning the usage of your personally identifiable information for advertising purposes at anytime, with effect for the future. To do this, please send a brief message to mpulse@mahle.com.

All rights reserved. Reproduction and publication in any form, including in electronic media and/or in the form of extracts, is only permitted with the express written consent of MAHLE Aftermarket GmbH. For more information and authorized copies, contact your personal MAHLE sales partner.

MAHLE

SEVEN STRONG BRANDS— FOR YOUR SUCCESS



WWW.MAHLE-AFTERMARKET.COM