

IMPULSE

MAHLE

Mobility
magazine
for the
repair shop

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—
SAVING THE CLIMATE

With fold-out poster on
replacing the compressor

—
WE ARE MAHLE

Up close, 25,000 times

—
**WE'RE THE
COOLEST!**

And the winning repair shop is ...

—
**THE BIG
REPAIR SHOP
BARBECUE**

Delicious barbecue recipes from all over the world





From professional to professional

Over the last year, we've broken new ground with our Aftermarket magazine—with a fresh new look, exciting stories, fun promotions, and valuable tips. Staying close to the customer—to you—is our mission. So in the second part of our “We are MAHLE” series, we present our sales team—your personal contacts.

Thermal comfort and thermal management are two of the main topics covered in this issue. We have also thrown in some very practical advice on increasing your sales this spring and summer. And we take a look at the great potential available to you in this area in the future. You'll also find a step-by-step guide to the perfect compressor replacement, which you can put up on the wall in your repair shop.

But recipes for success aren't the only thing you'll see in this MPULSE: we also have delicious barbecue recipes from colleagues all over the world, the legendary BIG MAHLE, and the coolest repair shop on the planet.

I hope you enjoy “devouring” this issue!

Olaf Henning
General Manager of MAHLE Aftermarket GmbH
and member of the MAHLE Management Committee

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GOOD BUSINESS CLIMATE

Mobility is changing, but one thing is certain: thermal comfort in the cabin remains a crucial factor. At the same time, efficient thermal management is becoming increasingly important—in the combustion engine and particularly in electric vehicles. MAHLE Aftermarket supplies the whole range and provides strong support. This MPULSE informs you about the latest developments in air conditioning, gives you tips on replacing the air conditioning compressor, and provides the best sales arguments for replacing the cabin filter and getting an A/C service at the spring check-up—so your repair shop business can continue to thrive.



»GOOD BUSINESS CLIMATE

CLIMATE CHANGE IN THE CAR

For a long time, the task of a vehicle HVAC system was to bring the air in the vehicle to a pleasant temperature. Today, the automatic systems that create a comfortable climate for each passenger are more and more sophisticated. With the ongoing trend towards electrification, these systems are becoming an increasingly integral part of the powertrain.

Thermal management in the downsizing engine

Downsizing allows fuel consumption to be reduced effectively. In order for this to work optimally, an intercooling system is required. Engine cooling affects the combustion process as intercooling takes place via a low-temperature coolant circuit. Engine cooling thus becomes thermal management—the process of controlling and regulating several circuits at different temperatures.

»**Summer operation:** The air conditioning circuit cools the interior to comfortable temperatures. As with the indirect intercooler, the air conditioning condenser can also be cooled indirectly using cooling water. This creates space in the front end of the vehicle.

»**Winter operation:** As with simple combustion engines, the availability of heat for the heating circuit is almost unlimited. The air conditioning circuit can be switched on to dehumidify and lubricate the system.



KEYWORD PTC HEATERS

PTC heaters ensure optimal thermal comfort and clear windows, even on cold starts, because they obtain their energy from the electrical system. High-voltage PTC heaters capable of delivering up to seven kilowatts are used in electric vehicles. PTC heaters have been part of MAHLE Aftermarket's range for a long time.



Separate tasks in the combustion engine

In a simple combustion engine, the air conditioning circuit and engine cooling are separated. The sole purpose of the engine cooling is to transport the heat that accumulates during combustion to the outside.

»**Summer operation:** Engine cooling protects the engine from overheating. The cabin is cooled to a pleasant temperature via the HVAC system's cooling circuit.

»**Winter operation:** The availability of heat for the heating circuit is almost unlimited. The air conditioning circuit can be switched on to dehumidify and lubricate the system.

A comfortable climate for every seat

Four-zone climate control allows the air volume to be regulated separately for each seat. The temperatures in the head and footwell areas are independently adjustable. Pleasant acoustics and draught-free ventilation are provided via a special comfort vent.

More efficient air conditioning = less fuel

In the past, the fuel consumption of HVAC systems averaged around 0.5 litres per 100 km over the year. Today's systems can make do with as little as 0.2 litres per 100 km. MAHLE's engineers are aiming to reduce this value even more by further improving the fuel efficiency of vehicles—independent of the amount of refrigerant used and the drive configuration.



Intelligent thermal management in the electric motor

In battery electric vehicles, the thermal management system needs to be optimised to conserve the cruising range of the battery. In the crucial fast charging process, up to 12 kW of heat is generated, which must also be absorbed by the cooling system. In plug-in hybrids, electric vehicles with range extenders, and battery electric vehicles, the powertrain doesn't generate sufficient waste heat in the electric drive mode to warm up the vehicle cabin. This is a challenge that doesn't occur with pure combustion engines, because there is always enough waste heat being produced. In an electric vehicle, a powertrain-independent heating system capable of delivering up to seven kilowatts is therefore required to ensure an adequate supply of heat, depending on the cabin size.

»**Summer operation:** Alongside battery cooling, the operation of the interior air conditioning in particular must be as energy efficient as possible. This can be achieved by optimising the control loop and air conditioning circuit.

»**Winter operation:** Since the motor produces virtually no waste heat, interior heating and cruising range are in direct competition. In the simplest case, the necessary heat is made available by a high-voltage heater installed on the air side. In electric vehicles, efficient electrical PTC heaters help to heat the cabin in a way that conserves the battery. The use of heat pumps can further improve the cruising range.



Electrification—a new challenge for air conditioning

Electric vehicles are creating entirely new challenges for air conditioning. On the one hand, the temperature-sensitive lithium-ion battery needs to be effectively protected against overheating as well as against excessively cold temperatures. On the other hand, the battery supplies all the energy for passenger comfort and battery temperature control in purely electric vehicles.

The optimal interior temperature of the battery during operation, including during charging, is between 0°C and +40°C. At temperatures significantly below or above this range, the battery ages more quickly and will need to be replaced before the end of its normal life. The HVAC system must therefore control the temperature of the energy storage system. The more electrified a vehicle is, the more expensive this is to do.



MEET – MAHLE EFFICIENT ELECTRIC TRANSPORT

At the IAA in September 2017, MAHLE demonstrated what an urban electric vehicle of the future with a highly efficient 48-volt twin-power drive unit might look like: the MEET concept vehicle. Naturally, this vehicle has extremely energy-efficient, climate-neutral thermal management. You can see how it works in a series of animations at mpulse.mahle.com. More info is available at meet.mahle.com.

Current battery cooling concepts

»With HVAC system refrigerant

The most compact method for cooling a battery is direct cooling using the refrigerant from the HVAC system's refrigerant circuit. A cooling plate that also acts as a refrigerant evaporator maintains direct contact with the lithium-ion cells inside the battery. The cooling passages on the plate have to be designed in such a way that evaporating refrigerant is available anywhere at any time, ensuring a consistent temperature between the cells.

»With engine coolant

Cooling using the engine coolant is the most flexible and energy-efficient method, in which coolant flows through the battery's cooling plate. The liquid is cooled in a secondary circuit via a "chiller" using evaporating air conditioning refrigerant. In winter, an additional low-temperature coolant cooler can take over the cooling.

Experience battery cooling in action with cool animations at mpulse.mahle.com.





»GOOD BUSINESS CLIMATE

SAVING THE CLIMATE

The air conditioning compressor isn't a typical wear part. Nevertheless, you'll see customers with compressor damage coming into your repair shop time and again. The cause, though, is rarely found in the compressor itself but in its periphery. Find out here what you should watch out for when replacing the compressor.

It's extremely important to always determine the actual cause of the damage so that you can completely eliminate the original defect and any consequential damage; otherwise, the compressor could fail again.

TYPICAL SIGNS OF A DAMAGED OR DEFECTIVE AIR CONDITIONING COMPRESSOR:

- › Customer complaints such as "poor cooling performance" or "loud noise when turning on the HVAC system"
- › Leaks

COMMON CAUSES OF FAILURE

- › Error code in the HVAC control unit or engine/central control unit, for example refrigerant pressure is too low or too high, electrical faults
- › Negative result in the A/C Performance Test with the MAHLE ArcticPRO® ACX A/C service unit
- › Insufficient compressor oil or refrigerant
- › Leaky air conditioning system
- › Solid matter contamination (e.g. chips)
- › Moisture in the air conditioning circuit
- › Mechanical damage
- › Electrical faults

REPLACING THE COMPRESSOR CORRECTLY

A customer complains about poor cooling performance, loud noises, or the complete failure of the HVAC system

- › Determine the cause of the failure: carry out the A/C Performance Test with the MAHLE ArcticPRO® ACX A/C service unit.
- › Read the fault memory of the HVAC control unit

Caution: This procedure should only be carried out by trained personnel. Gloves and protective glasses should be worn. No smoking. Do not perform procedure outside!

Compressor does not build up any pressure

- › Visually inspect all components for leakage or damage such as stone chips on the condenser, porous V-belts, or leaky pressure lines

Cause is in the compressor environment.

Fix defect.

Environment is OK.

Compressor is defective.

Caution: Refrigerant damages the environment and should not be released into the atmosphere! Never mix refrigerants R134a and R1234yf!

- › Extract refrigerant using the MAHLE ArcticPRO® ACX A/C service unit.

In the case of metallic abrasions, dark residues, incorrect oil, an unknown quantity of oil, non-approved UV contrast agent, and the like, flush the entire system. To do this, bypass the expansion valve or throttle and the dryer or accumulator. Always flush against the direction of flow. Follow the vehicle manufacturer's specifications for the duration and number of flushing cycles.

- › Remove the drive belt and compressor.

- › Flush the HVAC system.

- › Compare the old part with the new part.

Check the part number, oil and refrigerant approval, type, and electrical connections.

- › Discharge the oil from the old compressor and dispose of it in accordance with environmental regulations.

Caution: Use the quantity and type of oil specified by the manufacturer.

Tip: Prior to fitting, position the compressor upright for three minutes with the belt pulley downwards, so that all components are coated with oil inside the compressor before the HVAC system is started for the first time.

- › Fill the new compressor with oil.

- › Replace the components that were removed for flushing.

Caution: The condenser, expansion valve or throttle, and dryer or accumulator cannot be flushed and must be replaced!

Tip: Coat new gaskets with clean compressor oil.

- › Install the compressor, connect the leads and connector plugs, fit the V-belt.

Important: This removes residual moisture from the system.

Tip: During evacuation, change the cabin filter (e.g. the CareMetix®).

- › Evacuate refrigerant circuit using ArcticPRO®.

- › Add refrigerant to the system.

Caution: Use the correct amount of manufacturer-approved product!

- › Connect diagnostic tool for follow-up check.

– Set the blowers to the medium setting and maximum cooling performance; switch off the HVAC system.
– Start the engine and let it idle for two to three minutes (without the HVAC system).
– Switch on the HVAC system for 10 seconds, then switch it off for 10 seconds and wait (repeat 5 to 10 times).

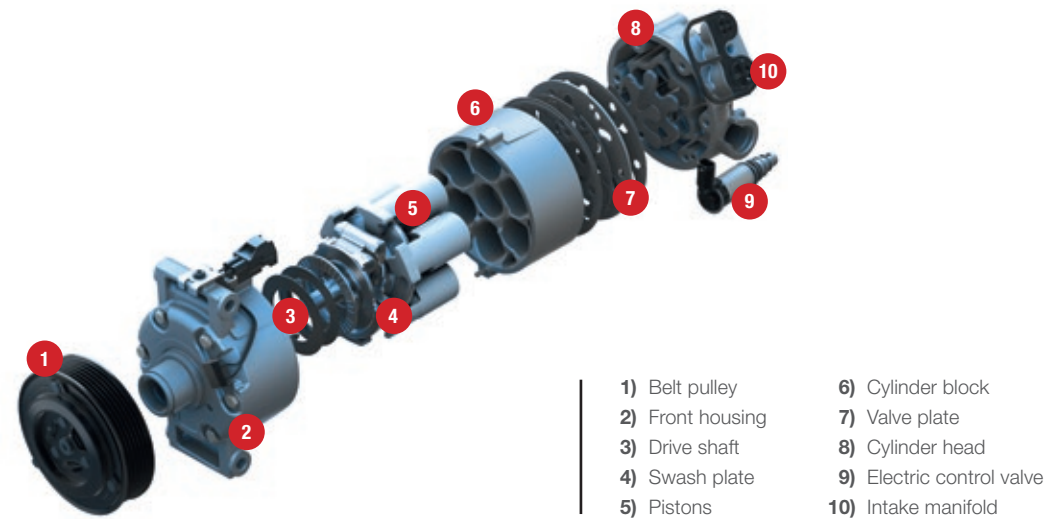
WATCH A COMPRESSOR REPLACEMENT

You can find the videos on MAHLE's YouTube channel. Fitting instructions and technical posters are available at mahle-aftermarket.com.

THE HEART OF AIR CONDITIONING: THE A/C COMPRESSOR

The compressor is the core component of vehicle air conditioning. It compresses the refrigerant, causing it to heat up. In this form, it's fed from the compressor to the condenser at the front of the vehicle and is cooled by ambient air and the fan. As it cools, the refrigerant changes to a liquid state and is then fed through the filter-dryer and cleaned. Any remaining water particles are

removed. The evaporator is located in the air duct inside the HVAC system. This is where the refrigerant changes its state once again, reverting to a gas. The evaporative cooling produced by this process is directed into the cabin and cools the interior. Finally, the refrigerant gas is returned to the compressor from the evaporator—and the cycle starts all over again.



- 1) Belt pulley
- 2) Front housing
- 3) Drive shaft
- 4) Swash plate
- 5) Pistons
- 6) Cylinder block
- 7) Valve plate
- 8) Cylinder head
- 9) Electric control valve
- 10) Intake manifold

WITHOUT THE RIGHT COMPRESSOR OIL NOTHING WILL WORK

The compressor oil has several important functions:

- > Lubricating the moving parts of the compressor
- > Cooling the compressor
- > Conserving all components in the air conditioning circuit
- > Improving the leak tightness of the air conditioning system

Caution: To ensure that oil circulates optimally in all operating ranges, synthetic refrigerant oils with a different viscosity are used with R134a and R1234yf. In belt-driven compressors (hybrid/electric), POE oils are normally used, as they aren't electrically conductive.



» SPRING CHECK-UP

THE BEST ARGUMENTS FOR REPLACING THE FILTER

Spring is often a good time for a new set of tyres. Here are the perfect arguments to encourage your customers to change their cabin filters too.

For people with allergies

As soon as spring comes around, the air is full of pollen again. This time of year is particularly problematic for people with allergies, but healthy people can also be affected by pollen.

The innovative MAHLE CareMetix® cabin filter makes the interior of any car a pollen-free zone. It does this without

using any substances that are harmful to health. Instead, the pH value of the filter medium is moved into the acid range. This makes the protein molecules of the pollen allergens harmless so they can no longer attach themselves to the body and trigger allergies. The anti-allergenic effect of CareMetix® has been proven time and again.



ON AVERAGE, AN ADULT BREATHEs IN 0.5 LITRES OF VENTILATED AIR PER BREATH DURING THE RESTING PHASE.

1,500,000

POLLEN The amount of pollen that just one breath can contain in springtime.

1x



15 GRAMS

The amount of dust and dirt absorbed by a MAHLE filter over 15,000 km. Who wants to have that in their lungs?



For busy people

Taking advantage of a tyre change to replace your cabin filter isn't just good for your health, but it also saves you the time and expense of an additional repair shop visit.

For people who are sensitive to odours

CareMetix® also filters out odours. Whether it's freshly manured fields or thick fog—your customers won't smell it at all, thanks to the odour firewall created by the innovative MAHLE filter.

For those who are health-conscious

Simply show your customers an old cabin filter. They'll be surprised at just how much dirt has been deposited there. If this dirt gets into the lungs, it can cause significant health problems. Cabin filters also eliminate mould and bacteria.

40 NEW CareMetix® FILTER TYPES ON THE MARKET FROM 2018

TIPS FOR FILTER REPLACEMENT

The assembly instructions are printed on the inside of the folding carton. Important: During installation, observe the correct air flow direction and the arrow on the filter. The filter layers are arranged from coarse to fine, so the installation direction is crucial.

You can find a great animation about how the cabin filter works and what happens when it's "full" at mpulse.mahle.com.



» SPRING CHECK-UP

THE BEST ARGUMENTS FOR AN A/C SERVICE

NO MAINTENANCE



LESS REFRIGERANT



LESS LUBRICATION



A POORER SEAL



HIGHER LOADS



POORER PERFORMANCE



MAJOR DAMAGE



SIGNIFICANT EXPENSE

Recommend that your customers have an A/C service in the spring so that they don't suddenly find themselves sweating in the summer. You've got some convincing arguments—particularly if the last service was two or more years ago.

- › Even if it is a closed system, the HVAC system loses about 10% to 15% of its refrigerant per year—particularly through the hoses and the many gaskets.
- › If there is too little refrigerant in the system, hardly any oil mist reaches the gaskets and hoses and they become brittle—and eventually leak.
- › And if there is too little refrigerant in the system, the compressor also suffers. In this case, the compressor has to work at full load but won't be able to achieve the necessary pressure and therefore the desired temperature in the vehicle.
- › The result: the compressor overheats. The refrigerant oil is damaged, coked, and its lubricity is considerably reduced. That's the end of the compressor: metallic abrasions and chips from the compressor contaminate the entire system. The HVAC system has to be completely flushed, and some components will need to be replaced. This costs time and money!

IMPORTANT

Your customers won't be able to check for themselves whether their vehicle has too little refrigerant. Yet the A/C service is often not a prescribed part of regular maintenance. So it's a good idea to use the tyre change appointment to offer your customer an A/C service.

A/C SERVICE WITH MAHLE ArcticPRO®

Extracting: With our A/C service units, you can easily check how much refrigerant is in the system. The unit does this by extracting the refrigerant. The built-in precision scale determines the exact quantity.

Replacing and testing: After extraction, the system is unpressurised and the filter-dryer can be replaced. The vacuum pump of the MAHLE A/C service unit then creates a vacuum throughout the refrigerant circuit. This deep vacuum removes residual moisture from the system and simultaneously acts as a leak tightness test: if the vacuum doesn't change, the system is leak tight.

Replenishing: After the checks have been performed, the MAHLE A/C service unit runs in automatic mode and refills the system with precisely the prescribed quantity of refrigerant. In addition, it replaces the exact amount of refrigerant oil that was lost in the extraction process with fresh refrigerant oil.



FOLLOW THESE TIPS TO STAY COOL ALL SUMMER

- › **COOL DOWN** If the car is parked in the sun, first open all the windows to let out the build-up of heat. Only then turn on the HVAC system and close the windows. This saves a lot of energy, protects the system, and shortens the cooling time.
- › **REPLACE** The cabin air filter should be replaced at every vehicle service, or at least every 15,000 km. It's best to do this in the spring, to eliminate the contaminants accumulated during the cold season. This enables the HVAC system to work more efficiently over the summer and "breathe deeply".
- › **PROTECT** An A/C service should be performed every two years. This ensures that there is always enough refrigerant in the system—for long-lasting and reliable functionality of the HVAC system.



I ONLY LET MAHLE TOUCH MY ENGINES

Interview with Mario Linke
 Owner of Methusalem
 Automobil-Restaurierung
 (automobile restoration),
 Cologne/Germany



Mario Linke restores and maintains iconic racing cars from the 1950s and 1960s—primarily Italian vehicles such as Maseratis and Ferraris as well as Porsches. But these rare and expensive models are no exhibition pieces—at Grands Prix for vintage cars, they show that they've still got what it takes. To get his legends fit for racing, Mario Linke chooses engine parts from the MAHLE Classic Line. We interviewed him at his repair shop, which he has managed since 1988. The former locomotive shed dating back to 1906 is a real rarity.



NEW FROM THE MAHLE CLASSIC LINE

- › Manufacture of small quantities now available
- › Rapid production of parts on request
- › New, expanded catalogue for Retro Classics in Stuttgart/Germany (March 2018)
- › Classic range expanded to include MAHLE's complete product range



THE FULL INTERVIEW WITH MARIO LINKE (left) at mpulse.mahle.com.

MAHLE: Mr Linke, why did you decide to specialise in classic motorsports?

Mario Linke: Well, it's logical that someone who loves technology would eventually end up in motorsports. After all, motorsports have always been renowned for the highest quality, the greatest technical demands, and the most important technical advances. Especially in the first few years after the war, of course, when development took off so quickly. That's how I came to specialise in vehicles from the 1950s and 1960s. These cars trace the history of technology and tell stories of times gone by. When it comes to engines and transmissions, I think motorsports is the most attractive field to be involved in.

MAHLE: The vehicles you work on are still used for racing. So you need engine components of the highest quality. What made you choose MAHLE?

Mario Linke: MAHLE is the global market leader in this field. So it's wonderful that such a large, well-established manufacturer is refocusing on its traditions. Unfortunately, that's not always possible nowadays in large corporations. It took some time for MAHLE to do this, but now things are looking great with the MAHLE Classic Line.



FACTS ABOUT THE VINTAGE CAR MARKET

- › The number of vintage cars is increasing by 10% to 17% each year.
- › Demand for spare parts is growing rapidly.
- › The MAHLE Classic Line currently includes more than 1,600 vehicle applications, and these are being expanded further.
- › Old cars are becoming more and more popular, even among young people.

MAHLE: Is it difficult for you to obtain spare parts?

Mario Linke: No, not with MAHLE as a partner. We always spend a long time looking for partners like this, and we're happy to have found MAHLE.

MAHLE: You've been focusing on Maserati, among others.

Mario Linke: Yes, this year, we restored the last Formula 1 car that Maserati constructed, in 1958. We'd been using the Maserati 250F, which was driven by Juan Manuel Fangio, for racing since 2002. Over the years, I've had a total of five 250Fs in the repair shop, including Stirling Moss's car. We refurbished all the engines.

MAHLE: You also worked on the Porsche Fuhrmann engine, equipped with parts from MAHLE.

Mario Linke: Yes, it's one of the most elaborate and technically demanding engines ever built. It has the highest number of moving parts per cylinder. There are MAHLE pistons in this engine too. Since the end of the 1990s, when I started specialising in racing engine construction, every piston we've used has come from MAHLE, naturally. And now we also get our bearings and bushings from MAHLE.

MAHLE: You compete in races with the vehicles you work on. What's happening in that area right now?

Mario Linke: In Le Castellet/France, we took part with three vehicles: a Porsche 904, a Maserati 300S, which was the winning car from Cuba, and a Maserati Tipo 63 Birdcage. Recently, we were at the Oldtimer Grand Prix at the Nürburgring in Germany and won both races there with the Maserati Birdcage. This year, we'll be in Monaco and Le Mans/France.

MAHLE: Then we wish you all the very best with your racing and many thanks for the interview, Mr Linke!

TOTALLY AMPED UP: THE COOLEST REPAIR SHOP

In the last issue of MPULSE, we were looking for the coolest repair shop on the planet. And now we've found it: the training workshop at the BBS I Uelzen vocational school in Germany. The winners are already using their well-deserved first prize.

The members of our panel were excited as soon as they read the application:

"The students at our one-year professional vocational school for automotive engineering are AMPED UP! Amped up for input, amped up for everything that involves moving parts, and amped up for anything to do with cars! With any luck, our amped-up boys will be voted the coolest and can soon launch their professional careers with even more expertise under their belts."

Uwe Moldenhauer,
Master vehicle technician, training supervisor,
and on-the-job training instructor at BBS I Uelzen

It's wonderful when an instructor sees his students as future heroes of the lifting platform—and lays the necessary foundations with extensive and high-quality training. MAHLE felt this deserved the top prize: the pimped-out ACX 150, which really makes learning enjoyable.



**One of a kind worldwide:
the pimped-out ACX 150**

- > Underbody lighting
- > Engine noise
- > Rims and much more

"The new equipment opens up a wealth of possibilities for enhancing the sustainable vocational training offered at BBS I Uelzen. The next generation of specialists will receive very practical training in resource conservation!"

Stefan Nowatschin, Head of the Regional Competence Centre for sustainable vocational training in the rural district of Uelzen.

A hot tip for novices and newcomers

In 2017, more than 50 students commenced their training in automotive engineering at BBS I Uelzen. In addition to two theory days and one day at the factory, the trainees spend two days per week gaining professional experience at the school's own repair shops. They are given work assignments in the learning areas of "Foundations of Electrics", "Diagnostics", "Mechanics", and "Care & Maintenance". The teams then work independently to find a solution.

The cool MAHLE ACX is used in the "Care & Maintenance" learning area. Technical instructor Uwe Moldenhauer explains the lessons at the training workshop: "The vehicles owned by the school are manipulated by the instructors so that the trainees can then use them, for example, to carry out a diagnosis, extract refrigerant, or refill the system—and the idea is that they hand over a functioning vehicle at the end."

>> CONGRATULATIONS AND THANK YOU

to all heroes of the lifting platform who took part in our competition!



The other winners are listed under SWEAT & GASOLINE at mpulse.mahle.com.



FITNESS CHECK FOR AGRICULTURAL MACHINES

The next harvest is always sure to come, and everything has to go perfectly. So spring is the ideal time to carry out a thorough fitness check on agricultural machines. This also includes taking a close look at starter motors and alternators. These parts are actually maintenance-free, but connection and assembly faults, defects in surrounding parts, heavy contamination, or overload can still result in damage. This could potentially lead to an expensive false start to the harvest season. Here you'll find the most common causes of defects and how you can fix them.

WHAT YOU SHOULD KNOW

- › MAHLE Aftermarket's range for agricultural and construction machinery includes not only starter motors and alternators but also air conditioning compressors and turbochargers
- › Over 80% coverage with starter motors and alternators, including for trucks
- › More than 50 years of MAHLE competence in starter motors and alternators, dating back to the former companies ISKRA and Letrika



TOP FAILURE REASONS FOR STARTER MOTORS

1. OVERLOAD

- › Thermal overload due to actuating for too long
Solution: Actuate the starter motor for max. 30 seconds, then allow it to cool for two minutes (see Technical Messenger 02/2017).
- › Mechanical overload due to starting when the engine is coming to a stop
Solution: Install a starter/lockout relay.

2. DEFECTS IN THE STARTER MOTOR ENVIRONMENT

- › Defective battery
Solution: Test and replace the battery.
- › Corroded wiring (contact resistance too high)
Solution: Clean corrosion from connections and attach new cable grips if necessary.
- › Key switch defective
Solution: Replace key switch.
- › Defective cube relay (sometimes too weak, can get stuck).
Solution: Replace cube relay.

3. HEAVY CONTAMINATION, FLUID INGRESS

- › **Solution:** Repair leaks.
- › Always thoroughly clean up engine oil, diesel, and hydraulic residues.

4. CONNECTION FAULT

- › Smoulder or fire damage to electric components: clamp 45 (flat plug) for monitoring the starting process is often mixed up with clamp 50 (start control).
Solution: Mark connections and cables if necessary (see Technical Messenger 09/2017).



TOP FAILURE REASONS FOR ALTERNATORS

1. CONNECTION FAULT

- › While battery was still connected, alternator came into contact with live housing; burning marks are visible.
Solution: Always disconnect the battery; electrical circuit must always be de-energised.
- › Cables have been swapped; connections are incorrect.
Solution: Mark connections and cables.

2. DEFECT IN THE ALTERNATOR ENVIRONMENT

- › Defective battery
Solution: Test and replace the battery.
- › Corroded wiring (contact resistance too high)
Solution: Clean corrosion from connections and attach new cable grips if necessary.

3. HEAVY CONTAMINATION, FLUID INGRESS

- › **Solution:** Always cover the alternator with a rag when changing the oil filter. Find and fix all leaks in and around the engine, fuel system, and hydraulic system. Always thoroughly clean up engine oil, diesel, and hydraulic residues (see Technical Messenger 06/2017).

4. ASSEMBLY DEFECT

- › Belt pulley was tightened with fork/open-end spanner, shaft causes abrasions in the area around the ball bearing.
Solution: Tighten the belt pulley with a torque spanner (as per manufacturer's specifications).

VALUABLE ASSISTANCE AND ONLINE ADVICE

Operation and installation videos are available on MAHLE's YouTube channel. You can find fitting instructions and Technical Messengers at mahle-aftermarket.com.

MORE AUTOMATION MORE SALES

Automatic transmissions are rapidly gaining ground, offering greater convenience and efficiency. In the last five years, the global production of vehicles with automatic transmissions has grown by around 40%. Demands on service have also increased, thus ensuring that the ever more complex automatic transmissions last longer and work perfectly.

Almost a quarter of newly registered vehicles in the EU are currently equipped with an automatic transmission. Hybrid drives, autonomous driving, and CO₂ reduction goals will make this trend even more pronounced. At the same time, more and more manufacturers are changing their guidelines on transmission oil—moving away from a strategy of filling it to last throughout the service life towards changing it regularly or as needed. Just like all operating media in the vehicle, transmission oil is subject to ageing and wear and can cause expensive damage

to the transmission if the prescribed service intervals aren't observed.

What does this mean for your repair shop? In the future, your customers will be requesting an automatic transmission service more frequently—in connection with maintenance intervals or, for example, because the transmission moves jerkily when changing gear or driving behaviour has deteriorated. You can also raise the topic of changing the transmission oil proactively with your customers, thus offering them a better service.

“The dynamic method is often the only way to eliminate minor gearbox malfunctions, such as jerking or slight slips caused by old or soiled oil.”

*Rafał Sosnowski, automatic transmission expert
Sosnowski repair shop*

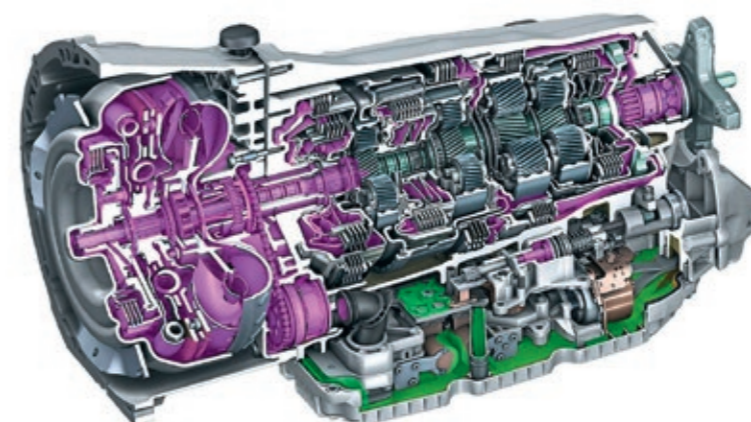
DYNAMIC OIL CHANGES ARE THE FUTURE

What happens at your repair shop when you carry out an oil change in an automatic transmission? Do you open the oil drain plug and remove the oil sump? That's what's known as a static oil change. This only replaces around 30% to 50% of the oil. In fact, it results in the old oil being mixed with new oil rather than being replaced. In a dynamic oil change using an automatic transmission flushing unit, you can replace 90% to 100% of the oil.

With the ATX 180 transmission oil service unit, MAHLE makes dynamic transmission oil changes easier and quicker than ever before. More about this on the next page.

YOUR CUSTOMERS WILL NOTICE THE DIFFERENCE

Customers would rather invest in an oil change that costs 400 euros than risk having to replace the entire transmission. Following the service, motorists see an immediate improvement in the transmission's switching behaviour.



Comparison of oil change methods

Static oil change (green):

30%–50% of the oil is replaced

Dynamic oil change (purple+green):

90%–100% of the oil is replaced



AUTOMATIC TRANSMISSION SERVICES MADE EASY

MAHLE provides a complete range for professional automatic transmission oil services: with the ATX 180 transmission flushing unit, you can automate the entire process. Of course, you will be given comprehensive training by MAHLE beforehand. Various adapter sets give you access to all the possible applications. And we supply the right MAHLE transmission oil filters so that you can change the filter too. The unit removes abrasions from the transmission and provides important protection against damage. All of this helps to ensure that your customers remain satisfied in the long term.



An investment that quickly pays off: with one or two transmission services per week, the investment will pay for itself within three to six months.

Do you have questions about the ATX 180? You'll find answers here: support-workshop-equipment@mahle.com



The ATX 180: packed with benefits

- › Almost a 100% fluid replacement with each use.
- › Clear indication of oil quality and transmission oil pressure during the service.
- › Precise control of flushing quantity with the double weighing principle.
- › No oil contamination—thanks to two pumps, separate oil circuits, and a short automated process that cleans the circuit. This requires only around one litre of the new oil.
- › Change oil types easily with the removable oil tanks.
- › A service time of just 5 to 15 minutes guarantees higher sales.
- › Hose connections are checked automatically and adjusted to the direction of flow before every service—no need to change this manually any more.
- › Automatic temperature control of the transmission oil—the flushing process starts automatically as soon as the oil has reached the correct temperature.
- › Dipstick mode: alternative oil change method via the oil guide pipe.
- › Integrated process for removing the oil sump and changing the transmission oil filter.
- › The intelligent ATX guide database quickly provides detailed information on the relevant vehicle specifications and service information such as oil type, fill levels, adapters, and filters.
- › The ATX 180 contains our E³ technology: Ecological x Economical x Efficient.

“We carry out between three and five oil changes a day. This is one of our most profitable business areas. In our case, the purchase of the machine paid for itself within several months.”

*Rafał Sosnowski, automatic transmission expert
Sosnowski repair shop*



ALMOST 90% OF ALL AUTOMATIC TRANSMISSIONS ON THE MARKET ARE COMPATIBLE WITH THE MAHLE ATX 180.

RECOMMENDATION: REPLACE AND FLUSH THE TRANSMISSION EVERY 60,000 KM OR EVERY FOUR YEARS.

REPAIR SHOP BARBECUES THROUGHOUT THE WORLD

AFTER A LONG DAY AT WORK IT'S BARBECUE TIME

As the days get warmer and longer, barbecue fever takes over at more and more repair shops. We've been on a mission to find the best barbecue recipes to try out at your repair shops around the world. And we have four hot tips for your next after-work barbecue.

LAMB SOUVLAKI FROM GREECE



The recipe for this Mediterranean delicacy comes from a repair shop in Athens that specialises in engines and has relied on MAHLE for many years.

INGREDIENTS

For a perfect traditional Greek lamb souvlaki, the crucial element is the marinade.

- > Marinade: olive oil, salt, pepper, oregano, thyme, lemon juice, garlic, onions (all mixed together)
- > Lamb (leg or shoulder)

PREPARATION

- > 1. Leave some wooden souvlaki skewers to soak in water for a couple of hours so they don't catch fire when placed on the barbecue.
- > 2. Cut the meat into bite-sized pieces and marinate.
- > 3. Leave to cool in the fridge for three hours so that the meat takes on the Mediterranean flavour of the marinade.
- > 4. Then put the pieces of meat on the skewers and barbecue for four to five minutes on each side on a high heat.



"BRAAIBROODJIE" FROM SOUTH AFRICA



This recipe for the incredibly tasty South African grilled cheese sandwich comes from a repair shop in Fochville, south-west of Johannesburg. In South Africa, sandwiches aren't just an accompaniment—they're the highlight of the barbecue.

INGREDIENTS

- > Bread for toasting
- > Butter or margarine
- > Cheese slices
- > Tomatoes
- > Onions
- > Salt and black pepper
- > Chutney

PREPARATION

- > Butter a slice of bread.
- > Cover with cheese slices, tomatoes, and onions.
- > Sprinkle with salt and black pepper.
- > Spread chutney on the second slice of bread.
- > Put the sandwich together.
- > Place on the barbecue and cook until golden brown on both sides.



“BISTECCA ALLA FIORENTINA” FROM ITALY



What do real gearheads need after a long, hard day's work? A juicy steak, of course! This recipe for a Florentine-style steak comes from a repair shop in Reggio Emilia, 160 km north of Florence.

INGREDIENTS

- > 1 kg beef sirloin
- > Olive oil, salt, pepper, rosemary

PREPARATION

1. Two hours before cooking, take the steak out of the fridge and dab with kitchen roll.
2. Heat up the barbecue, and once the charcoal is a little “ashy”, place the meat on the grill. Cook for 3–5 minutes on one side, depending on the thickness.
3. Now turn the steak over and cook for 3–5 minutes on the other side. If the meat is very thick, leave the steak on the barbecue with the bone upright for a further 1–2 minutes. After that, the steak will be done.
4. Remove from the barbecue and leave to stand for a few minutes. Then cut and season with olive oil, salt, pepper, and rosemary.
5. The steak tastes great with roasted garlic potatoes, which can also be cooked on the barbecue.



THE “BIG MAHLE” FROM STUTTGART



How do you make an ordinary burger into a BIG MAHLE? Serge Gilger, manager of the MAHLE canteen in Stuttgart, has found an answer that's just as delicious as it is unusual. He created a blue and red burger using completely natural ingredients and

no added food colourings. We want to share the recipe and the unique taste experience with you. Have fun barbecuing, and bon appétit!



INGREDIENTS FOR APPROXIMATELY EIGHT BIG MAHLES

FOR THE BURGERS:

- > 8 bread rolls of your choice
- > 1 kg fresh minced beef
- > 200 g red pepper, diced
- > 2 eggs
- > 1 bread roll, soaked in water
- > 1 finely chopped red onion & 1 clove of garlic
- > Seasoning: salt, pepper, paprika, chilli, hot mustard, parsley

FOR THE FILLING:

- > Radicchio
- > Red onion
- > Red cabbage
- > Tomatoes
- > Radish sprouts
- > Blue cheese

FOR THE SAUCE (APPROX. 600 ML):

- > 300 ml ketchup
- > 500 g blueberries
- > 1/2 jar blueberry jam
- > 200 ml cola
- > 1/2 onion
- > 1/2 tsp cinnamon
- > 1 tbsp sugar
- > Olive oil
- > Black pepper
- > Chilli, finely chopped

PREPARATION

THE BLUEBERRY BBQ SAUCE:

- > Finely chop the onion and sauté in the olive oil.
- > Add the blueberries and cola, and bring to the boil until the sauce thickens.
- > Now add the ketchup, the finely chopped chillies, the blueberry jam, and the sugar.
- > Season using the ingredients listed above.
- > Simmer for around 30 minutes on a low heat until the desired consistency is reached, then blend to a puree. All done!

THE MEAT:

- > Soften the onions and garlic until translucent, then add the chopped parsley and diced pepper.
- > Place the mince in a bowl, add the onion and pepper mixture followed by the bread roll and eggs, season

to taste (e.g. with 1 tbsp hot mustard), and knead thoroughly.

- > Form the patties from this mixture and grill or brown in the pan for around 5 minutes per side. All done!

CONSTRUCTION OF THE BIG MAHLE

1. A little sauce on the bread roll, halved lengthways
 2. Radicchio leaf
 3. Patty
 4. Blue cheese
 5. Sauce
 6. Tomatoes
 7. Red onion
 8. Sliced red cabbage (raw and sprinkled with salt)
 9. Radish sprouts
 10. Top of bread roll (a skewer can be used to hold the burger together)
- > Blue potato wedges taste great as a side dish. Bon appétit!



WE ARE MAHLE

UP
CLOSE
25,000
TIMES

ON SITE FOR YOU WORLDWIDE: OUR MAHLE AFTERMARKET SALES TEAM

In the last MPULSE, we presented some of our colleagues from the different product divisions. In this issue, you'll get to know our sales employees. With more than 25,000 sales partners, we're up close to your wishes and needs—wherever your repair shop is.

MAHLE Aftermarket in figures:

» 25,000

SALES PARTNERS

» 169,500

sqm LOGISTICS AREA

» 100%

PASSION

» 10,000

CUSTOMERS SUPPLIED
IN 143 COUNTRIES IN 2017

» 8

SALES OFFICES

» 17

LOGISTICS LOCATIONS

» 6

BRANDS





NIKO JOHANNIDIS

Sales Manager Central Europe
niko.johannidis@mahle.com

“We implement your requirements successfully in the market.”



GEORGES MOURAD

Sales Manager Western Europe, Middle East, and Africa
georges.mourad@mahle.com

“My team and I give 100% for more than 1,000 customers.”



FRANCESCO BENATTI

Sales representative for the aftermarket in Italy for alternators, starter motors, and electric motors
francesco.benatti@it.mahle.com

“What drives me: I want to find the best, fastest, and most economical solution for you.”



SVEN VOGEL

Sales representative for the Southeast Europe region
sven.vogel@mahle.com

“Even after 27 years, my job is exciting every single day. We work together as a team to ensure long-term success.”



KAREN BASSIEN-WINTERSTEIN

Sales representative for the West and Central Africa region | karen.bassien@fr.mahle.com

“I travel across the world for you and your requirements. If you're happy, I'm happy.”



ECKART FRITZ

Sales Manager Eastern Europe
eckart.fritz@mahle.com

“We are on the road throughout eastern Europe for you with our highly motivated team.”

Questions about the MAHLE Sales team? Simply contact the sales employee responsible for your region or get in touch via info@mahle-aftermarket.com. We look forward to hearing from you.

NEW ON THE MARKET

We are consistently expanding our successful range aimed at repair shops. Here we present a small selection of our new products. More new products and info can be found at mpulse.mahle.com ("New on the market" section).

» PISTONS

Vehicle type:
Pass. car
Manufacturer:
BMW
Vehicle models:
330 d, 530 d, X3 3.0 D, X5 3.0 D,
and many more
Characteristic features:
Piston with cooled ring carrier,
cooling passage, and graphite coating
Part no.:
081 PI 00102 001



MAHLE
ORIGINAL

» PISTONS

Vehicle type:
LCV (light commercial vehicle/
small van)
Manufacturer:
Fiat
Vehicle models:
Ducato 3.0 D, Iveco Daily IV/V/VI,
Citroën Jumper 3.0 HDI
Characteristic features:
Piston with ring carrier and cooling
passage, graphite coating
Part no.:
007 PI 00102 001



MAHLE
ORIGINAL

» HOUSING THERMOSTAT

Vehicle type:
Pass. car
Manufacturer:
VW
Vehicle models:
Beetle, Golf, Jetta
Part no.:
TH 53 75



BEHR **MAHLE**
ORIGINAL

» TRANSMISSION OIL FILTERS

Vehicle type:
Pass. car
Manufacturer:
Audi, Seat, Skoda, VW
Vehicle models:
A3, Alhambra, Altea, Altea XL,
Beetle, Caddy III, CC, Eos,
Golf IV, Golf Plus, Golf V, Golf VI,
Golf VII, Jetta III, Jetta IV, Leon,
New Beetle, Octavia, Octavia II,
Octavia III, Passat, Scirocco,
Sharan, Superb II, Tiguan,
Toledo III, Toledo IV, Touran,
TT, Yeti
Characteristic features:
For DQ250
Six-gear DSG transmission
Part no.:
HX 132D eco



MAHLE
ORIGINAL

» AIR FILTERS

Vehicle type:
Pass. car
Manufacturer:
Renault
Vehicle models:
Espace V, Grand Scenic,
Megane IV, Scenic IV, Talisman
Characteristic features:
Square panel insert with bevel cut
on the long side and fleece coating
Part no.:
LX 4297/1



MAHLE
ORIGINAL

» TURBOCHARGERS

Vehicle type:
Pass. car
Manufacturer:
Volkswagen
Vehicle models:
Seat Cordoba, Seat Ibiza,
Scoda Fabia, VW Polo
Part no.:
030 TC 17345 000



MAHLE
ORIGINAL

» TURBOCHARGERS

Vehicle type:
Com. veh.
Manufacturer:
Renault Trucks
Vehicle models:
Renault Trucks Manager,
Kerax, C series, Maxter,
Major
Part no.:
209 TC 17844 000



MAHLE
ORIGINAL

» AIR CONDITIONING COMPRESSORS

Vehicle type:
Pass. car
Manufacturer:
Opel, Vauxhall
Vehicle models:
Opel: Astra, Combo, Corsa, Meriva,
Tigra, Zafira
Vauxhall: Astra, Corsa, Meriva, Tigra,
Zafira
Characteristic features:
MAHLE 6CVC compressor
(Compact Variable Compressor
with 6 pistons)
Part no.:
ACP 45



MAHLE
ORIGINAL

» AIR CONDITIONING COMPRESSORS

Vehicle type:
Pass. car
Manufacturer:
Opel, Vauxhall
Vehicle models:
Opel: Astra, Corsa
Vauxhall: Astra, Corsa
Characteristic features:
MAHLE 6CVC compressor
(Compact Variable Compressor
with 6 pistons)
Part no.:
ACP 59



MAHLE
ORIGINAL

» AUTOMATIC TRANSMISSION SERVICE UNIT

Vehicle type:
Pass. car
Manufacturer:
All passenger cars with automatic transmissions
Vehicle models:
All passenger cars with automatic transmissions
Characteristic features:
Service unit for dynamic oil flushing of automatic
passenger car transmissions. Fully automated
process, ATX guide with all relevant service data
for intuitive operation, "Zero cross" concept to
ensure purity during oil type changes
Part no.:
ATX 180



MAHLE

A BIG DEAL:

OUR TRUCK RANGE

MAHLE Aftermarket is consistently expanding its range for commercial vehicles, which means you can always count on the quality and reliability of MAHLE products in your repair shop. Read on to find out what's new.

STARTER MOTORS & ALTERNATORS

In 2018, we will achieve a coverage of over 80% with starter motors and alternators for commercial vehicles. We currently plan to introduce 15 new types of each. This is underpinned by MAHLE's Corporate Planning, which aims to significantly strengthen our activities in the area of electronics and mechatronics. Originally, we started out with starter motors and alternators for agricultural machinery. These are more robust and designed for a longer service life. Your commercial vehicle customers will benefit from this if you install our MAHLE products.

FILTERS:

CareMetix® cabin air filters

Following the huge success of CareMetix® in the passenger car segment, we are working hard to further develop this world first in cabin air filters for heavy-duty commercial vehicles. After all, truck drivers spend more time in the vehicle cabin than anyone else. So from a safety at work perspective, it's extremely important to protect the respiratory tract. The CareMetix® broadband filter keeps bacteria, mould, pollen, fine particulates, and even unpleasant odours out of the cabin. You can expect the first filters for

your commercial vehicle customers to become available from May 2018.

We are focusing on the current models of the seven major manufacturers.

Air filter LX 2810

This special item for MAN trucks has been in our aftermarket range since the start of 2016. The patented LX 2810 in OEM quality has a distinctive horseshoe shape that sets it apart from the classic round air filters in the commercial vehicle segment.

KX 400 D Eco/KX 400 KIT/ KX 406 KIT fuel filters

For these fuel filters in our aftermarket range, we are an OE supplier for the current Mercedes-Benz Actros, Arocs, and Antos models from Daimler. A patented PIN element makes it easier for you to change the filter correctly. When carrying out the change, the PIN glides and fits precisely into the intended opening of the housing, for guaranteed leak tightness and a clean job. We also have the corresponding oil filter OX 423/9D Eco, including PIN patent, in our range.

TURBOCHARGERS

At MAHLE Aftermarket, we have been developing turbochargers in original equipment quality for well over 10 years. In the truck segment, we are even the market leader in aftersales with a coverage of more than 50%.

Special considerations when replacing a commercial vehicle turbocharger

Many non-controlled commercial vehicle turbochargers are delivered in "zero position", which means that with some models, you have to manually adjust the position of the housing according to

FACTS ABOUT MAHLE FILTERS

Market coverage greater than 90% for all filter types*

- › Oil filters **94.1%**
- › Fuel filters **93.5%**
- › Air filters **92.5%**
- › Cabin filters **91.1%**

Number of filter types for commercial vehicles: 634

- › Commercial vehicles: **447**
- › Agricultural and construction machinery: **187**

OPERATING DATA OF A COMMERCIAL VEHICLE TURBOCHARGER

- › Rotor speed: up to 130,000 rpm
- › Charge air temperature: up to 220°C
- › Exhaust gas temperature: approx. 700°C
- › Power output range: 50 to 1,000 kW

*For the 10 largest com. vehicle manufacturers.

the installation position and application (i.e. you need to rotate the turbocharger so that it can be installed in your vehicle). You can find all the relevant info about the requirements for commercial vehicle turbochargers in our Technical Messenger (05/2017) at mahle-aftermarket.com.

MAHLE supplies specific mounting kits for every turbocharger.

You can find the turbocharger installation video on MAHLE's YouTube channel.

PRAXIS LIVE! BY PROS FOR PROS

Since the end of 2016, the training and technology centre of the Heilbronn Chamber of Trade (BTZ) in Germany has included our new practical training concept in its offering. Traditional classroom-style learning is a thing of the past—PRAXIS live is a new concept featuring the MAHLE Aftermarket technology experts! The participants move around a number of different stations to investigate broken turbocharger shafts, for example, or melted pistons. Their task is to identify the cause of the damage and work out how the damage could have been avoided. Below you can read some first-hand accounts of the practical benefits you'll get from this concept—from the participants of the "Damage prevention in the engine environment" training course.

"Other courses just show you lots of pictures. With MAHLE, you have the piston and bushing right there in your hand. You can feel how the turbocharger components fit together. This methodology sets it apart from other training courses."

Lothar Rosenbusch,
Instructor in vehicle technology for 17 years,
BTZ Heilbronn

"The course included many detailed practical scenarios. We saw some components that were heavily damaged, like nothing we'd seen before. I immediately recommended this training course to others."

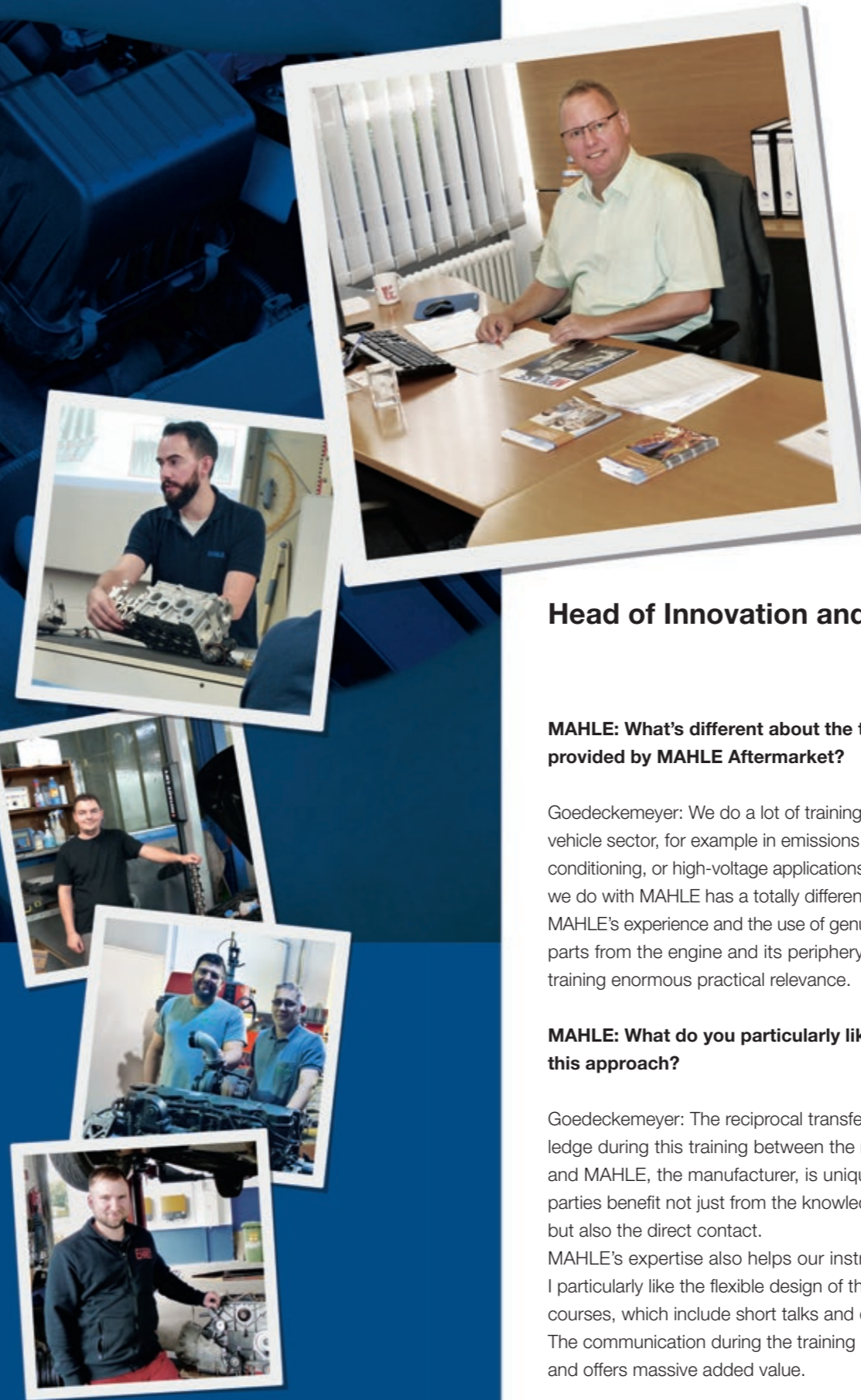
Ralf Stegmeyer,
Working in the motor vehicle industry for
more than 30 years,
Owner of ET Reman GmbH, Heilbronn/Germany

"I now have more background knowledge, specifically as a result of the training, and can be more proactive and explain to my colleagues what they need to watch out for when assembling engines."

Heiko Meyer,
Working as a vehicle mechanic for more
than 10 years,
VW repair shop

"It was extremely interesting to see cases of damage from the other side. How the manufacturer carries out testing and how you deal with warranty parts."

Daniel Pfefferle,
Car mechanic at Autohaus Ehret,
Bretzfeld/Germany



4 QUESTIONS FOR MARTIN GOEDECKE MEYER

Head of Innovation and Technology at BTZ Heilbronn.

MAHLE: What's different about the training provided by MAHLE Aftermarket?

Goedeckemeyer: We do a lot of training in the motor vehicle sector, for example in emissions testing, air conditioning, or high-voltage applications. The training we do with MAHLE has a totally different approach. MAHLE's experience and the use of genuine damaged parts from the engine and its periphery gives the training enormous practical relevance.

MAHLE: What do you particularly like about this approach?

Goedeckemeyer: The reciprocal transfer of knowledge during this training between the mechanics and MAHLE, the manufacturer, is unique. Both parties benefit not just from the knowledge transfer but also the direct contact.

MAHLE's expertise also helps our instructors. I particularly like the flexible design of the training courses, which include short talks and discussions. The communication during the training is fantastic and offers massive added value.

MAHLE: Why opt for a full-day training course?

Goedeckemeyer: It's a huge advantage for the participants. It means you can delve more deeply into discussions with individual people. Of course, it's tricky for mechanics to find the time. But the ones who come along and discover that we're doing something very practical really do enjoy it.

MAHLE: What would you like to see from MAHLE?

Goedeckemeyer: For them to inform us about their new technologies and the things that are important for mechanics, such as new mobility concepts and developments.

Find more info on MAHLE's range of training courses at mahle-aftermarket.com under "Services".

AFTER BURNER

Latest reports, up-to-date news, and all other information.

Get turbocharger-smart

We show you the most common causes of failure in turbochargers in a four-part series at mpulse.mahle.com under the “Do it & get it” section. You’ll also discover how you can prevent failure and how you can get the turbocharger up and running again.



Installation videos with top tips

We all know that time is money, so our new installation videos on our YouTube channel show you the crucial steps in a concise and snappy way, allowing you to quickly refresh your knowledge. A little story wraps up all the information in an entertaining way. What’s new: replacing the compressor, flushing an air conditioning system, and handling the MAHLE ROU.



New project from JP, co-presenter of the PS Profis television series

A new tuning project from JP and MAHLE is currently under way for the Auto-mechanika in September. It involves a really cool car and lots of horsepower. We keep you up to date at mpulse.mahle.com under “SWEAT & GASOLINE”.



» AND IF YOU WANT EVEN MORE—CONTINUE ONLINE!
MPULSE.MAHLE.COM

Barbecue Weeks at MPULSE

In May, we start our Barbecue Weeks at MPULSE. You can look forward to some delicious recipes, hot tips, and great campaigns. So drop by and fire up the barbecue!



A new look for the homepage

We are optimising our website so that you can find what you’re looking for more quickly. And to make browsing even more fun, we’re giving the site a makeover. Take a look for yourself at mahle-aftermarket.com.



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MAHLE



OFFICIAL SUPPLIER
SCUDERIA FERRARI



GET A HEAD START!
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