



**Solutions!**

ANNUAL REPORT 2018

## THE YEAR 2018

### Dual strategy

We continued to pursue our dual strategy in 2018: as well as optimizing the combustion engine, we are driving forward the development of alternative mobility concepts.

### Sales

MAHLE achieved sales of EUR 12.6 billion—and thus strong organic sales growth of 4.4 percent.\*

\* After adjustment for exchange rate effects and changes to the consolidation group

### Research and development

With investments of EUR 751 million, we maintained our group-wide research and development activities at a high level.

### Equity ratio

We have substantially increased the equity ratio to 36.4 percent.

### Employees

MAHLE employed 79,564 people worldwide (reference date: December 31, 2018)—1.6 percent more than in the previous year.

### MAHLE Group figures

in EUR million	2018	2017	2016
Sales	12,581	12,788	12,322
EBITDA	1,377	960	1,079
EBIT	773	355	473
Result from business activities	614	262	228
Consolidated net income	446	102	63
Tangible fixed assets	3,137	3,009	3,029
Capital expenditure on tangible fixed assets (without first consolidation)	609	612	563
Equity	3,014	2,632	2,722
Dividend paid of the MAHLE GmbH*	13.4	7.5	6.0
Employees (as at Dec. 31)	79,564	78,277	76,632

\* Proposal for the specified business year



### Engine systems and components



As a global market leader in our key market segments, we have decades of systems and development expertise as well as extensive production experience to build on. Since our company's early days, the development of piston systems and cylinder components has been a core competence at MAHLE. Because we understand the interaction of all engine components, we can deliver optimal solutions to our customers.

Our products are used around the globe in two-wheeled vehicles, passenger cars, commercial vehicles, and large engines. And the range is continuously being expanded, so that emissions and fuel consumption in combustion engines can be further reduced in the future.

### Thermal management



The increasing electrification of the automotive and commercial vehicle industry calls for superior innovative strength in the thermal management of batteries and the entire electric powertrain. Thermal management is also essential for the ongoing development of the combustion engine. For instance, increasingly effective and efficient cooling systems are making a substantial contribution toward reducing fuel consumption. Air conditioning innovations are enabling new design concepts for interiors and helping to provide a high degree of thermal comfort in vehicles alongside efficiency improvements. Only innovative products from the Thermal Management business unit for batteries, fuel cells, power electronics, and electric drives make extended cruising ranges, high levels of efficiency, and long service lives possible and are thereby playing a significant role in shaping the shift toward zero-emission powertrains.

### Filtration and engine peripherals



MAHLE manufactures filters, pump systems, and oil coolers for engine and transmission applications—all of which are designed to increase the engine's efficiency and service life and reduce emissions. We are thus contributing to clean air and preventing engine damage resulting from oil and fuel contamination. Engine peripherals often vary due to different regional emissions regulations, individual car body shapes, and various power classes—even for identical basic engines. As a development partner and global market leader, in recent years, MAHLE has developed modular systems for every major product group on behalf of its customers.

### Mechatronics



Mechatronic components are making the crucial difference in enhancing the efficiency of the powertrain and advancing e-mobility. With its Electric Drive Systems, Actuators and Auxiliaries, and Control and Power Electronics product groups, MAHLE already offers relevant solutions in this area today. These activities are founded on our expertise in the development and manufacture of electric motors and electronic and mechatronic systems. Although these are used in a wide variety of applications, their technology is closely related, which affords synergies and economies of scale—two decisive factors of success in the automotive industry.

Page **06** →

*Closing the loop*

Electric compressors remove the link between air conditioning systems and combustion engines – and are therefore becoming key components in electric vehicle air conditioning.

Page **16** →

*On the road*

An American dream is combined with MAHLE's thermal management expertise to become a reality: the fuel cell truck is on the road!

Page **26** →

*There's more than one way  
to achieve your goal*

Cutting fuel consumption by up to 5 percent – MAHLE harnesses waste heat from the combustion engine to reduce CO<sub>2</sub>.

Page **34** →

*From Post-it to prototype*

Shaping the future with tremendous enthusiasm and commitment: two MAHLE corporate start-ups put very special innovations on the road.

# Solutions!

The motto for our Annual Report 2018 is central to MAHLE's activities. We don't just talk about what the sustainable transportation of the future will look like, we show how it's done. And we're already doing it today! With intelligent solutions for alternative drives—whether electric vehicles, fuel cells, or alternative fuels. And with reliable products that further improve the efficiency of the combustion engine. At MAHLE, we think in many different ways. And we travel in one direction: forward. With strong solutions for a positive future!

ANNUAL REPORT 2018



You can also find this report online at  
[www.annualreport.mahle.com](http://www.annualreport.mahle.com)



# Contents

# 04–41

## *Magazine*

Five questions to Dr. Jörg Stratmann – 04

Closing the loop – 06

On the road – 16

There's more than one way – 26

From Post-it to prototype – 34

# 42–55

## *The company*

Our self-perception – 43

Letter from the CEO – 44

Report of the Supervisory Board – 46

Highlights 2018 – 48

MAHLE worldwide – 50

Members of the Supervisory Board – 52

Members of the Group Management Board – 53

# 56–71

## *Responsibility*

Committed employees – 57

Corporate Social Responsibility – 62

By people for people – 68

# 72–97

## *Group management report*

Fundamental information  
about the MAHLE Group – 74

Report on economic position – 78

Additional key performance indicators – 87

Opportunity and risk report – 92

Outlook – 95

# 98–128

## *Consolidated financial statements*

Imprint/contact – 129

»We're already  
delivering the  
right solutions  
today.«

FIVE QUESTIONS TO DR. JÖRG STRATMANN



Five short questions with five straightforward answers from Dr. Jörg Stratmann, Chairman of the Management Board and CEO of the MAHLE Group.



## Question 1 →

### *The Annual Report 2018 bears the title “Solutions!” With an exclamation mark! What’s the message?*

At the moment, the future of mobility is fraught with unanswered questions: What will individual transportation mean in the future? What kind of infrastructure will we need? What drive types will prevail in the long term? We’re addressing these questions with practical answers. That’s what sets us apart at MAHLE, and we demonstrated this in 2018. Our message is clear: we’re designing the individual mobility of tomorrow and already delivering the right solutions today.

## Question 2 →

### *People create solutions. Is that also the case at MAHLE?*

Of course! Our approximately 80,000 employees worldwide are specialists in their fields. They know what they’re doing. They’re committed, focused on their work and on finding solutions, and they always have the needs of our customers in mind. They persevere and aren’t discouraged by setbacks. We have a top team!

## Question 3 →

### *Who or what impressed you the most in 2018?*

We’re in the middle of a transformation. Last year was a case in point: lots of new developments, lots of designs on the test bench, new challenges, and lots of new ideas. It would be understandable if there were some uncertainty, but more than anything else, I sense optimism and pragmatism in the company: we’re tackling the issues of the day without hesitation. That’s the right attitude. We see change as a great opportunity.

## Question 4 →

### *And the next solutions? What are the goals for 2019?*

Uncertainties such as volatile markets, tariff and trade disputes, high raw material prices, and geopolitical developments will again be concerns in 2019. But we’re focused on our goals. We’ll continue to work on our profitability and on our performance in 2019. And of course, we’ll bring new products and solutions onto the market.

## Question 5 →

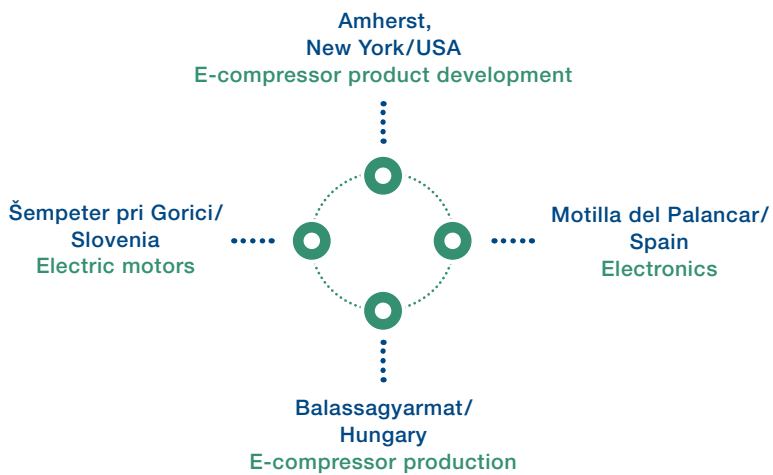
### *What’s your personal motto for 2019?*

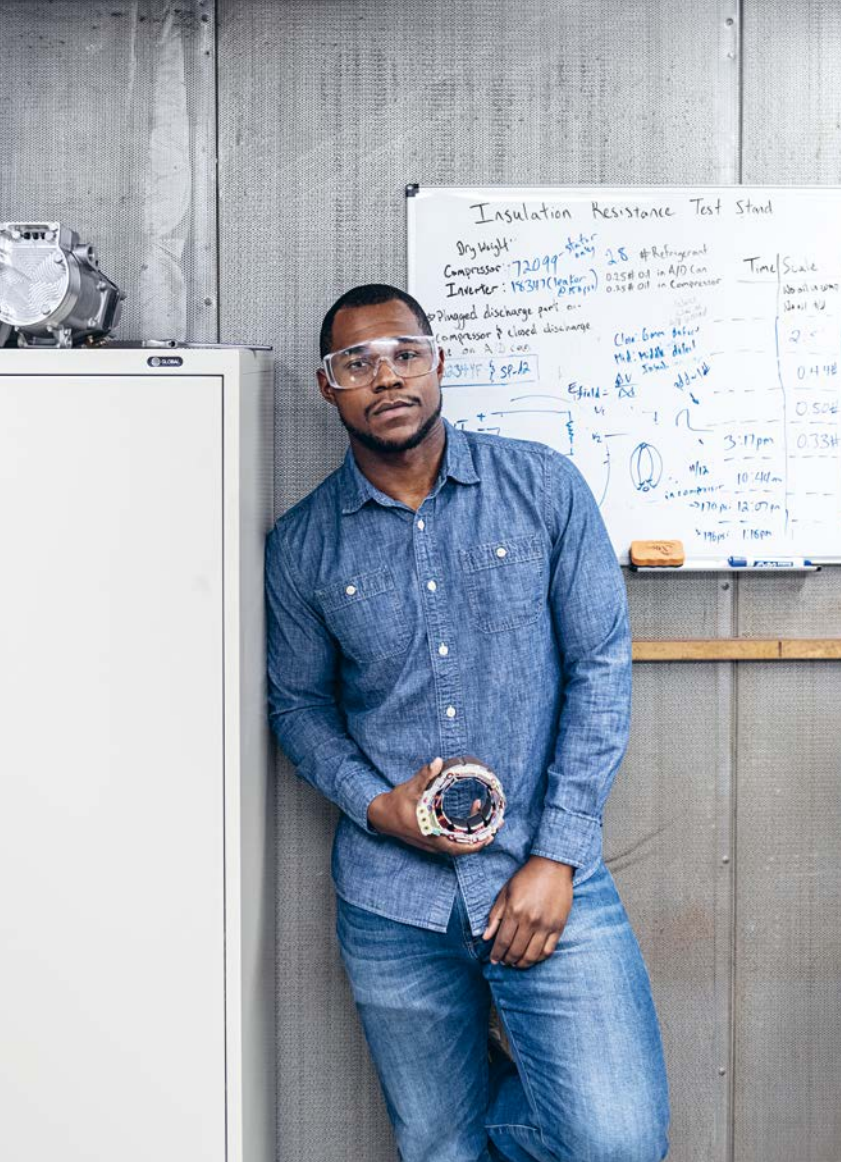
My motto is opportunities through change. We want to increase our profitability despite the transformation. This is a major challenge that we will focus on and tackle with all our strength in 2019. In doing so, we will create new opportunities through change. And for that we need new ways of thinking. Because only those who think new can improve what has been tried and tested, create something new and thus continue to be the best partner for their customers in the future.

# Closing the loop

E-mobility requires many solutions – and MAHLE is driving them forward.

The battery is one of the most important components in an electric vehicle – in terms of cost as well as performance. Its significance is thus comparable to that of the internal combustion engine – and it needs to be looked after just as carefully. Maintaining the correct battery temperature not only determines the service life of the battery, but also the speed at which it can be charged and even the cruising range of the vehicle. If the battery temperature is managed properly and its capacity handled carefully, you will get more out of it. The electric compressor from MAHLE is already at the center of the air conditioning and refrigerant circuit – ensuring the correct interior cabin temperature. Now it is also at the center of the battery cooling function – ensuring the correct battery temperature and it is becoming a key component in the e-mobility drive system. Because if the battery runs optimally, so will e-mobility – to the point that it can be perfectly integrated into everyday life.





••••• AKEEM FRANCIS, electrical engineer  
Amherst, New York/USA

» *The power of the e-compressor lies in the detail. And this detail is the team striving for perfection.*«

..... The electric compressor is made up of many precisely coordinated components. Just like the global team that is working intensively across borders on this product — from the United States through Slovenia, Spain, Hungary, and Germany — and uniting a wide variety of disciplines at the same time.

### E-mobility – a global project

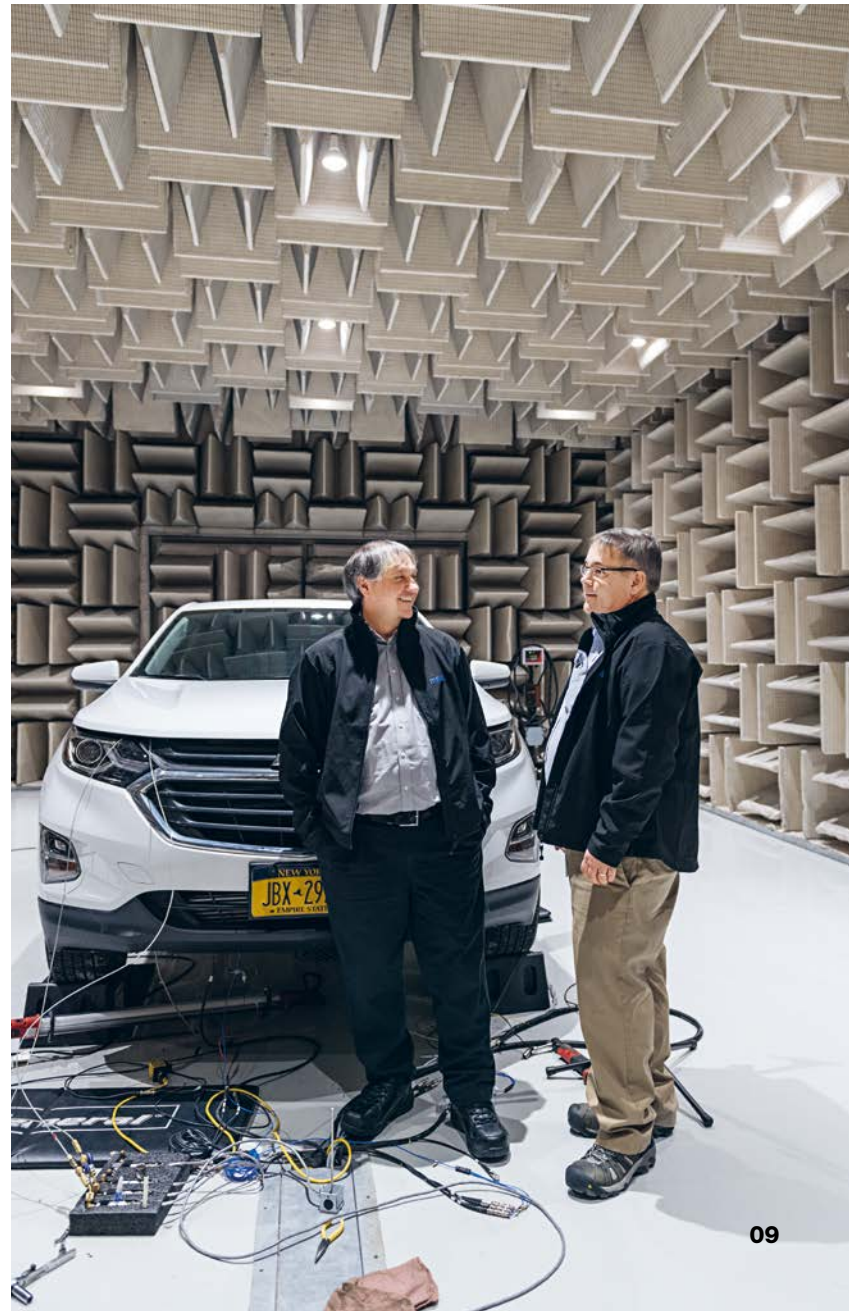
Amherst/USA. The success story of the e-compressor originates in the region of Western New York. Relatively far north on the border with Canada. Here, where winter temperatures sometimes reach minus 30 degrees Celsius, things are heating up inside the MAHLE building. Whirring, beeping, silence. Careful listening in sound-insulated rooms. Testing, adjusting, testing again. Engineering design and development with a precision that cannot be seen by the naked eye. This is where the engineers spend their time. Achieving absolute perfection. A walk through the product development and test laboratories, past test equipment, screws, and sensors, shows how a central component is brought to life from an idea at MAHLE.

In the first test room, an electric vehicle is connected to the laboratory through a complex array of cables and instrumentation. The e-compressor is sitting ready on the test bench. John O'Brien, systems engineer, begins: "The e-compressor is a crucial component for maintaining a comfortable cabin interior and providing adequate battery cooling — both during vehicle operation and during charging." His team partner Jonathan Hammond, engineering manager, stands by his side and continues: "The cooling provided by the e-compressor is key to improving charging performance. You can speed it up." He's referring to one of the essential characteristics that will help to make e-mobility just as much a part of

*BOTTOM: Jonathan Hammond (left) and John O'Brien (right) put the e-compressor through its paces.*

everyday life as combustion technology still is today. “The key to popularizing e-mobility is making the end product familiar to the consumer. Rapid charging is critical to that.” We continue through the engineering center. Workbenches, cabinets. Everyone is engrossed in their work.

It's Friday. Delivery day. The next prototypes are going out to customers. There are components lined up on tables. These include parts from Slovenia and Spain because some colleagues are not on site. While MAHLE Electric Drives in Slovenia supplies the motor, or as the team colleagues explain, the “heart” with which the e-compressor can drive itself and hence be independent of the combustion engine, MAHLE Electronics in Spain provides the “brain” of the e-compressor: the power electronics. These components are now being assembled here in Amherst in the way that was planned at the very start. The distinguishing feature of MAHLE's e-compressor is evident in this assembly: precision across all components. This is because MAHLE develops all of the components itself. And precision is exactly what has made MAHLE a pioneering automotive supplier since day one. With countless tests, meticulous attention to detail, and a huge amount of know-how. Akeem Francis, electrical engineer, is age testing a motor winding specimen with electric power. He adjusts the test equipment providing current to the sample and the wires start to glow. This is an extreme way of testing the limits of materials under specific conditions. It is an extreme that will never be reached during normal use in the electric vehicle. But if you know the limits, you can guarantee safety. In terms of high voltage, this means that the electrical charge must not have any point of contact with the occupants of the vehicle. “I primarily work on the insulation system of the e-compressor,” says Akeem Francis, summing up his work in a nutshell. His colleague John O'Brien





SEBASTJAN MASERA, Head of Product Development  
MAHLE Electric Drives, Šempeter pri Gorici/Slovenia

*»E-mobility is like a bicycle race: it's not those who start fast and slow down at the end who win, but the ones who plan for the whole race. That's MAHLE.«*

quickly brings the definition of precision to a charming, unprecedented level by proudly reformulating this for his colleague: “The customer is growing increasingly interested in insulation resistance, which Akeem focuses on. His work helps us tremendously.” Akeem Francis smiles and adds: “It’s vital to keep vehicle occupants and anyone else away from situations in which they could be exposed to the high voltage of the battery.”

Just a few meters away, another member of the team, James Campbell, prototype lab technician, sits in front of several modules. He explains his work in a comprehensive, almost poetic way: “The engineering team designs the concept and commissions the production of the parts. Then it comes to me.” When asked if he turns the engineers’ dreams into reality, he laughs and confirms: “In a way, yes.” His colleague Shelly Hamilton, senior mechanical engineer, supports him: “I prepare the components according to the desired configuration, and he assembles them. Then I’ll go and run tests to see if the individual parts perform as we need them to.” Anyone working day after day in this environment quickly takes all of the precision for granted. “The e-compressor is an incredibly precise machine. All the parts have to be flawless — that’s what keeps Shelly and James busy,” adds John O’Brien. “Making sure that all the parts fit together within our very narrow tolerance ranges.” Long before a single part can be put together, the work of Brett Bowman begins: “I conceptualize the electric architecture that drives the e-compressor. This ensures all three subsystems — electronics, motor, and compressor — operate together in the most effective way to meet the demanding customer requirements.” He doesn’t have much space for that either. The room erupts into laughter as Jonathan Hammond clarifies the statement: “We are always reducing his space. The mechanical designers are pressured by the customer to make things smaller





and lighter. And then the electrical engineers figure out how to make it happen.” The field of electrical applications is exciting and relatively new to everyone. Not just to MAHLE or the customer, but to the whole world. E-mobility is in its infancy. That leaves a lot of leeway for innovation. And completely new answers. “You often have to work with the customer to understand what they really need at the end of the day. The way to tackle such a challenge is to collaborate closely and figure it out together,” explains Brett Bowman. The fact that so much is new can also be heard in the feedback from the most recent team member, Ilya Burdukov, mechanical design engineer. He has been working on mechanical compressors for years, but the electric compressor is a totally new product. “I had to go through a big learning curve, but I definitely enjoyed it.” In one of the last rooms, James Faller, electronics engineer, is tinkering with the electronics. He takes individual modules out of a cabinet and tests them. It is highly detailed work: “I inspect and confirm that each component performs as designed and then test it on the e-compressor. If there’s an issue, I try to debug, find solutions, and give feedback to the team in Spain.” The research and development center of MAHLE Electronics is located in Spain. MAHLE engineers from all over the world work here on developing innovative electronics solutions — and thus also for the e-compressor.

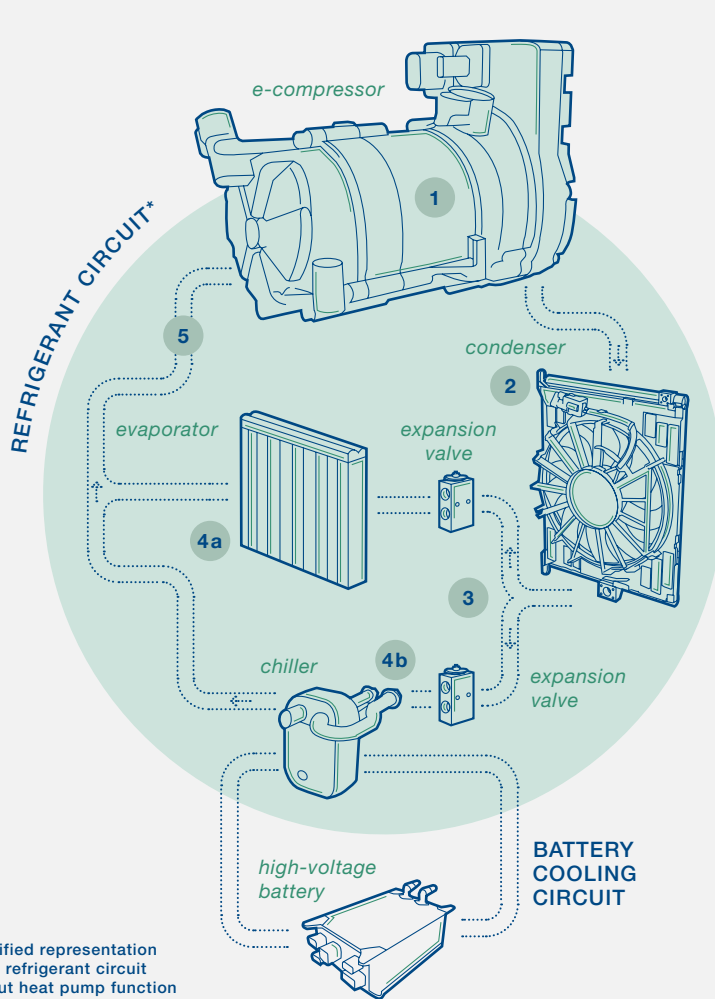
The e-compressor is now going into production in Hungary, on the world’s first production line for MAHLE e-compressors. The international team has worked across the various time zones and languages to successfully commence series production of the e-compressor. Despite the different cultures, one thing above all unites them: the MAHLE mentality. James Faller explains what it is: “At MAHLE, it’s never ‘No, you can’t do that,’ but rather ‘How can we do it?’ It’s very liberating and empowering for us to do what we do.”

*TOP: James Campbell has an eye for detail, whatever the component.*

*LEFT: Brett Bowman provided the ideas for the electric architecture that drives the e-compressor.*

## HOW AN ELECTRIC AIR CONDITIONING COMPRESSOR WORKS

The air conditioning compressor produces cool air from heat energy – for the well-being of the vehicle occupants and the battery. It is based on the principle of an air conditioning circuit in which every single component counts.



\* Simplified representation of the refrigerant circuit without heat pump function

→ **1.** The e-compressor compresses the gaseous refrigerant and thus ensures high pressures and high temperatures. The hot gas is then pumped to the condenser.

→ **2.** In the condenser, the gaseous refrigerant is cooled and liquefied by the ambient air.

→ **3.** The liquid refrigerant passes through an expansion valve, where its pressure and temperature are reduced.

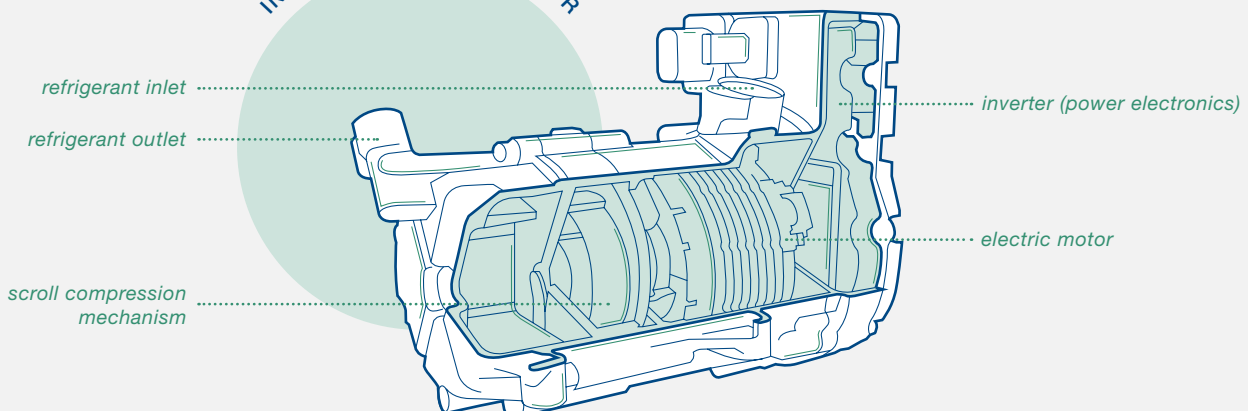
→ **4.** The largely liquid refrigerant flows through the evaporator and through the chiller. This is where the evaporation process takes place.

→ **4a.** Heat is removed from the air that passes through the evaporator and into the cabin, which is consequently cooled.

→ **4b.** The refrigerant circuit and battery cooling circuit are connected via the chiller. This enables the transfer of heat from the battery coolant circuit to the refrigerant circuit.

→ **5.** The vaporized refrigerant returns to the e-compressor, and the cycle begins again.

### INSIDE THE E-COMPRESSOR







..... DR. ARMIN FROMMER,  
Head of Product Development E-Compressor  
Amherst, New York / USA

» *We once revolutionized mobility with the aluminum piston. The e-compressor has the same potential.*«



*RIGHT: Shelly Hamilton's work includes ensuring that a first-class e-compressor can be produced from the many high-quality components.*



..... JOSE ANTONIO CASTILLO, Head of Development High-Voltage Electronics  
MAHLE Electronics, Valencia / Spain


*»Electronics is the new power of mobility. With it, we created the most powerful e-compressor on the market.«*



*LEFT: Electrical engineering from Motilla del Palancar — MAHLE relies on international and interdepartmental teams in its development work.*

The customers are convinced by this too. Aside from the technology, Dr. Armin Frommer, head of Product Development E-compressors, sees yet another crucial element as the basis for this success: “Trust in the team.” And adds: “We once revolutionized mobility with the aluminum piston. The e-compressor has the same potential. We want to shape and develop this change too. Because one thing is certain: it doesn’t matter whether mobility is old or new, the challenges remain the same. We will carry on with our work as usual. With passion and systematic development activities.”

Akeem Francis sees it from a very sporty perspective: “For me as someone from an athletic background, it’s somewhat fundamental for the team to recognize that we’re here to play, and we’re able to win. And we did. Anything else would have been devastating.”

With the e-compressor, MAHLE is supplying the component that is central to the thermal management of the electric powertrain. And all the other components that are needed. It’s not just about offering systems expertise for e-mobility. It’s about clearing the path for anyone who wants to buy an electric vehicle. This path begins at MAHLE. And MAHLE has — once again — delivered. 



## And let’s not forget ...

... all the many other product solutions, projects, and initiatives that we delivered, initiated, and drove forward in 2018. Here are some highlights.

### TECHPRO ADAS

The patent-pending digital solution from MAHLE saves time and money, because TechPRO ADAS now allows vehicle workshops to adjust and calibrate driver assistance systems quickly and easily—using a single digital calibration panel. The new solution is continuously updated online and expanded to cover more vehicles. With this digital tool, MAHLE is setting new benchmarks in this product group.

### ADSORPTION AIR CONDITIONING

It’s possible to make standstill air conditioning powerful, engine-independent, and thus very quiet—with MAHLE. This new air conditioning concept from MAHLE works using the cycle of evaporation, adsorption, condensation, and desorption. The MAHLE Integrated Thermal System is extremely low-wear and absolutely noise-free. And thus more efficient than conventional systems.

THE FUEL CELL TRUCK IS ON THE ROAD—AND WITH MAHLE, IT REALLY GOES FAR





# On the road

Often, obvious solutions are identified early on, yet they need the right time and the right achievers to actually implement them. At the age of six, Trevor Milton, CEO of Nikola Motor Company, decided that one day, he would build the fuel cell truck. Nikola was the first to successfully accomplish this mission, together with MAHLE as a systems specialist for thermal management. Trevor Milton and Matthias Fix, Vice President Sales and Application Engineering Commercial Vehicles at MAHLE, talk about trust and a common goal.

*Nikola Motor Company is an American hybrid truck development company in Phoenix, Arizona/USA. Founded in 2012 by Trevor Milton, the young start-up is deemed to be a pioneer in the field of electric high-performance applications in the transport sector. For the Nikola Two and Nikola Tre fuel cell trucks, MAHLE supports Nikola Motor Company with its thermal management systems expertise. MAHLE is the development partner and supplier for the truck's entire cooling and air conditioning system.*

Miles **0** →

**Nikola Two covers  
1,000 kilometers — on one tank.**

11:00. The Nikola Motor Company headquarters in Phoenix. The sun is high in a brilliant blue sky, and palm leaves stir in the breeze. The truck leaves the yard and threads its way to the West Coast on the five-lane highway.

..... Phoenix, Arizona/USA. The large hall looks like the typical start-up garage culture has simply been transposed into a much bigger dimension. Employees sit behind computers at scattered desk clusters. These are interspersed with couches, a barbecue grill, partitions with electric circuit modules, workbenches, and garden tents converted into conference rooms. On a banner stretched across the hall, it reads “Dirty has never been so clean.” This is where their hands actually get dirty — for a very clean cause. In the midst of all this, a dog bounds up to two men. They are Trevor Milton and Matthias Fix. “He belongs to the family,” says Matthias Fix and greets the dog. Evidence that MAHLE also belongs to a special team that has been resolutely pursuing a major goal over the past few years — to bring the first fuel cell truck onto the market. While the truck is taking a test drive to Los Angeles, Trevor Milton and Matthias Fix jointly take stock, looking to the past once again and then far ahead to the future.



Miles **32** →

**Nikola Two accelerates twice as fast as a diesel truck.**

11:25. Left on the fast lane to pass another truck. Palm trees and taco bars are replaced by scrub and wide open spaces along the roadside.

*The fuel cell truck is on the road. This is an exclamation mark for the use of fuel cells in long-distance hauling. What makes the fuel cell superior to the battery?*

**TREVOR MILTON:** Well, to begin with, there are clearly advantages to every type of technology out there. The fuel cell is not the solution for everything, neither is the battery. They both have a place in the industry.

**MATTHIAS FIX:** It's important to differentiate the various applications before we talk about superiority. Regarding the commercial vehicle, these applications can be inner-city distribution, regional, or long haul. The farther you want to go, the bigger the battery needs to be.

**TREVOR:** But it's not smart carrying a huge battery mass with you, which doesn't leave room for any goods. This is where the fuel cell comes into play.

*»If you can bring innovation and perfection together, you can do something really incredible. And this is what we have achieved.«*

TREVOR MILTON, CEO Nikola Motor Company





**MATTHIAS:** Commercial vehicles have to carry a lot of goods, they hold a lot of weight, and they happen to deal with different climatic conditions. But batteries are rather heavy and they need space and a comfortable temperature range in order to function properly, to mention only a few challenges. That simply makes the battery an inferior solution for long haul.

**TREVOR:** We still need a battery for our truck, but the fuel cell makes the difference here as the primary source of energy. With a much better outcome.

**MATTHIAS:** In this case, you need a much smaller battery, and a smaller battery means less weight and more space for goods.

**TREVOR:** This is the key for the fuel cell to lead the way to better mobility. It delivers more efficiency, zero emissions, long capacities, low cost of operation, and instant torque power, while solving social and environmental problems. It's really the ultimate fit for technology.

*Driving long distances is one of the key questions in the e-mobility universe. You are setting new standards and traveling farther with the fuel cell than everybody else: How far does it go?*

**MATTHIAS:** The question is not only how far the truck goes. It's about how far the whole project is going. Trevor, you have a unique take on this as you are providing the infrastructure for the refueling stations as well. It's another key topic to make this technology a success.

»How far can the whole fuel cell project go? That's what unites us with Nikola — thinking about the bigger picture.«

MATTHIAS FIX, Vice President Sales & Application Engineering Commercial Vehicles at MAHLE





Miles **100** →

**Nikola Two is 10 tons lighter than a comparable diesel.**

13:35. The flowers at the roadside are the same yellow as the road markings. The next exit is called “Centennial,” marking a period of 100 years. Nikola Two continues straight ahead.

**TREVOR:** Absolutely, this is why many have not succeeded yet. It’s a typical chicken-and-egg problem.

**MATTHIAS:** You need both to make it work.

**TREVOR:** For us, this means that it’s not enough to only build a truck. We also have to strategically build hydrogen stations on those roads where the trucks are sold. And this is what we’re doing. We produce our own hydrogen, and the fuel cost comes included with the truck purchase, so you don’t have the instability of fuel prices and network issues. We solve the entire problem at once.

**MATTHIAS:** This is very important actually, in terms of our MAHLE strategy as well: pushing zero-emission technologies. With this project, we really go well to wheel. You’re taking care of refueling stations and how the energy is made available. It’s renewable energy! This means that the operation of the truck is completely emission-free at the end of the day.

**TREVOR:** We have these huge wind farms all along the roads here. Each day we experience peaks, when there’s too much energy on the grid to be used. This is what we’re doing now: we store this energy and generate hydrogen from it to use for our trucks.

*Nikola is ahead of its time with the fuel cell in every way. When did the idea of building a fuel cell truck come up in the first place?*

**TREVOR:** That story goes back to my dad, who was the manager of the railroad. When I was a little boy, I would sit right next to the conductor who drove the locomotive. He would look over and see the trucks on the road as we were driving parallel to the freeways and say: One day they’ll be smart enough to build the locomotive semitruck. That was the



Miles **280** →

**The 1,000 hp Nikola Two truck cruises along the roads.**

16:00. The truck proceeds along Interstate 10. In the fields, wind turbines rotate vigorously in the wind.

beginning—when I was six years old. Today, it's still the same picture on the roads, but with one big difference: our truck is out there too. And soon there will be so much more to get excited about.

**MATTHIAS:** We're really moving forward at high speed. And this fits nicely with us at MAHLE. We want to build the path for future mobility. It's a crucial project for us to demonstrate this and prove our expertise. How long have we been working together now? Two years, right?

**TREVOR:** Two years, yes.

**MATTHIAS:** But it feels like we've had this partnership for much longer. You have an ambitious target, Trevor. And we have one of the key competences to achieve this target: thermal management. Together, we're making this happen.

**TREVOR:** This partnership is very beneficial to both sides. Here at Nikola, we designed a truck that has never been built before. We went through multiple adjustments refining the entire thermo system. And MAHLE was able to handle this. You're the experts. We're the ones who try a lot of things and are not afraid to fail, which leads to great open discussions with you.

**MATTHIAS:** Yes, this is what we provide—almost a hundred years of experience and the know-how to bring this high-volume production together, with the innovative spirit of Nikola. This is the collaboration. I appreciated your wording earlier, Trevor—combine perfect German engineering ...

**TREVOR:** ... with the innovation strength of American companies.

**MATTHIAS:** This combination has made the truck a successful product.





**TREVOR:** This is what it takes. It's important to know what we're good at, and we know what MAHLE is good at. It is your philosophy to deliver a perfect solution and to have zero failure.

*Talking about combining two worlds, Nikola Two was built for the American market, and Nikola Tre for the European market. The designs are different. Are there any other differences?*

**TREVOR:** European trucks cover half the range of US trucks. They don't need a range of 1,000 kilometers per day, just 500 kilometers or less is enough. The main difference is more of an aesthetic nature. Ultimately, they have the exact same technology.

**MATTHIAS:** The objective of the truck is the same everywhere: we want to reduce CO<sub>2</sub> emissions.

**TREVOR:** Around 30 percent of global emissions stem from transportation. It's the single biggest source of emissions. With our truck, we'll be taking a bigger chunk out of the emissions production than any other product in the world. Therefore, our goal is simple: we want to build as many as we can.

*As more and more commercial vehicles are needed, it's about time for the fuel cell to complement the internal combustion engine for long haul. When will this happen?*

**TREVOR:** Well, it begins now. The first test trucks are on the road, and we start series production in 2022. European production will probably begin in 2023. The same applies for the refueling stations. We're building over 700 hydrogen stations in America over the next ten years and planning to do the same in Europe. It will be the largest network of hydrogen stations in the world.

» *We combine perfect German engineering and American innovation strength.* «

TREVOR MILTON, CEO Nikola Motor Company





Miles **400** →

**Nikola Two is fully fueled up  
in just 20 minutes.**

18:00. Arrival at the Santa Monica Pier in Los Angeles. A man on the beach plays guitar and sings “Breathe this air.” The sun is shining. A quick call to Nikola in Phoenix. “What about the tank?” Trevor Milton wants to know. The answer: “Still half full.”

**MATTHIAS:** And again, there is not just one solution. We are convinced that the future lies in the powertrain mix. Inner cities might have different solutions, such as more battery vehicles. Long-distance transportation, where higher energy is needed, lends itself more to fuel cells. And there will still be a market for diesel engines for quite some time. So, the ultimate question of whether and when the fuel cell will take over long-haul transportation, I think, is really hard to predict. But changes are chances. The fuel cell truck can gain significant momentum. We are ready, and this project is a great start.

**TREVOR:** Yes, and, for now, we are just focusing on getting this done and getting our two trucks on the road around the world. Once this is achieved, I mean, the sky is the limit. You can do whatever you want with fuel cells. You can go into other modes of transportation—even into aerospace.

**MATTHIAS:** MAHLE and Nikola—if you can think it, you can do it.

**TREVOR:** So let’s do it!



»*We have one objective with this truck: zero CO<sub>2</sub> emissions.*«

**MATTHIAS FIX**, Vice President Sales & Application Engineering Commercial Vehicles at MAHLE



## And let's not forget ...

... all the many other product solutions, projects, and initiatives that we delivered, initiated, and drove forward in 2018. Here are some highlights.

### CNG/LNG DRIVES FOR COMMERCIAL VEHICLES

Both the CNG (compressed natural gas) and the LNG (liquefied natural gas) versions of natural gas powertrains for commercial vehicles offer substantial CO<sub>2</sub> savings potential. Simply replacing fossil diesel fuel with fossil natural gas reduces CO<sub>2</sub> emissions by 15 percent. If synthetic methane from renewable power is used, engine operation is actually CO<sub>2</sub> neutral. The switch to gaseous fuels, however, presents us with new challenges. For gas-powered drives, these include increased exhaust gas temperatures. To address this, MAHLE provides crucial technologies to enable cooled exhaust gas recirculation. These reduce combustion temperatures, protect the engine components against thermal damage, while preventing premature ignition in the cylinder, also known as “knocking.”

### HYBRID AND ELECTRIC DRIVES

In hybrid electric drives or purely electric drives, it all starts with the battery. This is the most important element in an electric vehicle, and many components contribute to it. MAHLE has expanded its extensive product portfolio to include solutions for the demand-based conditioning of temperature-sensitive traction batteries. These allow the cooling and heating architecture to be kept as simple as possible and ensure fast and efficient temperature regulation.

# There's more than one way to achieve your goal

MAHLE has developed a solution to increase the efficiency of the combustion engine in commercial vehicles. This solution opens up further possibilities. More ways to meet statutory emissions regulations. More ways to improve transport using existing technologies. MAHLE is the first to succeed in combining all these possibilities in one compact box: using a waste heat recovery (WHR) system. Now is the time to tap into the immense potential that lies in the use of exhaust gas heat from combustion engines.

We take a look at a very special technology that is making a major contribution to climate protection.



SAVING FUEL THROUGH WASTE HEAT RECOVERY



**30** percent

is the reduction in CO<sub>2</sub> emissions required by the EU by 2030 for heavy commercial vehicles in the EU vehicle classes 4, 5, 9 and 10.

**3.8** million

is the expected number of commercial vehicles to be newly registered worldwide in 2030.

**80** percent

of commercial vehicles will still be equipped with a combustion engine in 2030.

»Waste heat recovery (WHR) has the potential to reduce CO<sub>2</sub> emissions today—not sometime in the distant future.«

What do diesel engines and MAHLE have in common? They're both success stories. And they've both been established on the market for a long time. MAHLE has been involved in combustion engine technology from the outset. So, if anyone knows that the technology still has untapped potential, it's MAHLE. While the call for CO<sub>2</sub> reductions has sparked a sometimes biased debate about the internal combustion engine and brought local zero-emissions powertrain technologies to the fore, MAHLE has continued its development in all directions. And in doing so, we've found a way to reduce

*Working beyond the limits of their individual locations, the Berlin and Stuttgart teams join forces to drive forward the WHR system.*

HANNES MARLOK, WHR Project manager





CO<sub>2</sub> right now—using special technology. After all, the combustion engine will continue to be an indispensable part of the diversified drive mix in the future. Especially on long-distance routes in the commercial vehicle segment—until well after 2030. In addition to hybrid and purely electric powertrain technologies, innovations in the combustion engine are also playing a key part in the overall reduction of CO<sub>2</sub>.

Voltastraße, Berlin/Germany. The name “MAHLE” is printed in large letters on the truck that’s turning into the yard at our Berlin location on this cold December morning. On this day in particular, the street bearing the name of the electric battery’s inventor—Alessandro Volta—acts like a harbinger. Today, we’re focusing on the combustion engine and talking about electrical energy at the same time. As the truck finishes turning and comes to a stop, a red box gleams from underneath the vehicle frame, directly behind the driver’s cabin. It bears the words “Boost Box.” This box is a source of power, since it houses a waste heat recovery system that converts the heat from the exhaust flow into electrical energy.

“The technology isn’t unknown,” begins Hannes Marlok, project manager in the WHR team. “But no one before us has ever managed to make the whole thing ready for series production.” MAHLE has packaged “the whole thing” in a compact box with a width of just 55 centimeters and developed a perfectly coordinated system, thus paving the way for series production. “But there’s even more to come in the future, because the next generation of the Boost Box will be much smaller than this,” Marlok says with a grin. The box looks simple. But it’s clear from the expressions on the faces of the WHR team members who’ve gathered in the yard in Berlin that something really special has been achieved here. “The waste heat recovery box cuts fuel consumption by up to 5 percent, thus also reducing CO<sub>2</sub>,” explains Michael Hötger, Managing Director of MAHLE’s Berlin location.

The technology is well-known, yet MAHLE is the first to really get it going. The reason is simple. “No manufacturer wants to take on the risk and change the entire vehicle structure, because that costs money and requires time and effort. But we’ve eliminated that risk with our box. Now the technology is easy for anyone to test without major design effort,” explains Michael Hötger.

## CO<sub>2</sub> CALCULATIONS

*Are vehicles with exhausts bad? And ones without exhausts good? If you want to compare the different powertrain technologies, you need to look at them from various angles to appreciate their potential.*

→ 1.

*From tank to wheel*

*This analysis only takes into consideration the CO<sub>2</sub> emitted by a vehicle during use. The potential of renewable fuels, for example, isn’t covered, nor are any CO<sub>2</sub> emissions produced during electricity generation—not technology-neutral due to the choice of assessment parameters.*

→ 2.

*From well to wheel*

*In addition to a tank-to-wheel perspective, this calculation also accounts for the CO<sub>2</sub> emitted in the production of the fuel or electricity. This approach goes some way toward technological neutrality since it records the potential of renewable fuels as well as any CO<sub>2</sub> emitted as part of electricity generation.*

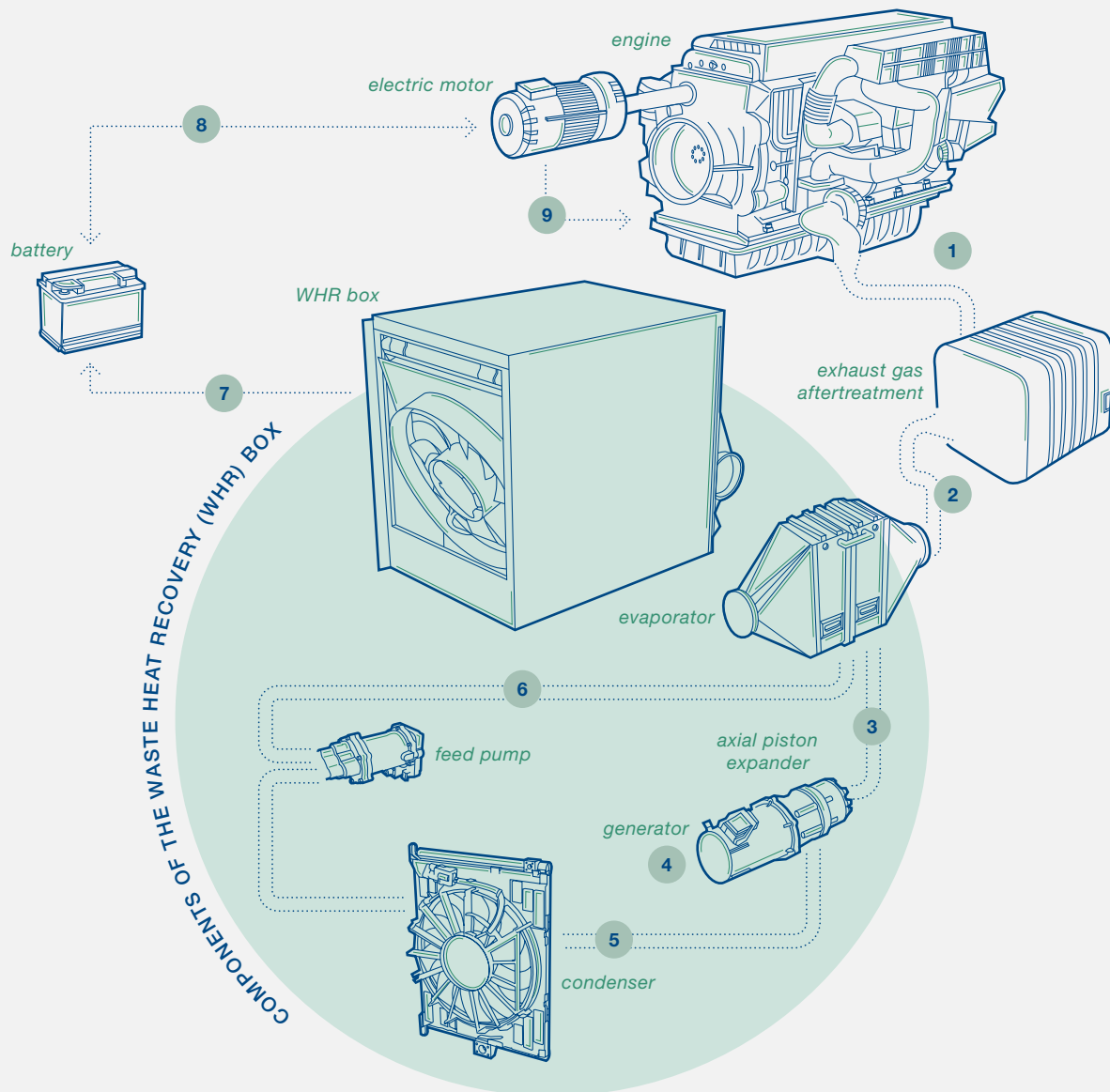
→ 3.

*From cradle to grave*

*This analysis of CO<sub>2</sub> emissions goes a step further than that described under point two. It also includes the vehicle’s production and its disposal at the end of its life cycle. It’s the most complex type of calculation, but due to its holistic approach it’s also the one that offers the highest degree of technological neutrality.*

*Technological neutrality is important when it comes to clarifying the best technological solutions from both an environmental and an economic point of view. With a technology-neutral assessment, different powertrains will remain on the market even if CO<sub>2</sub> thresholds become stricter, and the customer will be able to choose the technological solution that best suits their primary objective.*

## CREATING USABLE ENERGY FROM EXHAUST GAS HEAT: HOW THE WASTE HEAT RECOVERY SYSTEM WORKS



→ **1.** Fuel is converted into kinetic energy in the engine. However, a significant proportion of the energy held in the fuel is carried away in the form of heat via the exhaust gas. This is where the waste heat recovery system comes in. Instead of releasing unused energy into the environment, it's now put to efficient use.

→ **2.** The hot exhaust gas is passed through the evaporator after the exhaust gas aftertreatment.

→ **3.** Inside the evaporator, the exhaust gases vaporize a working medium, which drives an axial piston expander.

→ **4.** Kinetic energy is produced in the axial piston expander, which drives a generator—thereby creating electricity.

→ **5.** The exhaust steam is then converted into a liquid in the condenser.

→ **6.** A pump is used to pressurize this liquid, which is then fed into the evaporator, heated, and turned into a gas again. This completes the cycle.

→ **7.** The WHR box feeds the electricity into the battery.

→ **8.** Energy recovery: Energy is recovered when driving downhill and when braking. It's stored temporarily in the battery and is available when needed.

→ **9.** The stored energy can be retrieved whenever an "extra push" is needed. When driving uphill, for example. This reduces fuel consumption and therefore also CO<sub>2</sub> emissions.

» *We don't ask: Should it be diesel or not? But: How can we reduce CO<sub>2</sub>?«*

MICHAEL HÖTGER, Managing Director at the MAHLE location in Berlin

*Intensively involved in the development of the WHR system from the start—and delighted that the technology is picking up speed.*



» *We're focusing on precisely what matters for the environment: efficiency.* «

Because even during the predevelopment phase in Berlin, the team of 25 people always had one thing in mind: the needs of the customer. So, the team also knows what matters at the end of the day: "It's important that the truck is kept on the road. It's only by staying on the road that it earns money for its owner. The WHR box is relatively simple to integrate into the vehicle structure."

*Happy to be part of a diverse, lively development unit in which every member of the team can contribute their own strengths.*


MICHAEL BUCHER, product expert in the WHR team



MAHLE focuses on the customer and the customer's needs. It's a simple maxim and yet at the same time a big claim, which constantly requires new thinking. Michael Hötger remembers one such instance at an intermediate stage in the project: "There was a moment when we realized that, yes, we've got all the components, but now we require a brand-new approach. We had to think again and leave everything out that we didn't need. And we packaged all the technology into one box." As a result, all the individual MAHLE components were brought together to form an integrated, ideally coordinated system, which functions perfectly inside a box.

Take a truck and a box. And then we can get started. "All we need is waste heat of 150 degrees and over for the WHR system to work. Within just one and a half to two years—a short time frame when you think about the future—the WHR box has already paid for itself. For the manufacturer. For the freight forwarder. And, above all, for the environment." Hannes Marlok translates this into a tangible illustration: "The system saves 6 tons of CO<sub>2</sub> per truck, per year. That equates to the CO<sub>2</sub> output of 0.6 people or just under four passenger cars with an average mileage. If you think about how many miles a vehicle like that covers and how much fuel it consumes, 5 percent is a great deal of potential."

MAHLE's WHR box attracted a lot of interest at IAA 2018. "Customer feedback shows that we have a good product—one that the market has been waiting for," says Michael Bucher, a product expert in the WHR team. "One of our customers now even wants to build the box himself. So, he calls us, looking for parts. We ask which components he wants us to supply. He laughs and says: 'All of them!'"

At the very moment a harsh wind sweeps around the truck in the yard in Berlin, another WHR box is on the road in China for initial testing with a customer. When it comes to series production, MAHLE will work as one across business areas, locations, and national borders. All the hard work has paid off, and the team is delighted with the positive feedback the WHR box is receiving. Hannes Marlok adds: "We don't yet know what the powertrains of the future will look like on our streets. But at MAHLE, we're ready. And above all, we're open to the technological possibilities that will enable a future with CO<sub>2</sub>-neutral mobility." 



## And let's not forget ...

... all the many other product solutions, projects, and initiatives that we delivered, initiated, and drove forward in 2018. Here are some highlights.

### THE MAHLE OIL MANAGEMENT MODULE

Our oil management module for vehicles with electric drives enables the cooling of multiple components: the electric drive motor, the transmission or oil-cooled battery, and even the power electronics. Further advantages are achieved by integrating several individual components into one compact module: weight reduction, lower pressure loss, reduction of interfaces and thus assembly effort compared with the individual components, optimal use of installation space, and optimized thermal management.

### THE VARIABLE VALVE TRAIN SYSTEM

In order to further optimize the efficiency of the combustion engine in commercial vehicles, MAHLE has developed a Shifting Roller System that allows engine valve timings to be adjusted to suit the requirements of different engine operating conditions. With this system, MAHLE integrates crucial functions such as engine braking into the valve train, thus making highly efficient operating modes like the Miller/Atkinson cycle possible and enabling exhaust gas temperature management. Under certain circumstances, the technology eliminates the need for expensive retarders to be used as service brakes, while also decreasing fuel consumption and optimizing exhaust gas aftertreatment, which in turn results in lower emissions.

# From Post-it to proto- type

MAHLE CORPORATE START-UP TEAMS PUT THEIR FIRST INNOVATIONS ON THE ROAD



... Solutions you simply believe in. That's the first step to pushing ahead with an idea. And you make more progress when you do it together. MAHLE launched the Incubator innovation program last year and encouraged all employees across Germany to submit their ideas. These were ideas that came to them during a chat in the canteen, on the way home in the car, or at work on the production line itself. And all of the ideas have one thing in common: the desire to do something better. Two teams succeeded in impressing both the internal jury and their first customers with their solutions. These solutions prove that MAHLE's innovations don't just catch the attention of our customers, they reach out to everyone.

### From a change of perspective ...

Stuttgart-Bad Cannstatt/Germany. At the heart of MAHLE's headquarters. "We're not doing any other work now. We're just focusing on chargeBIG," says Dr. Walter Krepulat, responding to our opening question about whether they've come straight from their "proper" jobs or from their Incubator project. chargeBIG is a full-time job. This statement describes the dimension of their idea well. But let's start again at the beginning.

*»Everyone's always striving for higher, faster, further. And now we come along and say, you don't need to do that.«*

SEBASTIAN EWERT, chargeBIG team



As the name suggests, chargeBIG means charging on a large scale, so it's tackling one of the most important aspects of e-mobility. Although an increasing number of battery-powered vehicles are on our roads, one question remains unanswered: How are we going to charge all of these electric vehicles? From individual charging points to a nationwide network infrastructure, chargeBIG now has the answer in the form of an intelligent charging system, which is user-friendly and can be installed anywhere.

»We give a lot and get a lot back. It's one of the best parts of the experience.«

NICOLE HEINRICH, chargeBIG team



CHARGEBIG TEAM  
Sebastian Ewert, Max Gerstadt,  
Nicole Heinrich, and Dr. Walter  
Krepulat (from left to right)

Sebastian Ewert offers up a decisive calculation: "On average, a car is driven only 40 kilometers per day. That means it's standing still for around 23 hours. So, there's no rush when it comes to charging it!" This ingenious change of perspective clears the way for intelligent charging. "It no longer needs to be charged as quickly as possible, only as quickly as necessary." And with that, the room goes quiet and there are smiles all around. These few words reveal what makes chargeBIG unique: simple and low-cost connection to the existing electricity grid.

### ... to a trailblazer of e-mobility

We stand outside in MAHLE's parking lot. The idea moved on from the Post-it stage a long time ago. "This is the charging cabinet," explains Nicole Heinrich, indicating the electrical enclosure she's standing next to. "Distributors, fuses, relays, electronics controls, communication, and safety are all tucked away behind one large door." Sebastian Ewert adds: "It's just what electricians are used to. This way, our charging cabinet is easy to connect and equally easy to maintain." One charging cabinet and lots and lots of parking spaces with charging plugs. chargeBIG's vision is for every parking space to be equipped with a plug in the future. And the way to achieve this is through an intelligent software package, into which the team has invested a great deal of hard work. Today, they can smile about it, because "Now it works!" How exactly, the team won't reveal. The cables and plugs, which are attached to the outside of the charging posts, are always in view. "This way, drivers no longer have to carry cables with them." Sebastian Ewert knows what he's talking about. As a driver of an electric car, he keeps a lot of cumbersome loops of cables and other equipment in his own trunk.

Sixty to seventy colleagues have collaborated on the prototype so far. When asked if they can assist the team, the response from every department has been "Of course," "Sure," "No problem!" Or even: "Can I help?" That's teamwork in action. Also from Max Gerstadt, a recent member of the team, who has been involved too, developing an important component for chargeBIG as part of the final year project for his degree.





*»Charging as quickly as necessary is better than charging as quickly as possible.«*

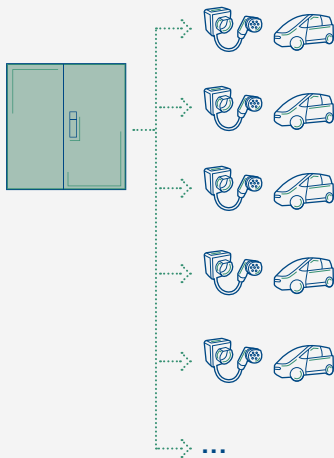
Dr. Walter Krepulat, chargeBIG team



*»In our team, you can tell that people really want to achieve something. I got caught up straightaway.«*

Max Gerstadt, chargeBIG team

### chargeBIG STRUCTURE



### CHARGING FOR EVERYONE!

chargeBIG is a charging infrastructure that builds on existing grid connections and makes maximum use of them. One charging cabinet supplies up to 36 charging points, to which a corresponding number of electric cars can be connected. The intelligent system optimally controls charging and prevents overloading of the existing grid by ideally distributing the available electricity.

*»It's quite possible that there's never been a scenario before where a manufacturer of child seats has worked together with a manufacturer of air conditioners.«*

MATTHIAS GANZ, Com4Kids team (second from left)



COM4KIDS TEAM  
Yvonne Maier,  
Matthias Ganz,  
Seyit Suemengen,  
Franziska Erhardt,  
Dr. Mario Wallisch  
(from left to right),  
Michael Conze  
(not pictured)

A mobile chargeBIG prototype charging cabinet can charge 18 electric vehicles. The first customers were convinced by its potential immediately. The next target is one hundred vehicles. “We’re working closely with our customers on this project so we can incorporate their feedback directly.” And what feedback has there been from MAHLE? The team members grin. The internal decision makers were also in agreement. At the last meeting, they simply asked: “What resources do you need to progress further?”

Incidentally, the chargeBIG team is already celebrating its first customer order. The MAHLE corporate start-up is carrying out a project for Stuttgart Airport that includes up to 110 charging points on its parking lots for fleet and staff vehicles.

### From large-scale expertise ...

A MAHLE co-working space in Stuttgart-Feuerbach/Germany, just a few kilometers from the company headquarters. A child’s car seat lies on a table. Nothing unusual so far. Dr. Mario Wallisch, Franziska Erhardt, Matthias Ganz, Michael Conze, Seyit Suemengen, and Yvonne Maier from MAHLE have gathered around the seat. A child’s seat and MAHLE: something new is happening here.

Dr. Mario Wallisch expresses the idea in a nutshell. An intelligently air-conditioned child’s car seat, which warms the child or prevents overheating. Franziska Erhardt takes us back to where this completely new idea came from: “In fact, Mario’s always saying that his children are sweating in their seats when they drive to France on vacation, which is very unpleasant for them and therefore also unpleasant for everyone else in the car.” Matthias Ganz adds that many parents have tried to deal with the problem: “There are concepts where you seat the child on top of ice packs placed inside the seat.” Smiles all around. “But that’s bad simply from a safety perspective, because it involves modifying the seat.” The team has been closely examining the world of children’s seating in the last few months. They’re familiar with every problem. And every attempted solution.



**FROM EXPERIENCE COMES INNOVATION**  
*New ideas arise when existing concepts are reinterpreted. The Com4Kids team with their innovative result: a child seat combined with MAHLE’s accumulated thermal management expertise.*

»Our product brings the comfort of the adult world into the world of children.«

DR. MARIO WALLISCH, Com4Kids team



#### MAHLE INCUBATOR

1. →

*Submission of ideas*

*MAHLE employees throughout Germany are encouraged to submit their ideas.*

2. →

*Selection of the best ideas*

*The best ideas are presented by their originators via an internal marketplace.*

3. →

*Short-listing of teams*

*The teams that make it onto the short list take part in a Concept Day, where they develop their ideas.*

4. →

*Qualifying stage*

*The top teams pitch their ideas to a MAHLE jury to qualify for the boot camp. The winning teams are chosen after the boot camp.*

5. →

*Winning teams*

*With their own budgets and largely released from day-to-day work, the teams develop their solutions into marketable products over three to six months.*

6. →

*New solutions*

*The prototypes are presented to customers.*

With the heating function of the seat, the team has also improved safety. In conventional car seats, children are often strapped in wearing thick winter jackets—with the result that the belt doesn't work as well as it should. If the seat is warmed up in advance, jackets are no longer needed and the belt mechanism is fully effective again.

This begs the question: Why can't you buy such a product already? "There have been market trials offering a kind of air conditioning," Yvonne Maier tells us. But MAHLE's home advantage lies in doing it properly, not "kind of." "Thanks to our thermal management systems, we're specialists in vehicle air conditioning. Now we're applying this expertise to seats for children."

### ... to comfortable mobility for the little ones

Thermal comfort for kids—from the moment they get into the vehicle to the moment they leave it. The Com4Kids team has put this feature in a compact module that connects to the child's seat. It turns the rigid plastic seat into a place where air is circulated—and where children finally feel comfortable. Matthias Ganz holds the module in one hand. What looks to the uninitiated like a small work of art has been specifically developed for children. "In our team, we're able to reach out to colleagues with 20 to 30 years of professional experience, for whom making a new product reliable and marketable is a piece of cake," says Dr. Mario Wallisch, showing how the corporate structures in the background support the start-up spirit. What's more: "The MAHLE name has meant people are willing to put their trust in us. Manufacturers of children's car seats know they're not talking to amateurs with a crazy idea."

The experts from MAHLE have held in-depth discussions with customers throughout the development of the air-conditioned child seat. It may be this unusual cooperation that explains why the seat has not existed before. "The manufacturers have their areas of competence in design and ergonomics, but as soon as the focus moves to thermal comfort, they're out." And it's over to MAHLE. With its great expertise in thermal management and with lots of ideas to get people moving in their everyday lives. Achieving greater comfort. For all ages.



## And let's not forget ...

... all the many other product solutions, projects, and initiatives that we delivered, initiated, and drove forward in 2018. Here are some highlights.

### INCUBATOR CHINA

As an innovation manager at MAHLE, Mujib Bazhwal has been following the Incubator program since its inception, and he's just as positive about it as he was a year ago, when the initiative enjoyed a productive launch in Germany. That's not only because of the successful innovations that emerged from the first round, but also because Incubator has now been enthusiastically taken up by other locations too. Mujib Bazhwal had barely sent off the inquiry to other countries when China came forward with a positive response and promptly got started. "It was crazy just how fast and flexible they were," remembers Mujib. In cooperation with Kun Hu at MAHLE in China, the program was introduced at the individual Chinese locations and the first ideas have already been selected. Out of 120 ideas, ten are currently in the running. "And you need to realize that, in our culture, we're not so familiar with thinking outside the box," says Kun Hu. "But when I saw the ideas, I knew that I was mistaken." Above all, Mujib is excited by the subjects: many of the ideas are associated with digitalization. And so, MAHLE's Incubator has begun its worldwide rollout. Further regions will follow. And when it comes to the question of whether the individual teams are also able to exchange ideas internationally, the answer is more than just a YES and even clearer: "We are One MAHLE!"

### INSPEKTO

Innovations are shaping the working environment at MAHLE. Another such development is now raising quality inspection to a new level. Inspekto, a piece of software based on artificial intelligence, is helping MAHLE employees with visual quality inspections by performing them in a fully automated process. The program was developed by a German-Israeli start-up in which MAHLE is a participant. The software is highly flexible and can be implemented on any production line. Inspekto prevents defects and thus saves time. This results in an even higher level of quality assurance.

CHAPTER

# The company

*Our self-perception* ..... 43

*Letter from the CEO* ..... 44

*Report of the Supervisory Board* ..... 46

*Highlights 2018* ..... 48

*MAHLE worldwide* ..... 50

*Members of the Supervisory Board* ..... 52

*Members of the Group Management Board* ..... 53

# Our self-perception

The MAHLE Group is a leading global development partner to the automotive industry and offers its customers complete systems from a product range that is unrivaled in breadth and depth. Our new developments are geared toward the further optimization of combustion engines and thermal management solutions as well as the expansion of e-mobility. We also want to set new future standards with our innovative solutions by consistently using and expanding our knowledge and innovative strength.

With our strategic orientation, we are addressing megatrends such as population growth, urbanization, globalization, connectivity, or limiting emissions to promote climate protection. We not only see these as an opportunity for further growth, but as an obligation to design our technologies so that mobility on our planet is as environmentally friendly as possible.

The Mahle brothers have bequeathed us a company structure that secures our independence and the long-term orientation of the group. In accordance with their specifications, we want to continue to successfully develop MAHLE as a leading company and attractive employer.

This also means that we stand by our values—fairness, compliant conduct, cultural diversity, and equal opportunities—and live by them every day in our relationships with our employees, customers, and suppliers. Assuming social responsibility was an objective declared by our company founders. We remain bound by this ongoing commitment, and it is reflected in our business decisions. Now and in the future.

# Solutions!

The motto of this Annual Report has always been our maxim: “Solutions!” For us, this means doing rather than just talking! This attitude has its roots in our past, where actions have always spoken louder than words. As an international group, we act accordingly and provide our customers with specific solutions. The projects presented in this Annual Report are proof of this.

On that note: take us at our word—and judge us by our actions!



+ 4.4%

#### Organic growth

This development was considerably higher than the average global market growth.



## *ladies and gentlemen,*

The developments in 2018 highlighted how MAHLE is making headway and driving forward its transformation. We rose to the challenges presented by the changes in our sector: we continued to push ahead with many new projects, exciting topics, and promising initiatives over the year.

A good case in point is our innovative culture. Both of the corporate start-ups that we will present to you in this Annual Report emerged from the Incubator project, the name given to our company's think tank. Here at MAHLE, we were excited about the imagination, enthusiasm, and commitment of the two teams in 2018—and so were our external customers.

We also provided our customers with solid technological solutions in 2018. Our new electric compressor, the thermal management solution for Nikola, and our waste heat recovery system are just three of many projects that demonstrate both the outstanding engineering know-how and the superbly orchestrated, interdepartmental cooperation between teams and across borders enjoyed by our company.

In 2018, we focused particularly on the future viability of our portfolio. We consequently acquired ebikemotion, the Spanish specialist for pedelec drives, and increased our shareholding to 80 percent in Brain Bee—the Italian vehicle diagnostics and workshop equipment expert. On January 1, 2020, we are also planning to take over all the shares in the former joint venture Behr Hella Service, which markets products for cooling and air conditioning in the automotive aftermarket.

All the following activities are contributing toward our dual strategy: We are continuing to optimize the combustion engine, making it even more efficient and lowering its emissions still further, because it will also have a supporting role to play in the future drive mix. At the same time, we are driving forward the development of alternative drive concepts. The purpose of these efforts is to make the individual mobility of the future more sustainable, more efficient, and affordable and to strengthen and develop our position as one of the world's leading development partners and suppliers to the automotive industry.

The year under review, 2018, was generally challenging for MAHLE. At EUR 12.6 billion, group sales fell slightly short of the previous year's level. After adjustment for exchange rate effects and changes to the consolidation

group, MAHLE achieved strong organic sales growth of 4.4 percent. This development was considerably higher than the average global growth in automobile production. We also improved the result from business activities substantially from EUR 262 million to EUR 614 million, with special effects playing a key role. We were unable to take further advantage of the earnings potential owing also to the noticeable slowdown in the global economy, particularly at the end of the year under review. We employed 79,564 people (reference date: December 31, 2018) worldwide—an increase of 1.6 percent.

MAHLE is able to create solutions for the sustainable mobility of today and tomorrow, because we can rely on a strong team around the world, which is handling the transformation. Despite all the new developments and political uncertainties that such a fundamental change involves, our international MAHLE team is extremely committed, focused, and goal-oriented. Together with my colleagues on the Management Board, I want to thank all our employees for their extraordinary performance in 2018.

My gratitude also goes to the MAHLE Supervisory Board, the members of MABEG (Verein zur Förderung und Beratung der MAHLE Gruppe e.V.), and the employee representatives for their constructive discussions and cooperation, which were shaped by a great deal of trust and a very positive relationship. Furthermore, I'd like to extend my thanks to our customers and partners around the world whose trust, constructive dialog, and strong loyalty continued to motivate us to perform at our best in 2018.

Twenty nineteen will be a demanding and busy year for MAHLE. The global economic risks are high, and the markets are developing less strongly. We'll continue to drive the transformation forward and improve our operating performance. It's not going to be easy. We want to give our customers the most effective solutions for serving their markets once again in 2019. These are major challenges, but we'll tackle them with determination—because we see them as opportunities that we'll seize and transform into solutions for the mobility of tomorrow.

I'd be delighted if you would continue to support MAHLE on this journey.

  
**Dr. Jörg Stratmann**  
Chairman of the Management Board  
and CEO of the MAHLE Group

# Report of the Supervisory Board

*Vadiz and Jenken,*

As in previous years, the MAHLE Group has benefited from the positive global economic climate in the automotive and commercial vehicle industry. After adjustment for exchange rate effects and M&A activities, organic growth increased by 4.4 percent, resulting in group sales of EUR 12.6 billion.

Overall, changes to the product portfolio arising from M&A activities had minimal impact on the structure of our sales distribution between products for passenger car and light commercial vehicle combustion engines on the one hand and unrelated products, including alternative drive systems, on the other. Our sales of products for combustion engines have meanwhile dropped to well below 45 percent. By contrast, the order intake for products for alternative types of drive (plug-in hybrid, battery electric, and fuel cell) has risen considerably.

The shift in market share between gasoline and diesel powertrains, which is especially apparent in Europe, has resulted in markedly negative effects on sales and profits at some of our production locations. This is all the more regrettable since clean diesel technology can achieve CO<sub>2</sub> and fuel consumption savings of around 20 percent in real driving conditions.

The main strategic M&A activities were:

- The sale of the activities of Bosch Mahle Turbo Systems (development, production, and sale of exhaust gas turbochargers) to the Chinese company FountainVest.
- The disposal of our 33.3 percent share in the front-end module producer Hella Behr Plastic Omnium to Plastic Omnium, our partner in this joint venture, in order to strengthen our focus on MAHLE's future group activities.
- The purchase of an additional 60 percent share—bringing the total to 80 percent—in Brain Bee, a specialist in automotive workshop equipment. With this majority acquisition, Aftermarket is significantly expanding its European presence in the area of equipment and services for workshops.



Overall, the MAHLE Group increased the result from ordinary activities from EUR 262 million to EUR 614 million in the 2018 business year. Despite this pleasing development, the significant gaps that are still being identified in operational business areas prevented a greater improvement in the result. A sustainable efficiency program for the operational and, in particular, the administrative areas is therefore essential for the coming years.

The Supervisory Board has thoroughly discussed and advised on all other decisions relating to the development of a long-term strategy for the group. This includes the Management Board's mission to develop approaches for the future of the German locations in order to also manufacture additional products for alternative drive concepts here.

In the 2018 business year, the Supervisory Board met all of its obligatory responsibilities in accordance with the law, Articles of Association, and Rules of Procedure. It held a total of five meetings in the business year. The Personnel Committee also met a number of times to examine current personnel issues. In addition, the Chairman of the Supervisory Board and the Chairman of the Management Board consulted verbally and in writing on a regular basis to discuss and agree on strategic and operational matters.

During the year under report, the Supervisory Board was informed regularly, promptly, and comprehensively through oral and written reports from the Management Board and during meetings about the business development of the company, the group, its business units, its profit centers, and its participations.

Alongside operational and strategic issues, the implementation of the law stipulating the equal participation of women and men in managerial positions was also discussed in these meetings. The Supervisory Board and the Management Board are both striving to increase the current proportion of women in managerial positions.

In April 2018, the members of the Supervisory Board were newly elected in accordance with the regulations of the 1976 Codetermination Act; the constituent meeting took place on April 24, 2018. The Supervisory Board would like to express its particular thanks to the departing members, Mr. Hans-Otto Assmus, Mr. Martin Bücher, and Mr. Manfred Steidle, for their many years of valuable cooperation. At its constituent meeting, the newly composed Supervisory Board elected Professor Dr. Heinz K. Junker as Chairman and Mr. Uwe Meinhardt as Deputy Chairman.

The departure of Wolf-Henning Scheider as Chairman of the Management Board of the MAHLE Group resulted in numerous changes of personnel as of February 1, 2018. In an extraordinary meeting, the Supervisory Board appointed Dr. Jörg Stratmann as Chairman of the Management Board with effect from February 1, 2018, and on the same date Bernd Eckl assumed responsibility within the Management Board for the Thermal Management business unit, and Georg Dietz succeeded Mr. Eckl as member of the Management Board responsible for the Engine Systems and Components business unit. Arnd Franz, member of the Management Board and responsible for OE Sales and Aftermarket, stepped down from the management team on March 31, 2019. He was succeeded by Martin Wellhöffer as head of OE Sales on the Management Committee. In this role, Mr. Wellhöffer reports directly to the Chairman of the Management Board. Due to the changes in personnel on the Management Board, Olaf Henning, Member of the Management Committee, responsible for the Aftermarket business unit, also reports directly to the Chairman of the Management Board.

The appointed auditors Pricewaterhouse-Coopers GmbH audited the annual financial statements and management reports of the MAHLE Group and of MAHLE GmbH for the 2018 business year, which had been set out in accordance with the German Commercial Code (Handelsgesetzbuch, HGB), rendering an unqualified audit opinion. The Supervisory Board agreed with the results of the audit following in-depth analysis of the audit reports and the report from the auditors in the Supervisory Board meeting.

The Supervisory Board approves the annual financial statements and the management reports of the MAHLE Group and of MAHLE GmbH, and does not raise any objections to the appropriation of income as proposed by the Management Board.

The Supervisory Board would like to thank all employees of the MAHLE Group for their commitment to the long-term success of the MAHLE Group.

Stuttgart/Germany, May 7, 2019  
For the Supervisory Board



**Professor Dr. Heinz K. Junker**  
*Chairman of the Supervisory Board  
of the MAHLE Group*

# Highlights 2018

In the past fiscal year, we again initiated and pushed forward many projects and initiatives. Here we present a small selection of topics that we focused on in 2018.



## 2!

Wheels

A mobile future on two wheels: MAHLE purchased ebikemotion, the Spanish specialist in pedelec drives, HMI, and connectivity. This acquisition strengthens the technology group's activities in the area of electrically powered bicycles.



## 250!

Electrical engineers

MAHLE opened its new research and development center for electronics in Valencia/Spain. In the future, around 250 electrical engineers, software developers, and IT experts will work here on the development of products and software solutions for vehicle electronics, including electric drive systems and auxiliary components, charge management systems, and heating and cooling systems. With this new research and development center, MAHLE is strengthening its competence in the area of power electronics and continuing on its path to become a holistic systems supplier in this field.



## 80%!

Participation

MAHLE increased its holding in Brain Bee, an Italian automotive workshop equipment specialist, to 80 percent, thus taking another important step toward becoming an integrated solutions provider.



## 2019!

Opening

MAHLE opened its first production line for electric compressors in the Hungarian town of Balassagyarmat. With this move, the technology group has built up its systems competence in electric vehicles and consolidated its market position in this business segment. Series production starts in 2019.



## 2018!

### Taking part in Formula E

MAHLE is now taking part in Formula E and an official partner and team sponsor of HWA RACELAB in the ABB FIA Formula E Championship 2018/2019, the world's first series for purely electric race cars. Through its involvement, MAHLE is highlighting its performance capabilities in the e-mobility sector.



## 1st!

### Testing and certification center

MAHLE opened a new WLTP- and RDE-capable testing and certification center (RDEC) in Northampton/UK—the first of its kind in Great Britain. MAHLE is thereby reducing the current bottlenecks in the application and certification of vehicles and providing its customers with targeted support in handling the immense challenges presented by the new approval standards.



## 5th!

### Eco Rallye

MAHLE was an official sponsor of the fifth Eco Rallye: the official FIA World Rally Championship for electric vehicles and alternative energies. The company is thus actively promoting the sustainable use of vehicles and encouraging efficient driving styles. MAHLE entered two of its own teams into the competition, which took place in Castellón, Valencia/Spain in 2018.



## 200 km!

### Cruising range

The German Design Council presented MAHLE with the prestigious German Design Award in the Excellent Product Design—Conceptional Transportation category for its urban vehicle concept MEET, MAHLE Efficient Electric Transport. MEET features numerous technical highlights, including a demand-based 48 V powertrain and intelligent thermal management for the efficient control of heating and cooling. This holistic approach and other energy-saving measures increase the vehicle's cruising range: MEET runs for around 200 kilometers without recharging.



## >90!

### Awards

MAHLE was delighted to receive more than 90 accolades, including Product Transformation Champion 2018 for innovative production logistics, which was awarded by corporate consulting company Roland Berger in conjunction with German trade magazine Automobil Production.

# A worldwide network – Our locations

Around 160 production locations  
16 major research & development centers  
More than 79,000 employees\*

## Major research & development centers

### EUROPE

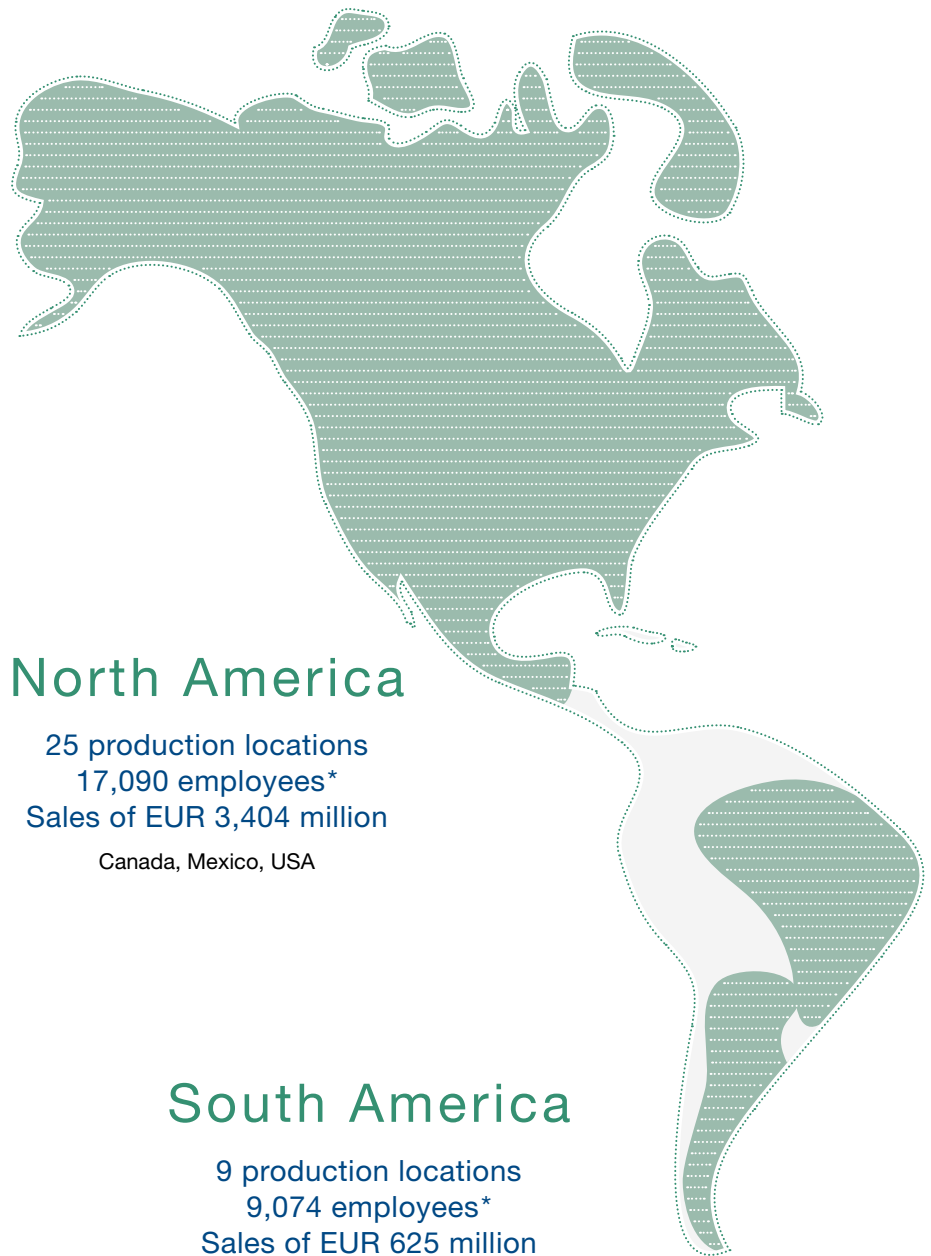
Northampton/Great Britain  
Šempeter pri Gorici/Slovenia  
Stuttgart-Bad Cannstatt/Germany  
Stuttgart-Feuerbach/Germany  
Valencia/Spain  
Foetz/Luxembourg

### NORTH/SOUTH AMERICA

Amherst, New York/USA  
Farmington Hills, Detroit, Michigan/USA  
Troy, Detroit, Michigan/USA  
Lockport, New York/USA  
Jundiaí, São Paulo/Brazil

### ASIA/PACIFIC

Numazu/Japan  
Pune/India  
Shanghai/China  
Kawagoe, Tokyo/Japan  
Okegawa, Tokyo/Japan



## North America

25 production locations  
17,090 employees\*  
Sales of EUR 3,404 million  
Canada, Mexico, USA

## South America

9 production locations  
9,074 employees\*  
Sales of EUR 625 million  
Argentina, Brazil

\* As at December 31, 2018

## Europe

70 production locations  
35,655 employees\*  
Sales of EUR 6,016 million

Bosnia and Herzegovina, Germany,  
France, Great Britain, Italy, Luxembourg,  
Austria, Poland, Portugal, Romania,  
Russia, Slovakia, Slovenia, Spain, Czechia,  
Turkey, Hungary, Belarus

## Asia/Pacific

55 production locations  
16,697 employees\*  
Sales of EUR 2,484 million

China, India, Indonesia,  
Japan, Philippines,  
Singapore, South Korea, Thailand

## Africa

2 production locations  
1,048 employees\*  
Sales of EUR 53 million

South Africa

# Members of the Supervisory Board

## Prof. Dr.-Ing. Heinz K. Junker Chairman

Former Chairman of the Management Board and  
CEO of MAHLE GmbH, Stuttgart/Germany

## Uwe Meinhardt Deputy Chairman

Executive Director of IG Metall,  
administrative office Stuttgart/Germany

## Hans-Otto Assmus

(until April 24, 2018)

Director Global Product Management Business Unit Engine  
Systems and Components MAHLE Group

## Peter Bauer

(since April 24, 2018)

Member of the Works Council of MAHLE Ventiltrieb GmbH,  
Zell im Wiesental/Germany

## Rolf Berkemann

(since April 24, 2018)

Vice President Sales and Application Engineering Passenger  
Cars 1/Region Europe, MAHLE Group, Stuttgart/Germany

## Dietmar Bichler

Chairman of the Supervisory Board of Bertrandt AG,  
Ehningen/Germany

## Martin Bücher

(until April 24, 2018)

Executive Secretary of the Central Works Council  
of MAHLE Group Germany

## Prof. Dr. jur. Wolfgang Fritzemeyer

Partner at international law firm Baker McKenzie,  
Munich/Germany (until June 30, 2018)

## Gerd Goretzky

(since April 24, 2018)

Deputy Chairman of the Works Council of  
MAHLE Behr GmbH & Co. KG, Stuttgart/Germany

## Josef Häring

Chairman of the Works Council of MAHLE GmbH,  
plant Rottweil/Germany

## Karin Himmelreich

Managing Director MP Transaction and  
Partner at MPT Jamieson, Frankfurt/Germany

## Jürgen Kalmbach

Chairman of the Works Council of MAHLE GmbH,  
plant Stuttgart/Germany

## Dieter Kiesling

Chairman of the Central Works Council of MAHLE Behr and  
Chairman of the Works Council of MAHLE Behr GmbH & Co. KG,  
region Muehlacker/Germany

## Michael Kocken

Trade Union Secretary of IG Metall,  
administrative office Stuttgart/Germany

## Prof. Dr.-Ing. Gisela Lanza

Head of the Institute of Production Science at the Karlsruhe  
Institute of Technology (KIT), Karlsruhe/Germany

## Thomas R. Letsch

Former Vice President Sales and Application Engineering  
Commercial Vehicles of MAHLE Group

## Dr. Franz-Josef Paefgen

Former CEO of AUDI AG, Bentley Motors Ltd and President of  
Bugatti International S.A.

## Prof. Dr.-Ing. Stefan Pischinger

Head of Institute, Institute for Combustion Engines,  
RWTH Aachen University, Germany

## Uwe Schwarte

Chairman of the Central Works Council of  
MAHLE Group Germany and Chairman of the Works Council  
of the MAHLE Filtersysteme GmbH, Stuttgart/Germany

## Manfred Steidle

(until April 24, 2018)

Chairman of the European Works Council of MAHLE Group  
and Deputy Chairman of the Central Works Council of the  
MAHLE Group Germany

## Annette Szegfü

Spokesperson of Management IG Metall, Frankfurt/Germany

## Dr. Bernhard Volkmann

Former Member of the Management Board and  
CFO of MAHLE GmbH, Stuttgart/Germany

## Georg Weiberg

Former Head of Global Truck Engineering,  
Daimler AG, Stuttgart/Germany



# Members of the Group Management Board

## Dr. Jörg Stratmann Chairman and CEO

(since February 1, 2018)

Research and Advanced Engineering, Corporate Quality Management, Corporate Planning, Corporate Communications, External Affairs; Engineering Services, Motorsports, and Special Applications profit center

(until January 31, 2018)

Thermal Management business unit; Industrial Thermal Management, Compressors, Control Units, and Front-end Modules\* profit centers

## Wolf-Henning Scheider Chairman and CEO

(until January 31, 2018)

Research and Advanced Engineering, Corporate Planning, Corporate Communications, External Affairs; Engineering Services, Motorsports, and Special Applications profit center

## Georg Dietz

(since February 1, 2018)

Engine Systems and Components business unit, Large and Small Engine Components profit center, Environmental Management/Safety at Work for the group

## Bernd Eckl

(since February 1, 2018)

Thermal Management business unit; Industrial Thermal Management, Compressors, Control Units, Front-end Modules profit center\*

(until January 31, 2018)

Engine Systems and Components business unit, Corporate Quality Management, Environmental Management/ Safety at Work for the group, Large and Small Engine Components profit center

## Wilhelm Emperhoff

Filtration and Engine Peripherals business unit, Corporate Purchasing Processes and Methods, Corporate MAHLE Production System, Mechatronics division

## Arnd Franz

Automotive Sales and Application Engineering, Aftermarket business unit

## Michael Frick

Finance, Controlling, Taxes, IT Services, Insurances, Revision and Risk Management, Mergers & Acquisitions Coordination

## Michael Glowatzki

Human Resources and Legal, Director of Personnel

\* From February 1, 2018, until June 30, 2018: In the year under review, we sold our shares in the joint venture Hella Behr Plastic Omnium (HBPO), which had been run as the Front-end Modules profit center.

# Members of the Group Management Board

*From left to right:*

Wilhelm Emperhoff

Michael Glowatzki

Georg Dietz

Michael Frick

Dr. Jörg Stratmann

*Chairman*

Bernd Eckl

*as at April 1, 2019*





CHAPTER

# Responsibility

*Committed employees* ..... 57 – 61

*Corporate Social Responsibility* ..... 62 – 67

*By people for people* ..... 68 – 71

# Committed employees – The foundation of our success

With their diverse skills, commitment, and expertise, our employees are the foundation of our success and the key to the future of the MAHLE Group.

## Employees

Megatrends like digitalization, technological change, and globalization are having an impact on the world of work and presenting us with new challenges. We're addressing these issues by continuously optimizing and redesigning our HR activities and by aligning our concepts and processes on a global basis. Our employees are our most important resource and safeguard the future viability of our company. Thanks to their wide range of skills, know-

how, and commitment, they make a valuable contribution to our corporate success every day.

It's important to us that our employees are motivated, experience a respectful working environment that is free of prejudice, and are able to perform their tasks effectively and efficiently. Key to achieving this are targeted personnel marketing, staff recruitment, comprehensive support, and the opportunity to gain qualifications and participate in ongoing development.



## Reaching out

*MAHLE's new HR campaign is particularly aimed at specialists in electrical engineering, software engineering, and IT.*



## Generating enthusiasm for MAHLE – with a strong employer brand

As an employer, we want to position ourselves and our dual strategy purposefully on the job market and get people excited about our company. In addition to the target groups that have been our focus until now—such as automotive and mechanical engineers—specialists in electrical engineering, software engineering, and IT as well as those from other fields of study are now increasingly gaining in significance. These experts will help us to shape our future in e-mobility and drive the technology forward. This makes it all the more important that we make these groups of people aware of our company. In our new, international personnel marketing campaign, which we've developed in conjunction with electrical engineers from various specialist functions, we specifically approach experts in the field of e-mobility and inform them about exciting career opportunities.

As one of the key events aimed at addressing this target group, we organized an E-Mobility Night in Stuttgart/Germany for the first time in 2018. Numerous electrical engineers and representatives

from the worlds of politics and science accepted our invitation. They had the chance to find out more about us and our activities in the field of e-mobility in a relaxed, after-work atmosphere. The event also provided an excellent opportunity for them to chat to our specialists and network.

The eTechathon at our location in Valencia/Spain had a practical focus. At this competition for up-and-coming electrical engineers, talented individuals based at our partner institution, Universitat Politècnica de València, were able to prove their expertise. This contest was a great opportunity for us to get an idea of the participants' specialist qualifications and level of knowledge as well as a chance to assess their creativity, problem-solving skills, and ability to work in a team. The event was initiated primarily as a consequence of our great need for highly qualified e-mobility specialists at our expanded research and development center in Valencia/Spain. In the future, around 250 engineers and specialists in the fields of software development, control and power electronics, simulation, validation, and electromagnetic compatibility (EMC) will work here to develop new products and solutions for sustainable mobility.



### Interconnected

*In the spring of 2018, MAHLE welcomed specialists from fields including electrical engineering, software engineering, and IT to its first MAHLE E-Mobility Night.*



## **Attracting talent to MAHLE – with a global HR, marketing, and recruitment concept**

In line with the strategic direction of our business, we've adapted our personnel marketing and sourcing tools across the group and established a global recruitment concept. The resulting harmonization and realignment of the Recruitment function will allow us to identify the best candidates and attract them to our company. The new Recruitment organization was introduced in Germany, Brazil, and the USA during the year under review. A worldwide rollout has now been planned.

We're making use of a wide range of opportunities to draw attention to MAHLE among students and experienced professionals in the e-mobility sector through personnel marketing and sourcing instruments aimed at specific target groups. Whether by participating at career events, conducting global media campaigns, or running talent retention activities, our international colleagues used many of these occasions to address talented people and experienced specialists directly.

One of our personnel marketing instruments is, for example, our global key universities concept. We currently have a relationship with selected key universities in 19 countries, at which we ensure a regular presence and dialog with professors and selected students by means of guest lectures, sponsorship activities, and cooperative measures. As part of the MAHLE summer and winter 2018 Campus Tour, we visited the electrical engineering faculties at our key universities in Germany to inform them about MAHLE as a potential employer and to highlight career opportunities. In China, we developed lecture series on the latest technologies for students of mechanical engineering, automotive manufacturing, and thermodynamics in conjunction with Jiangsu University.

Our involvement in Formula Student, especially our cooperation in Formula Student Electric, is a valuable personnel marketing instrument. Here, students compete against teams from all over the world in race cars they've designed and built themselves. MAHLE provides financial and technical support to this initiative as well as offering training activities. In the year under review, the 34 teams we sponsored were very successful again.

Special highlights in terms of media engagement include intensifying our work on LinkedIn for the experienced professionals target group and the launch of our global Instagram account. Instagram is a photography-based platform that is currently used by over one billion people around the world. This makes it the fastest-growing digital network and therefore another important communication channel for our target groups. Under @MAHLEcareers, we provide authentic insights into our day-to-day work to show the diversity of tasks and topics addressed within our company.

## **Boosting skills for MAHLE – with an extensive range of training opportunities**

We want to offer long-term prospects to passionate, motivated employees. That's why we've always focused on selected measures and instruments that support ongoing development and vocational training. Vocational training and cooperative studies have proven their worth at MAHLE and are highly valued. For us, a well-grounded apprenticeship is an excellent opportunity to help future generations of specialists gain the right qualifications and ensure our future requirements are met.

The apprenticeship system in Germany underwent many changes in 2018. Topics related to digitalization, such as data security, online research, and data networking, are now on the training schedule for careers in metalworking, electrical engineering, and mechatronics. As a result, these apprenticeships are taking the digital transformation of our sector into account. In 2018, we trained a total of 478 employees in Germany. Of these trainees, 334 are employed in one of our 21 industrial or commercial apprenticeship opportunities. One hundred and forty-four students are undertaking dual education in 12 courses of study. We're also investing in initial vocational training in Europe and around the world in order to prepare aspiring specialists for their roles. In Austria, for example, 60 young people underwent an apprenticeship in ten occupations, while 70 trainees completed courses in Poland. In addition, 79 apprentices received training in seven professional fields in North America, especially in Mexico.

The ongoing personal and professional education of our employees is also very important to us. Our wide range of training options therefore covers over 300 subject areas, which are constantly reviewed against current requirements. For example, the present catalog includes global opportunities in the field of e-mobility as well as programs focusing on personal skills, such as self-management and resilience.

Our e-learning portal provides a particularly flexible and convenient option for further training. It is available to all our employees around the world and supports independent learning using digital media. With our Sales Online Academy, for instance, we offer appropriate specialist training to our sales staff. It contains a media library with short training videos, which can be accessed as “learning nuggets” at any time and from any location via our Learning@MAHLE platform.

Another element of personal and professional development at MAHLE is worldwide secondment. We offer specialists, managers, trainees, and students the option to broaden their horizons, exchange knowledge, and network with international colleagues at one of our locations outside their home country. Foreign assignments are also a key component of our International Trainee Program. We foster mobility and the establishment of a global mind-set in order to continue to promote the international transfer of know-how, cultural exchange, and the ability of our employees to cooperate around the world.

We give our managers a high level of support as part of their development and prepare them extensively for their demanding roles. It's important to us that they work closely together and prioritize the sustainable commercial success of the whole company in their day-to-day work. We address the wide range of challenges in the various management levels on a national, regional, and global basis through development programs and leadership training. With the reorganization of our development programs as part of the strategic group initiative HR Boost!, we ran the first Global Talent Circle in the year under review. This is a worldwide initiative for the ongoing development of top executives and includes modules in Brazil, China, and Germany. Region-specific Regional Talent Circles and national Leadership Development Programs also took place to further support our managers. These measures contribute toward the ongoing development of the participants'

professional and personal skills, bolster the expansion of cross-functional and international networks, support interdepartmental dialog, and represent an important cornerstone of systematic succession planning.

### **Supporting One MAHLE – with diversity & inclusion**

MAHLE has signed the Diversity Charter because we're convinced that diversity makes us more successful. We value our employees' work – irrespective of characteristics like age, gender, religion, sexual orientation, disability, nationality, and origin. We celebrate our diversity on our annual Diversity Day, held around the world. In 2018, the day of events at various locations in 15 countries – including China, Germany, Italy, Japan, Poland, Portugal, Hungary, and the USA – focused on the topics of gender diversity and generational diversity. In workshops, discussions, and hands-on activities, employees had opportunities to find out information, participate, and exchange ideas.

To highlight how diverse our company already is, we launched our global Role Model campaign. This initiative draws attention to a wide range of examples of diversity in practice at MAHLE. In 2018, we also implemented a series of different activities to support women worldwide. In Argentina, Brazil, Germany, Japan, and Slovenia, local Female Leadership Conferences took place for the first time. They were addressed at all female managers with the aim of raising the visibility of women in managerial positions, promoting networking among the attendees, and boosting the exchange of ideas. For example, MAHLE in Great Britain organized an International Women in Engineering Day event at its locations in Rugby and Kilmarnock. International Women's Day was also celebrated with our colleagues around the world. In this way, more than ten countries engaged with the topic of Women at MAHLE through numerous activities.

Diversity is also closely linked to the subject of flexibility. As an attractive employer, we want to promote employee-friendly working conditions for our staff. These include flexible working hours as well as options for mobile and part-time work, which are features of our personnel policy in many countries. Above and beyond these parameters, we offer our employees numerous options and offers intended to support work-life balance as part of the MAHLEforMe program. These range from a



laundry service, health promotion schemes, and support in caring for elderly relatives through child-care provision and company sports initiatives.

The family days in Rottweil/Germany, Šempeter pri Gorici/Slovenia, and Gebze/Turkey are good examples of this approach. In the year under review, these occasions once again gave the families of many employees the opportunity to see our locations for themselves and enjoy an exciting program of social events.

Our colleagues in Poland showed that MAHLEforMe not only benefits our workforce, but can also be tied in with charitable causes. The three locations at Ostrów Wielkopolski, Krotoszyn, and Wrocław competed against each other in sports such as running, cycling, and walking. The 90,000 kilometers covered in the events were converted to a sum of money that was donated to charity. Thanks to this wide range of activities, initiatives, and changes to our HR activities, we're also strengthening the bond between our employees and the company. By doing so, we aim to contribute to the well-being of employees at MAHLE and provide them with a working environment in which they're happy to give their best.



### Supporting One MAHLE

*On Diversity Day, employees from MAHLE locations in 15 countries had the opportunity to get involved in workshops and discussions and to exchange ideas.*



# Corporate Social Responsibility

As a company that operates internationally, we accept our responsibilities—toward the people who work for us and as part of society. At MAHLE, corporate activities and social engagement go hand in hand. With our resource-efficient technologies, our sustainable product solutions, and our modern production processes, we are helping to steadily reduce the pressure on people and the environment. And we want to keep on improving every day.

## Responsibility toward employees and the environment

We believe that one of our most important tasks is to harmonize our corporate success with the well-being of people and the environment. Consequently, we always aim to incorporate the environmental and social considerations alongside the economic factors in our decision-making.

We accept our responsibilities and work to ensure the well-being of our employees. To achieve this, we need safe workplaces that do not pose a risk to the health of our staff. We also aim to conserve water resources, reduce emissions and energy consumption, and minimize the negative impact of our business activities on the environment wherever possible.

## Sustainability management at MAHLE

What does MAHLE mean by the term “sustainability”? Sustainability means that we take the ecological and social considerations into account alongside the economic factors when making our decisions. The task of sustainability management is therefore to analyze and, where possible, reduce any negative impacts arising from our business activities.

In addition to a high level of quality as well as innovative products, our customers also increasingly require us to make a clear contribution toward sustainable development. In practical terms, this means using fair business practices, complying with social standards, and actively protecting the environment. We also place these requirements on our suppliers. MAHLE applies internationally recognized standards that are typical for our industry, for example in the design of our management systems with regard to the environment and safety at work.

As a globally operating group, we are aware of our corporate responsibility toward the environment and the people around us. This is why in February 2018 we created the Sustainability central position, which is coordinating the subject and driving it forward with the relevant business areas in the company. In the future, the topic of sustainability will be integrated even more strongly into MAHLE's business processes, including regular reporting about our progress.

### Focusing on safety at work

In the 2018 business year, safety at work was a matter of priority for our activities in the field of health, safety, and environmental protection (HSE). We act within the framework of our HSE guideline, and once the new ISO 45001 standard is adopted, we will gradually implement it at our locations and arrange for them to be certified accordingly.

We tackle the subject of safety at work proactively across the group and raise awareness among our employees and managers. The key performance indicator (KPI) is the accident rate, which is used to record accidents involving at least one day of absence. Our objective is to decrease the accident rate across the group to fewer than five accidents per million hours worked by 2022.

### Accident numbers continue to fall

In the business year under review, our figure for accidents per million hours worked fell significantly for the second year running. Our accident rate for 2018 thus fell to 5.7 percent, which was 16 percent lower than in 2017.



Safe

*Safety at work was a matter of priority for MAHLE's activities in the field of health, safety, and environmental protection (HSE) in 2018. This also included ensuring suitable protective equipment is worn when entering production areas (pictured here: our plant in Jaguariúna/Brazil).*





## Safety at work as a managerial priority

In 2018, we developed and rolled out a training program on the subject of safety at work. It is initially aimed at our managers and raises their awareness of safety at the workplace by means of practical case studies covering subjects such as how to recognize, evaluate, monitor, and minimize occupational risks. At a later date, we will also communicate our safety at work initiative to our other employees.

## Safety initiatives at numerous MAHLE locations

All of our locations actively drive forward safety at work. In recent years, for example, our plant in Izmir/Turkey has been carrying out a project under scientific supervision to reduce ergonomic risks (e.g., musculoskeletal overload) for our employees at their workplaces. As a result, there has been a significant reduction in injuries caused by poor ergonomic conditions. The measures have caused absences at this location to drop substantially.

In Asia, we received several prestigious awards for safety at work in our plants in 2018, including the Cup of Safety & Health prize for outstanding companies for our thermal management plant in Wuhan/China. MAHLE was one of 795 companies to receive this award following stiff competition from 62,000 participants throughout China. To encourage our plants in their efforts with regard to safety at work, MAHLE has awarded the Safety Excellence Award to outstanding plants since 2017. In 2018, the prize went to our filter plant in Mogi Guaçu/Brazil, where employees and managers were actively involved in our global safety initiative under the motto Safety First and safe behavior was specifically recognized. Together with other projects in this area, this meant that there were no occupational accidents at all in Mogi Guaçu in 2018.

## Energy management as a key component of environmental management

As a producing company, the energy consumption at MAHLE's locations is a pivotal aspect of its impact on the environment. Smelting, casting, and plastics processing operations, such as injection molding and deformation, are among the particularly energy-intensive production processes at MAHLE. In 2019, our goal is to reduce our energy intensity — energy consumption as measured against sales — by 2 percent with the same production structure.

## Energy-saving concepts worldwide

Our plant in McConnellsville/USA is a model for just how much energy can be saved through systematic reduction activities. By implementing various measures, we have cut on-site electricity consumption by around 13.5 percent in five years, which is the equivalent of a CO<sub>2</sub> saving of around 3,300 tons. The steps taken to achieve this included the installation of an automated shut-off system for the radial fans located on the cooling section of the strip annealing line. The plant has also set up a function to remotely monitor and control production machinery, enabling the energy-efficient operation of several furnaces thanks to programmed temperature reduction during idle times. Our location received the Energy Efficiency Champion Award of the electricity supplier AEP Ohio for this successful energy-saving program.

Other MAHLE locations are also implementing energy-saving measures. For example, our plants in La Loggia/Italy and Izmir/Turkey optimized their furnaces. In Izmir alone, this has resulted in an annual saving of 747,000 kWh of natural gas, corresponding to a reduction of 22 percent. By gradually changing our plant lighting over to energy-saving LEDs, we are making annual savings of around 360,000 kWh of electricity in our plants in Mühlacker/Germany and Numazu/Japan, to take just two examples. The Thermal Management business unit is also saving more than 200,000 m<sup>3</sup> of natural gas each year at its location in Stuttgart/Germany through steps that include the optimization of its heating concept and the renovation of its combined cycle power plant.



## Award winners

*The exemplary energy-saving concept implemented by our colleagues in McConnellsville/USA cut electricity consumption at the location by 13.5 percent—and earned them an award.*



## Reduced resource consumption

All our locations around the world continuously strive to further reduce waste volumes and water consumption. These efforts are based on our environmental management system, which is certified in accordance with the international standards ISO 14001 and EMAS. In order to conserve valuable resources, MAHLE has resolved to cut the volume of waste it produces by 10 percent by 2022.

At our piston plant in Tsuruoka/Japan, we collect the cooling water arising during production and reuse it in further processing. This has allowed us to cut water consumption here by 30 percent (21,600 m<sup>3</sup>).

## TERRA environmental program

The TERRA program at our locations in South America is a cross-functional, interdisciplinary initiative aimed at further improving our environmental balance sheet. Measured against production quantity, our target is a reduction of 2 percent in energy and water as well as drop-off and wastewater (starting from 2016). By making adjustments to the production machinery and training the operating teams, we have thus been able to reduce iron and steel production scrap by around 8 percent in our plant in Itajubá/Brazil, according to initial assessments. With the same approach at our production location in Mogi Guaçu/Brazil, we even succeeded in reducing plastic production waste by an average of 80 percent.



## Exciting

*In the annual Summer Click program organized by MAHLE in Portugal, our employees' children aged between 13 and 17 can enjoy a range of activities—including a short internship in our company.*



## Social engagement

At MAHLE, engagement with society and social responsibility are important pillars of our corporate culture. For this reason, the MAHLE Group and its employees in many countries support numerous projects and initiatives. Our engagement is primarily focused on issues such as social interaction, education, and the fight against poverty and disease. The driving force behind these efforts is our workforce, with our employees also acting on behalf of others outside of working hours. The ways in which we offer assistance are as diverse as the projects themselves: MAHLE has supported some initiatives and institutions consistently for many years, whereas other projects help to address acute problems through concerted one-off campaigns on the ground.

### Helping the needy at many MAHLE locations

Bringing joy by making wishes come true for people in need—this is one way of describing the engagement of our employees at many places around the

world. For example, colleagues at our Polish locations take part annually in the Noble Gift (Szlachetna Paczka) charity campaign, one of the largest and most well-known fund-raising programs in Poland. People in need are given furniture, food, clothing, or even medical equipment. While our company funded such a gift once again last year, our employees themselves provided even greater support. Also in Poland, near the location in Ostrów Wielkopolski, our colleagues support a children's home and have donated sports and leisure equipment for two recreational rooms.

Social engagement is also a top priority in Great Britain. The Warwick Rotary Club's annual dragon boat race on the River Avon has become a highlight. University graduates take part in this special race during their first year at MAHLE UK. The 2018 team had the task of recruiting rowers from all over the company and collecting charitable donations for a local hospice as well as a children's hospital. Our team named MAHLELICIOUS also won all three races and successfully raised GBP 777 for charity.

In August 2018, our MAHLE plant in Wölfersheim/Germany was one of the hosts of the Tour der Hoffnung (tour of hope). Germany's largest privately organized charity cycle tour stopped at our location, where the approximately 200 participants received refreshments and a donation of EUR 7,500. Well-known personalities from the worlds of politics, business, and society ride in the Tour der Hoffnung and collect donations for children suffering from leukemia and other types of cancer.

Eighteen colleagues from our Hwaseong location in South Korea provided special neighborly assistance in July 2018. They ran leisure activities that included singing, dancing, and smile therapy for around 20 elderly people at a nearby senior center, giving the residents of the home a welcome change from the everyday routine.

In Brazil, we supported the Dança e Cidadania (dance and citizenship) program to give free dance lessons to roughly 350 children and young people from low-income families in Campinas, Mogi Guaçu, Sumaré, and Itajubá. In their shows, the young dancers impressed 3,500 people with their skills. MAHLE has supported the project since 2002 and is its biggest sponsor.

### **Supporting our employees' families**

MAHLE is focused on supporting the families of its employees. For example, every year MAHLE Portugal organizes the Summer Click program, in order to offer our employees' children an exciting and instructive occupation during the holiday season. Youngsters between 13 and 17 years old can complete a short internship in the company, which will certainly help to better prepare them for their future careers.

## **Commitment to education**

MAHLE also invests in the education of children and young people beyond the families of its employees to equip them for the professional challenges of the future.

The MAHLE location in Gaildorf/Germany has been cooperating with two kindergartens since 2010. The Technolino program is addressed at the very youngest children and, through various small projects, encourages them to research, investigate, and try things out—and thereby discover science and technology in a fun way.

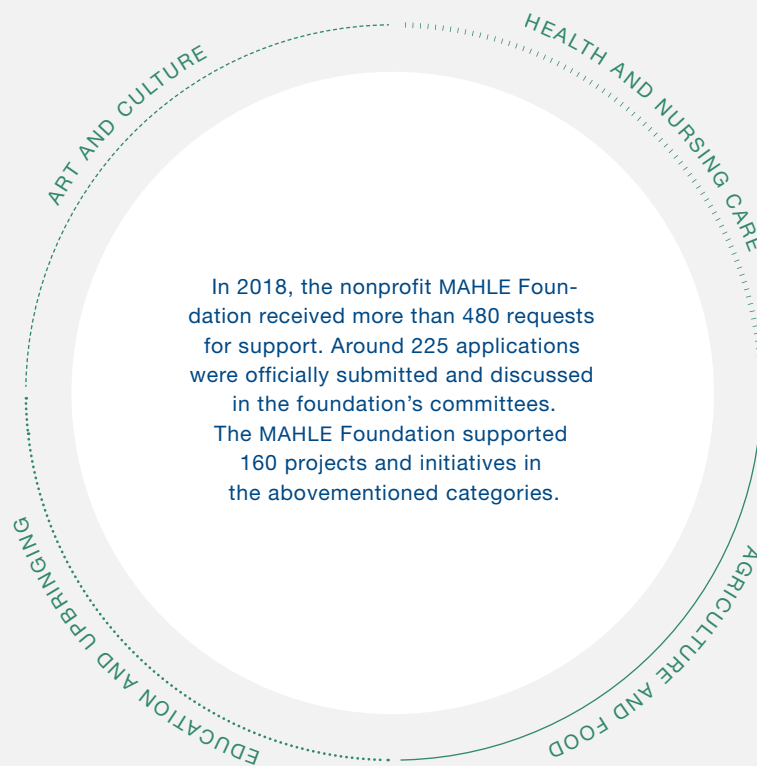
In North America too, MAHLE is supporting the education of high school pupils to boost their interest in scientific and technical careers in particular. In 2018, our US plants in Morristown, Troy, Lockport, and Farmington Hills as well as our plant in Tilbury/Canada took part in various robotics programs at local schools. Supported by mentors from MAHLE's workforce, 110 pupils in senior high school designed and built working robots in teams, while also solving everyday engineering challenges under budgetary and time constraints.

And that is not all. MAHLE employees at our worldwide locations show a high degree of social engagement with their voluntary participation in many more initiatives. The charitable projects, donations, and fund-raising campaigns are often instigated and carried out on their own initiative.

The MAHLE Management Board would like to thank all the dedicated helpers for this outstanding commitment.

# By people for people — the work of the MAHLE Foundation

Whether seed research funding, the work carried out by the Filderklinik in Stuttgart or the children's cancer center at the Charité in Berlin, or adult education projects — in 2018, the MAHLE Foundation supported around 160 projects and initiatives, opening up new prospects for people in various different ways.



MAHLE Foundation

# 99.9%

*A guarantee  
of independence*

The MAHLE Foundation holds 99.9 percent of the MAHLE Group's shares. Every year, it receives a dividend, which it uses to finance its funding projects. The nonprofit organization thereby guarantees that MAHLE is able to remain an independent company. This ensures that the majority of the group's net income for the year is reinvested in the MAHLE Group MABEG e.V. (Verein zur Förderung und Beratung der MAHLE Gruppe e.V.) exercises the voting rights at MAHLE GmbH shareholder meetings. Since its inception over 50 years ago, the MAHLE Foundation has supported and sponsored more than 5,000 different projects and initiatives.



## Health and nursing care

In 2018, the MAHLE Foundation supported the work of the Department of Pediatrics, Division of Oncology and Hematology, at the Charité hospital in Berlin. As one of Germany's largest centers for childhood cancer, the clinic covers the entire range of medical services. Pediatric care is becoming increasingly open to integrative medicine – alternative treatments that complement conventional medicine. For example, the pediatric oncology team has developed an anthroposophic care and therapy concept that is in its pilot stage and will be integrated into the clinic's conventional nursing practice. The approach includes training nursing staff in anthroposophic therapies and remedies. This care and therapy concept aims to enhance the effect of medical treatments and thus significantly improve the well-being of the young patients.

The Filderkliniek GmbH – in which the MAHLE Foundation is a 70 percent shareholder – continued to be a priority for the organization's funding activities in the field of health and nursing care in

the year under review, 2018. The medical institution has been active in the area of integrative, anthroposophical medicine for over 40 years and is now one of the lighthouse projects for this system in southern Germany. The foundation's main focus this year has been on supporting the strategic development and reorganization of the Filderkliniek. One of the key points of this process is, for example, to define future treatment priorities. "I'm delighted that such good progress has been made toward implementing the 'Filderkliniek 2020' strategy," says Jürgen Schweiß-Ertl, managing partner of the MAHLE Foundation. "The Kompetenznetzwerk Integrative Medizin is also shaping up well." The network, which was founded by the Filderkliniek and nine other clinics in 2017, is unique in Germany. Its members work on the ongoing development of the integrative medicine concept. Under this integrative approach, natural healing methods, homeopathy, and anthroposophical medicine are not viewed primarily as an alternative to conventional medicine, but they are instead combined with it to a high standard.



### Lighthouse project

*The Filderkliniek in Stuttgart/Germany has been active in the area of integrative, anthroposophical medicine for over 40 years and has earned itself an outstanding reputation.*





## Diversity

*The MAHLE Foundation supports the Forschung & Züchtung Dottenfelderhof (Dottenfelderhof Research and Breeding) initiative, which cultivates high-quality, mixed-population varieties of grains that are adapted to today's environmental conditions.*



### Agriculture and food

“Agriculture and food” has been one of the foundation’s funding priorities for decades, with a particular commitment to promoting biodynamic farming. This includes seed breeding, especially the cultivation of varieties adapted to their respective growing regions. “We continued to support certain research projects in the field in 2018,” says Jürgen Schweiß-Ertl.

For example, the Forschung & Züchtung Dottenfelderhof (Dottenfelderhof Research and Breeding, FZD) initiative has for many years been cultivating delicious and healthy vegetables and cereal crops that are adapted to today’s environmental conditions. In one new approach, mixed-population varieties of high-quality grains are grown alongside isolated varieties. They are cultivated to be resistant to pests and weeds even without the use of pesticides, synthetic fertilizers, or genetic engineering. The initiative also uses breeding methods that have been handed down for centuries: selection and crossing. By doing so, the FZD preserves and exploits the genetic variety of cultivated plants. Through its research, it is making a major contribution to maintaining the diversity, health, high quality, and productivity of cultivated plants in the future and

thus playing an important role in providing people with a healthy and varied diet.

### Education and upbringing

In 2019, the Waldorf educational philosophy celebrates its 100th anniversary, yet its approach is now more topical than ever and its concerns relate to future issues. The MAHLE Foundation is involved at many levels. For instance, the foundation supports the Emergency Pedagogy unit of the Freunde der Erziehungskunst Rudolf Steiners e.V. (Friends of Waldorf Education), based in Karlsruhe/Germany, which carries out important work for people suffering from the effects of trauma. On the basis of its many years of experience in the field, the unit has developed a Waldorf-derived concept of emergency and trauma pedagogy that has proved its worth in various contexts — whether international missions in war zones and disaster-struck regions or work with traumatized refugees.

The Lern-Praxis-Werkstatt (LPW) project in Weinheim, located in the Bergstraße region of Germany, is committed to opening up new horizons for people — including refugees — who don’t have any professional qualifications. The LPW offers adults who are unable to meet the requirements for an

apprenticeship or conventional vocational training an easier way to access education. In a workshop provided by the project partners, a social education worker and an occupational trainer teach basic professional and technical skills, such as how to use tools. Competences like reliability, motivation, precision work, and the ability to work in a team are also part of the teaching. The LPW thus facilitates the shift from feeling helpless and hopeless to successfully accessing schooling, vocational training, or measures organized by the job center.

The MAHLE Foundation can also look back on a very successful lecture series, which it initiated in cooperation with StadtPalais – Museum of Stuttgart and Stuttgart’s cultural office. They organized seven interesting talks by renowned figures from the fields of culture, science, and religion, entitled “How we became who we are – in the footsteps of our poets and thinkers.” Originally planned as a short series of educational lectures, the event has evolved into a crowd-puller, with around 2,000 visitors attending the talks in Stuttgart’s StadtPalais so far. “We’ve been pleasantly surprised by the public response and the event’s success,” says Jürgen Schweiß-Ertl. The MAHLE Foundation is already planning another

series for this year, focusing on the theme of inventors and innovators from Baden-Württemberg, the German federal state in which MAHLE is headquartered.

## Art and culture

In terms of art and culture, the MAHLE Foundation has funded a variety of initiatives in theater, music, and eurythmy. One such activity is the Stuttgart-based Konzerte für Schulklassen project, which teaches music to pupils aged six to eleven in state schools using methods from the Waldorf educational philosophy. Waldorf educator Thomas Sträßer visits the classes, which often include a high proportion of children from an immigrant background, and prepares them for a concert. The class is then offered the chance to participate in a concert in the city’s instrument museum, where they can also find out about musical instruments that their school doesn’t own. The subject is introduced using stories, and pieces are chosen to suit each individual class. In recent years, over 7,000 schoolchildren have been reached this way. The demand is very high, and between 30 and 40 concerts are planned for 2019.



## Opportunities

*The Lern-Praxis-Werkstatt (LPW) project offers people who don't have any professional qualifications an easier way to access education, giving them new prospects.*



CHAPTER

# Group management report

72-97

*Fundamental information about the MAHLE Group* ..... 74–77

Business activities and corporate structure – 74

Business segments – 75

Group strategy – 76

*Report on economic position* ..... 78–86

Economic conditions – 78

Business development – 80

Net assets, financial position, and results of operations – 83

*Additional key performance indicators* ..... 87–91

Human resources – 87

Technology and innovation – 89

Purchasing – 90

Production, quality, and environment – 90

*Opportunity and risk report* ..... 92–94

*Outlook* ..... 95–97



As one of the world's largest suppliers and development partners to the automotive industry, MAHLE strives to make transportation more efficient, more environmentally friendly, and more comfortable.



We are among the market leaders in our business segments.



Faced with a changing mobility landscape, we are focusing on a dual strategy. This involves optimizations to the combustion engine as well as innovations in alternative powertrain technologies.

# Fundamental information about the MAHLE Group

## BUSINESS ACTIVITIES AND CORPORATE STRUCTURE

MAHLE has a global presence — as a leading international development partner and supplier to the automotive industry and as a technology pioneer for the mobility of the future. We are committed to making transportation more efficient, more environmentally friendly, and more comfortable. That is why we are continuing to optimize the combustion engine, drive forward the use of alternative fuels, and lay the foundations for the widespread acceptance and worldwide introduction of e-mobility.

On the basis of a broad systems competence, our product portfolio consisting of engine systems and components, filtration, and thermal management addresses all the crucial issues relating to the powertrain and air conditioning technology. In addition, our expertise in electric and electronic components and systems enables us to offer integrated systems solutions for e-mobility.

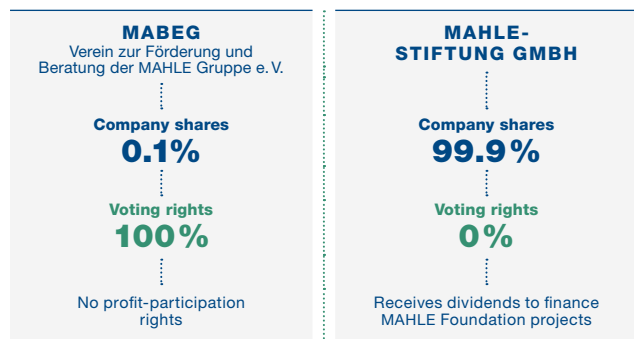
MAHLE products are fitted in millions of passenger cars and commercial vehicles. And that is not all: for decades, our components and systems have also been used on racetracks and off the road — in stationary applications as well as for mobile machinery, rail transport, and marine applications.

Our group consists of four business units: Engine Systems and Components, Filtration and Engine Peripherals, Thermal Management, and Aftermarket. Added to this are the Mechatronics division and five profit centers, which serve specific market and customer segments.

MAHLE is represented on five continents. We recognized the advantages of the opportunities presented by globalization at an early stage and enhanced our product portfolio by strategically founding and acquiring new business activities. Today, we operate around 160 production locations and 16 major research and development centers around the world, employing just under 80,000 people overall.

The nonprofit MAHLE Foundation controls 99.9 percent of the company's shares; 0.1 percent of the shares are held by Verein zur Förderung und Beratung der MAHLE Gruppe e.V. (MABEG), which also holds the voting rights and thus exercises the shareholder rights. This structure ensures our entrepreneurial independence and allows us to make long-term plans and future-oriented investment decisions.

## OWNERSHIP STRUCTURE OF THE MAHLE GROUP



## MAHLE GROUP

Sales: EUR 12,581 million  
Headcount: 79,564

BUSINESS UNITS				DIVISION	PROFIT CENTERS
<p><b>Engine Systems and Components</b></p> <p>Sales: EUR 2,781 million Headcount: 28,112</p>	<p><b>Filtration and Engine Peripherals</b></p> <p>Sales: EUR 2,256 million Headcount: 10,953</p>	<p><b>Thermal Management</b></p> <p>Sales: EUR 4,629 million Headcount: 23,874</p>	<p><b>Aftermarket</b></p> <p>Sales: EUR 928 million Headcount: 1,713</p>	<p><b>Mechatronics</b></p> <p>Sales: EUR 453 million Headcount: 4,303</p>	<p>Engineering Services, Motorsports, and Special Applications</p> <p>Large and Small Engine Components</p> <p>Industrial Thermal Management</p> <p>Compressors</p> <p>Control Units</p> <p>Sales: EUR 1,534 million Headcount: 10,609</p>

As at December 31, 2018

A core management tool for our group is our operating result – a key figure similar to EBIT. The main differences compared with EBIT lie in the amortization of goodwill, the depreciation and amortization of hidden reserves, which are disclosed in purchase price allocations, and in the treatment of income from the sale of business activities.

## BUSINESS SEGMENTS

### Engine Systems and Components business unit

Not only is the Engine Systems and Components business unit one of the mainstays of our business, it also represents one of MAHLE's core fields of expertise. We have decades of development and systems competence in this area, are the world market leader in many segments, and enjoy a global presence with production locations for engine systems and components around the world. Our range of products includes steel and aluminum pistons, piston rings, cylinder liners, and bearings as well as valve train systems and components, which are used around the globe in passenger cars, commercial vehicles, large engines, and two-wheeled vehicles. We are continuously developing this portfolio, paying particular attention to reducing emissions and energy consumption in combustion engines.

### Filtration and Engine Peripherals business unit

We manufacture filter systems as well as components for the engine periphery and are among the world market leaders in this business segment. Our products improve air cleanliness and prevent contaminants in oil and fuel from damaging the engine, thus increasing its efficiency and service life. In recent years, we have worked in close cooperation with our customers to develop modular systems for all the major product groups, because the product environment can vary significantly, even in identical basic engines. We have also taken another step forward with components made of special plastics, which were previously manufactured from metal. These are characterized by the high level of integration of functions that represent direct added value for customers. For example, we are developing all-plastic oil filter modules, which fully integrate the oil pump and oil cooling technology and are used in powertrains for electric vehicles.

### Thermal Management business unit

Our products and ideas for the future are making a decisive contribution to the successful electrification of the powertrain. Only our innovative products from the field of thermal management for batteries, fuel cells, power electronics, and electric drives make extended cruising ranges, high levels of efficiency, and long service lives possible and are thereby playing a significant role in shaping the shift toward zero-emission powertrains. Thermal management is also becoming more and more important in the ongoing development of the combustion engine. For instance, our increasingly effective and efficient cooling systems are making a substantial contribution toward reducing fuel consumption. Our air conditioning innovations are enabling new

design concepts for interiors and helping to provide a high degree of thermal comfort in vehicles. In combination with high-performance mechanical and electric compressors and electric auxiliary heaters, we are making crucial improvements to consumption and range in the overall vehicle air conditioning system. We are the world's second largest supplier in the thermal management sector.

### Aftermarket business unit

The Aftermarket business unit supplies a broad range of products and services in original equipment quality to the trade and to automotive workshops around the world. In addition to standard MAHLE spare parts, such as engine components, filters, turbochargers, and mechatronics components, we are increasingly offering products for thermal management such as thermostats and air conditioning compressors. Vehicle diagnostics, exhaust gas analyzers, and service equipment for maintaining HVAC modules and automatic transmissions complete the product portfolio, which is supplemented by a wide range of services, including technical support via our global network, customer training, and service information. In view of the diversity of today's vehicle technologies in the fleet, innovative and solution-oriented support is key to our business partners' success. That is why we work every day to expand our competences, services, and product areas. At the same time, MAHLE stands out thanks to its adaptive product management, fast and reliable logistics processes, strong brands, and competitive pricing. We are thus able to offer our customers individual repair solutions and improve workshop efficiency — thereby increasing customer satisfaction.

### Mechatronics division

Not only are electric passenger cars and commercial vehicles gaining in importance, but so is lightweight, urban e-mobility. This requires modular systems comprising highly efficient electric motors and the associated electronic control units. With this in mind, we expanded our Mechatronics division in 2018 to include the Pedelec Drive Systems product group and introduced new products and systems for battery-powered electric vehicles and fuel cell vehicles. These activities are founded on our expertise in the development and manufacture of electric motors and electronic and mechatronic systems. Although these technologies are used in a wide range of applications, they are technically closely related. As a result, we — and therefore our customers — can benefit from even greater economies of scale and synergy effects.

### Profit centers

Five business fields are organized as profit centers, which serve specific market and customer segments. Specifically, these are: Engineering Services, Motorsports, and Special Applications; Large and Small Engine Components; Industrial Thermal Management; Compressors; and Control Units. With this structure, we offer our customers a high degree of flexibility as well as tailor-made applications and components, thereby supporting them in the development of specific new products. In the year under review, we sold our shares in the joint venture Hella Behr Plastic Omnium (HBPO), which had been run as the Front-end Modules profit center.

## GROUP STRATEGY

Our group strategy is based on the analysis of relevant megatrends from which we have derived various future scenarios. Four of these megatrends are having a particularly powerful impact on the automotive industry:

- Climate change (including the resulting political climate targets)
- Increasing urbanization
- Global population growth
- The increasing importance of Asia as an economic region

These megatrends call for new mobility solutions and present the automotive industry with new challenges. In addition to the expansion of car-sharing options and public transport, the increasing electrification of the powertrain, the growth in digital networking of vehicles, and autonomous driving are taking center stage. But it is not just on the roads where digitalization is playing an ever greater role — it is also becoming increasingly important for our internal company processes, through subjects such as Industry 4.0 and big data or even process automation. And these megatrends are also changing our customer landscape as a whole through, for example, the emergence of new suppliers of electric vehicles or of new digital business models.

How quickly this structural change will take place depends, on the one hand, on which technical solutions will hold their ground in the market and, on the other, on ever-increasing political demands. For passenger cars and light commercial vehicles in urban distribution transport, technologies such as hybrid and electric drives will continue to gain further relevance alongside alternative usage models such as car sharing. The combustion engine will remain vitally important to heavy-duty commercial vehicles in the short and medium term, but alternative drive types such as the fuel cell are also becoming more important and complementing existing technologies.

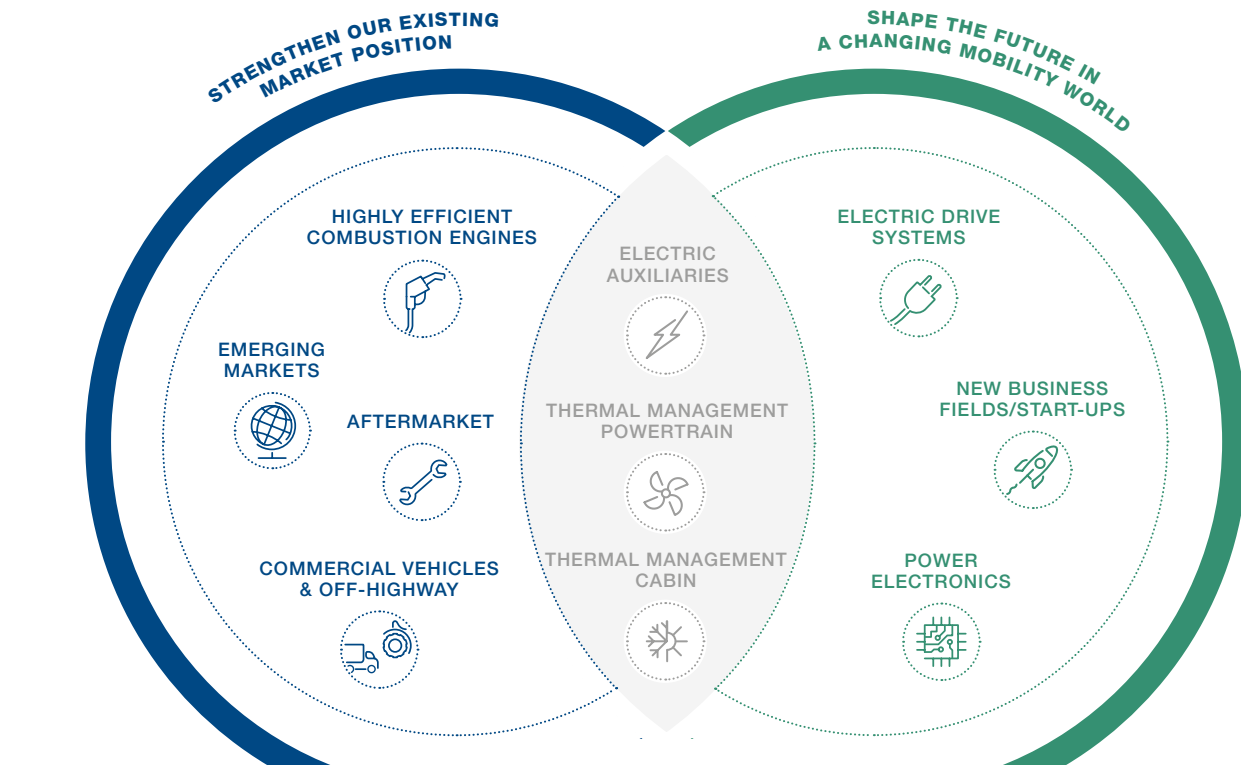
Overall, we expect the combustion engine to remain a central feature of mobility both for passenger cars and for commercial vehicles. In view of the worldwide increase in vehicle production and the fact that combustion engines are also used in hybrid vehicles, we anticipate that the demand for corresponding components and systems will initially continue to grow.

MAHLE has derived a dual strategy on the basis of these assumptions and findings:

1. We will continue to be a technology leader in the ongoing development of the combustion engine and ensure the highest possible level of competitiveness in terms of quality and costs. In the process, we will especially concentrate on unlocking further CO<sub>2</sub> savings potential with regard to friction, thermal management, and the air pathway. By doing so, we are offering our customers solutions that comply with current and future legislation and make a significant contribution to reducing emissions.



## DUAL STRATEGY



2. At the same time, we will push ahead with the development of innovative solutions and products for alternative powertrain technologies and expand the appropriate business segments. Business segments that are independent of the OEM business for the passenger car combustion engine are today already accounting for more than 50 percent of group sales – and we intend to consistently increase this share.

Our dual strategy is also reflected in our thermal management activities. Overall, the importance of efficient thermal management will continue to grow – both in conventional and in alternative drive systems. Over the years, we have specifically expanded this business segment, developing many thermal soaking innovations – both for the interior and for the powertrain, including the battery – and launching them on the market. We will continue to pursue this innovative approach resolutely.

We will substantially intensify our activities in electronics and mechatronics over the years ahead. By doing so, we plan to expand our extensive competence in electronics with the aim of supplying our customers with even better systems solutions for electric vehicles with regard to thermal management as well as the powertrain. System-based solutions like this are preferred by our customers, especially those in Asia. Furthermore, we intend to expand our portfolio of electric motors both for passenger cars and for two-wheeled vehicles, which are gaining ever-greater importance in urban mobility around the world.

Overall, we are pursuing a holistic approach in terms of the optimization of the combustion engine and the development of solutions for alternative powertrain technologies. It is not the electric motor alone that determines efficiency in an electric vehicle, but instead the interplay of various technologies. This is demonstrated by the example of MEET (MAHLE Efficient Electric Transport), our vehicle concept for future urban mobility. Commercial vehicles also benefit from the combination of various technologies. For example, a combustion engine's entire system can be operated even more efficiently by using systems designed to recover heat from exhaust gases.

Against the background of our dual strategy, we constantly review our portfolio as well as the strategic direction and economic performance of the group. One of our strategic goals is to evenly distribute sales across our core markets of Europe, North and South America, and Asia/Pacific – with a particular focus on the Asian growth market. We consider our global presence to be an important prerequisite for proximity to our customers and for developing innovations in line with the demands of the individual markets.



We achieved a significant organic increase in sales, which, with a rise of 4.4 percent, grew much faster than the market.



Due in part to positive special effects, we achieved considerable growth in the result from business activities to EUR 614 million.



As a result, we improved our equity ratio by over 4 percentage points to 36 percent.

# Report on economic position

## ECONOMIC CONDITIONS

### Overall economic development

According to the January report by the International Monetary Fund (IMF), the rate of growth in the global economy of 3.7 percent in the 2018 business year was unchanged in comparison with the previous year. However, the risks to the economy increased in the course of the year – the economic outlook was dampened in particular by differences in trade policy, geopolitical tensions, and stricter financing conditions. Nevertheless, the upturn in the advanced economies continued at 2.3 percent, even though growth in some economic areas – such as in the euro zone and Great Britain – weakened more than expected. The very positive development in the emerging markets and developing economies continued with growth of 4.6 percent.

At 1.8 percent, economic growth in the euro zone was below that of the previous year, although strong demand, the upturn in the job market, and loose monetary policy favored economic development. On the other hand, the slowdown in export growth had a negative effect. The national economies of Germany and France in particular grew less strongly than in the previous year.

It was a different story in the USA, where – at 2.9 percent – the economy expanded more vigorously than in 2017, thanks to tax cuts and higher private consumer spending. Economic recovery in Brazil underwent a slight acceleration with an increase of 1.3 percent.

In the Asia/Pacific region, growth in the Chinese national economy of 6.6 percent was still strong, but more restrained than in previous years. Tensions over trade policy and protectionist tariffs put the country's economy under strain – especially toward the end of the year. At 0.9 percent, Japanese economic development was significantly lower than the growth of the previous year, despite rising domestic demand.

### Exchange rate development

The MAHLE Group operates internationally and therefore also transacts business in foreign currencies. Exchange rate movements are thus of central importance as they influence the conversion of financial data for accounting purposes.

In the 2018 business year, exchange rate development was marked by the devaluation of key trading currencies relevant to our business against the euro, as measured by the average market price (direct quotation) compared with the previous year. For example, the annual average exchange rates of the Argentine peso (–57 percent), Turkish lira (–27 percent), and Brazilian real (–16 percent) slumped sharply. The US dollar (–4 percent) and the Chinese renminbi (–2 percent) also devalued against the euro on average over the year.

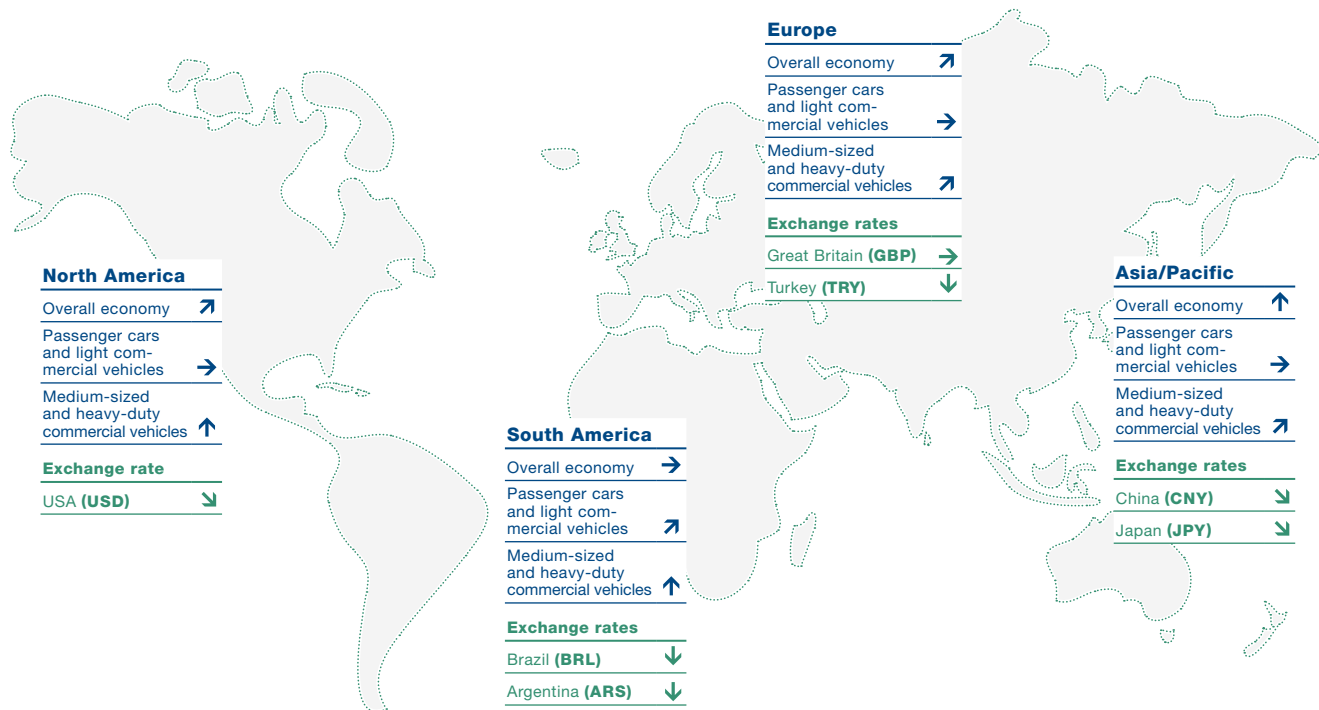
MAHLE counters the risks associated with exchange rate fluctuations with a process known as natural hedging. In this way, our strategy – of operating production locations in all major sales regions around the world – aims to make the group less susceptible to currency turbulence and exchange rate fluctuations.

### Development of the markets for passenger cars and light commercial vehicles

Following the growth of the past few years, which has been substantial in some cases, global production of passenger cars and light commercial vehicles declined slightly in the year under review.

The development in Europe fell short of expectations. Difficulties in obtaining certification to Worldwide harmonized Light duty Test Procedure (WLTP) standard as well as subdued demand in Great Britain as a consequence of the Brexit negotiations led to a drop in vehicle registrations in western Europe. Added to this was a significant slump in the Turkish market. By contrast, the recovery in Russia continued and partially offset the decline in other European markets.

## DEVELOPMENT OF THE MARKETS 2018



Exchange rate development of various foreign currencies against the euro (EUR) as measured by the average market price compared with the previous year: Argentine peso (ARS), Brazilian real (BRL), British pound (GBP), Chinese renminbi (CNY), Japanese yen (JPY), Turkish lira (TRY), US dollar (USD)

As in the previous year, a fall in demand had already been recorded in North America, but local production did benefit from the start-up of new production plants to some extent at least. In South America, vehicle production continued to grow as expected in the year under review. However, this growth was significantly dampened by political and economic tensions, above all in Brazil and Argentina.

The vehicle markets in the Asia/Pacific region weakened slightly and dropped below the previous year's level. The primary cause lay in the decline in the Chinese market, which shrank for the first time since 1990. Uncertainty with regard to the trade dispute with the USA and rising living costs resulted in significant caution among vehicle buyers, especially in the last quarter. Japan remained only at the previous year's level. India, on the other hand, stayed on track for growth at over 6 percent.

### Development of the markets for medium-sized and heavy-duty commercial vehicles

Worldwide production of medium-sized and heavy-duty commercial vehicles increased during the year under review, whereas the growth rate fell substantially under the previous year's double-digit figure.

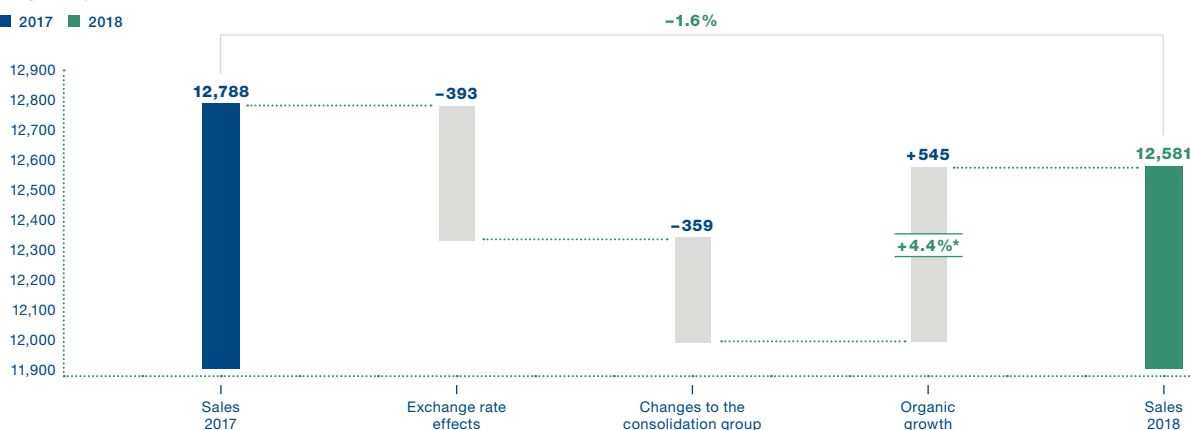
Production increased in Europe, with demand experiencing further recovery, especially in Russia. North America recorded double-digit growth for the second consecutive year. This is attributable to the cyclical recovery in the market for heavy-duty commercial vehicles. Production in South America also once again achieved a double-digit recovery.

In 2018, the Asia/Pacific market was marked by a fall in the growth rate. Following an increase of roughly 20 percent in the previous year, production in the year under review was just slightly above the previous year's level. The reason lies in a cyclical downturn in the market for heavy-duty commercial vehicles in China, where the market contracted by almost 8 percent. Production volumes also normalized in Japan in the year under review. After a year of weaker results in 2017, when the new emission level depressed the market, India regained its strong growth with a high double-digit expansion in output.

## SALES BRIDGE

in EUR million

■ 2017 ■ 2018



\* Calculated on 2017 sales adjusted for deconsolidations

## BUSINESS DEVELOPMENT

### Development of the MAHLE Group

In the year under review, the MAHLE Group generated sales of EUR 12.6 billion. We therefore achieved strong organic sales growth (i.e., after adjustment for exchange rate effects and changes to the consolidation group) of 4.4 percent. With this substantial increase, MAHLE's performance was significantly above global market growth. We thus also successfully exceeded our forecast from early 2018. Before adjustments, revenue was 1.6 percent below the previous year's value. Negative exchange rate effects of EUR 393 million and changes to the consolidation group of EUR 359 million had an adverse impact on our sales. Among other influences, exchange rate developments affecting the US dollar, Brazilian real, and Argentine peso depressed sales figures. The sale of our shares in the joint venture Hella Behr Plastic Omnium (HBPO), our profit center for front-end modules, on June 26, 2018, also reduced our sales base.

In the year under review, the development of the MAHLE Group was dominated by an intensified focus on our core fields of expertise. This involved the realignment of our group and a number of portfolio decisions. We therefore sold our shares in the joint ventures Bosch Mahle Turbo Systems (BMTS) and HBPO in order to align our future investments more strongly with our core business as well as with promising technologies and fields of application. In this way, we are following our dual strategy, which we continue to drive forward.

As part of this dual strategy, we further expanded our Mechatronics division. In an initial step, we opened our research and development center in Valencia/Spain, which has helped us to significantly enhance our competence in electronics in the year under review. We also won our first series order in the onboard charger business segment. In addition, our acquisition of 100 percent of the shares in ebikemotion will enable us to strengthen our activities in the area of electrically powered bicycles and expand our overall systems competence.

We also want to continue pushing ahead in the thermal management business segment, which is of central importance for conventional as well as alternative drive types. For that reason, we opened our first production plant for electric compressors in Balassagyarmat/Hungary. The technology in these compressors removes the link between air conditioning systems and combustion engines, and we have already won several customer projects from international automobile manufacturers. Series production is due to begin in 2019. We have also increased our participation in MAHLE Behr, which pools our expertise in vehicle air conditioning and engine cooling. We now hold a total of 57 percent of the company shares—up from 51 percent. The targeted development of our competence in thermal management has also paid off in other areas. We have been able to apply our expertise to support the Nikola Motor Company in the development and industrialization of a truck with a fuel cell drive. This partnership includes the air conditioning system for the driver's cabin as well as the cooling systems for the drive components.

In addition, we are strengthening our activities in the aftermarket business segment. First, we increased our shareholding in Brain Bee—a specialist in automotive diagnostics and workshop equipment—to 80 percent during the year under review, which takes us a step closer toward becoming a holistic solutions provider. Second, we are establishing an even better position for ourselves in the aftermarket business segment with the planned acquisition of all the shares in the former joint venture Behr Hella Service (BHS) in early 2020.

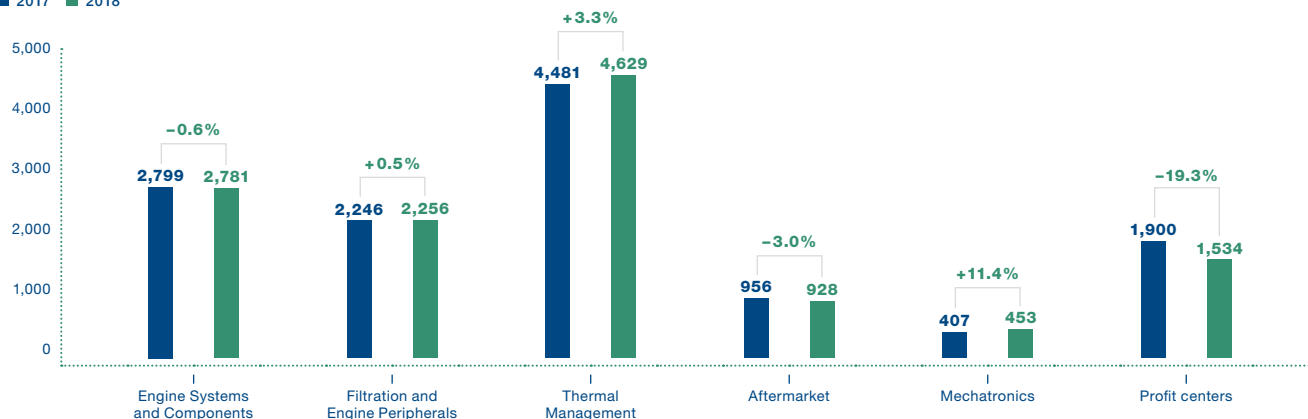
### Development of the business segments

Significant organic sales growth has been recorded in all our business units, the Mechatronics division, and our profit centers in the year under review. In the Filtration and Engine Peripherals and Thermal Management business units and the Mechatronics division, sales exceeded the previous year, even in absolute values, although exchange rate effects substantially impaired sales in some cases.

## SALES BY BUSINESS SEGMENT

in EUR million

■ 2017 ■ 2018



### Engine Systems and Components business unit

Sales in the Engine Systems and Components business unit amounted to EUR 2,781 million in the year under review, thus remaining roughly at the previous year's level. However, the sale of our German forging operations and of MAHLE Metal Leve Miba Sinterizados in Brazil in 2017 had an adverse impact. Adjusted for these disinvestments and for the significant negative exchange rate effects, the business unit generated organic growth of just under 5 percent. We realized the largest sales increases—as was also the case in 2017—in steel pistons for commercial vehicles and in assembled camshafts, and we further expanded our production capacities for these products around the world. Sales of passenger car diesel pistons in Europe substantially declined—a consequence of the ongoing debate surrounding diesel. From a regional perspective, we recorded strong organic growth in South America in particular and benefited from the market recovery on this continent.

### Filtration and Engine Peripherals business unit

At EUR 2,256 million, sales generated in the Filtration and Engine Peripherals business unit in 2018 remained at the previous

year's level. Here too, negative exchange rate effects (amounting to EUR 66 million) had a detrimental effect on sales, although organic sales growth exceeded 3 percent. Sales of cylinder head covers and oil pumps saw the strongest growth in the year under review, while demand for oil filter modules shrank as a result of the diesel question. Asia/Pacific and Europe proved to be the fastest-growing regions. Overall, the business unit had to deal with increases in material prices in the period under review, but we countered these with measures to boost productivity. As far as development is concerned, we are focusing more strongly on customer solutions that are unrelated to the combustion engine, such as the development of an oil management module for electric vehicles.

### Thermal Management business unit

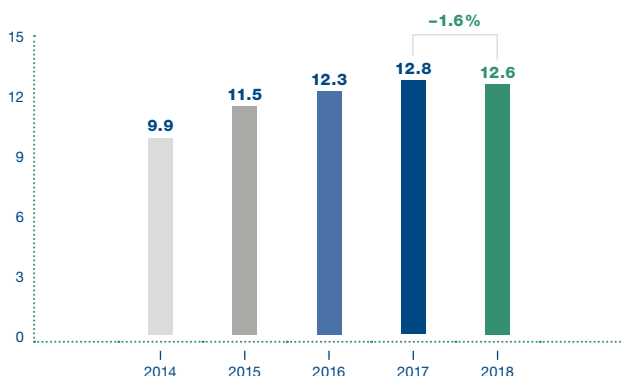
Sales in the Thermal Management business unit rose by 3.3 percent to EUR 4,629 million, despite substantial negative exchange rate effects of EUR 108 million. Organic growth amounted to just under 6 percent. Products for battery-powered vehicles in particular saw strong demand and recorded notable sales growth. We likewise sold significantly more cooling modules, charge air coolers, and HVAC modules than in the previous year. On a regional basis, development was extremely positive in North America above all. Here, the rise in demand led to strong sales growth among commercial vehicle customers and for SUVs, pickup trucks, and minivans.

### Aftermarket business unit

In the Aftermarket business unit, we recorded sales totaling EUR 928 million in the 2018 business year. Although the acquisition of further shares in the diagnostics specialist Brain Bee during the year under review had a positive influence on sales, strong negative exchange rate effects had a detrimental impact amounting to EUR 71 million, which resulted in sales being 3 percent lower than in the previous year. Adjusted for consolidation and exchange rate effects, organic growth in Aftermarket amounted to around 3 percent. In 2018, we also entered the market and established our business in the areas of electronics

## DEVELOPMENT OF SALES 2014–2018

in EUR billion



and air conditioning compressors. Looking at our global markets, our South America and Asia/Pacific regions in particular developed very successfully. This was due, among other contributing factors, to a positive trend as regards filter products in China and the successful expansion of Service Solutions in the Chinese market. Furthermore, the eastern European market recorded continued growth.

### Mechatronics division

Sales in our Mechatronics division grew by 11.4 percent to EUR 453 million in the year under review. This figure takes into account the acquisitions of MAHLE Electronics in the 2017 business year and of ebikemotion in 2018. Overall, organic growth amounted to just over 6 percent. As a result of increased demand from the markets for agricultural and construction machinery, our sales rose sharply, primarily in starter motors and alternators. In addition, we substantially intensified our engineering activities in the high-voltage traction motors and power electronics product areas.

### Profit centers

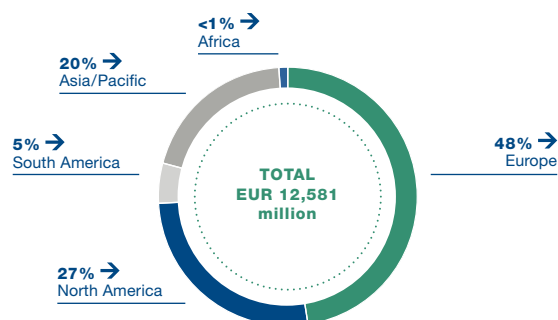
In our various profit centers serving specific market and customer segments, sales substantially declined to EUR 1,534 million in the year under review. This was primarily attributable to the sale of our shares in the joint venture HBPO, which had been run as the Front-end Modules profit center. Adjusted for this consolidation effect (EUR 361 million) and negative exchange rate effects (EUR 41 million), the profit centers achieved organic growth of more than 2 percent. Compressors — our strongest profit center in terms of sales — contributed to this result, generating organic growth of 2 percent. The Large and Small Engine Components, Industrial Thermal Management, and Control Units profit centers all likewise achieved substantial sales increases. One highlight for the Engineering Services, Motorsports, and Special Applications profit center was the opening of a test center compatible with WLTP and RDE (Real Driving Emissions) in Great Britain.

### Development of the regions

With production and development locations in 32 countries, the MAHLE Group has a presence around the globe. Our international positioning ensures we are close to our customers and able to cooperate with them intensively while also responding flexibly to regional market fluctuations.

In the year under review, our sales development in certain regions suffered greatly from negative currency exchange rate effects. From the group's perspective, sales generated in North America, South America, and Asia/Pacific in particular were impaired by the devaluation of important trading currencies against the euro. In organic terms, however, we achieved sales growth in all regions, and this was significant in some cases. The detail of the development in the regions is as follows, based on sales by country of production:

### SALES BY REGION



The directional arrows (↗ ↘) show the change in the proportion of sales compared with the previous year

### Europe

Sales in the Europe region amounted to EUR 6,016 million, thus falling by 2.4 percent in comparison with the previous year. This was primarily attributable to the sale of our shares in the joint venture HBPO. By contrast, sales in Europe rose organically by a good 1 percent. Positive sales development was seen, above all, in Germany and in the eastern European locations of Slovenia, Slovakia, Russia, and Romania. Our Filtration and Engine Peripherals and Thermal Management business units grew particularly strongly — although discussions about the future of the diesel engine dampened demand for certain products.

### North America

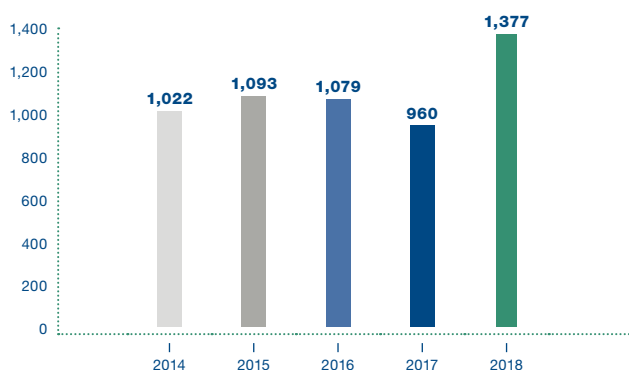
In North America, we generated sales of EUR 3,404 million, which is 0.4 percent above the previous year's level. Adjusted for severe negative exchange rate effects amounting to EUR 160 million, primarily due to the US dollar, and for the sale of our shares in HBPO, organic sales growth was very successful at more than 8 percent. In the year under review, we increased our sales in the United States, Mexico, and Canada, where our Thermal Management and Engine Systems and Components business units achieved significant organic sales growth.

### South America

Sales in South America fell by 7.5 percent to EUR 625 million — essentially as a result of the negative exchange rate effects of EUR 146 million arising from the currency devaluations in Argentina and Brazil. Excluding these effects, a strong rise in organic sales of over 16 percent was achieved. MAHLE's growth in the South America region was thus substantially above the general market trend. In the Engine Systems and Components business unit in particular — and above all in the market for medium-sized and heavy-duty commercial vehicles — we significantly increased our organic sales. We also experienced strong growth in our Thermal Management business unit — which benefited from new projects in Brazil — and in the Aftermarket business unit.

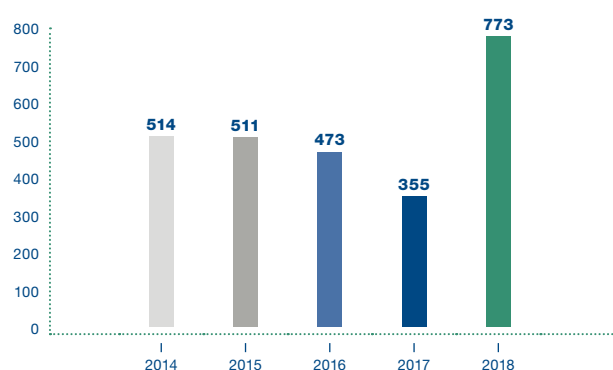
## DEVELOPMENT OF EBITDA 2014–2018

in EUR million



## DEVELOPMENT OF EBIT 2014–2018

in EUR million



### Asia/Pacific

In the Asia/Pacific region, sales in the year under review slipped slightly below the previous year's level at EUR 2,484 million. Negative exchange rate effects (EUR 78 million, especially in China, India, and Japan) had an impact here too, as did the sale of our shares in HBPO. Organic sales rose by just under 4 percent. Our sales grew in China in particular: first, demand for commercial vehicles declined less steeply than expected and second, sales figures in the passenger car sector increased despite the weak market environment. Our Engine Systems and Components and Filtration and Engine Peripherals business units also experienced very successful development in the Asia/Pacific region, with organic sales growth turning out to be especially strong. Demand rose in the commercial vehicle sector in particular. The Aftermarket business unit also grew strongly.

### Africa

Growth of 12.9 percent—or even as high as around 17 percent in terms of organic growth—caused external sales of our African locations to rise to EUR 53 million. Once again, the majority of this revenue in the MAHLE Group's smallest region was generated by the Thermal Management business unit.

## NET ASSETS, FINANCIAL POSITION, AND RESULTS OF OPERATIONS

### Results of operations

In the 2018 business year, the MAHLE Group improved the result from business activities very substantially from EUR 262 million to EUR 614 million. We thus exceeded the moderate increase expected at the start of the year. This considerable improvement in the result was largely due to the absence of the warranty expenses that had negatively impacted the previous year's result and income from the sale of our shares in the joint venture HBPO in June 2018. These effects had a strong positive influence on our operating income figures EBITDA and EBIT and, to some extent, on the operating result used for internal steering—a key figure similar to EBIT, but adjusted for individual circumstances. These effects more than compensated for burdens on the operative business, such as sales declines due to the diesel question, increases in material prices, and one-off costs associated with project start-ups.

The key income statement items developed as per the following details: influenced by the reduction in warranty expenses, cost of sales fell more sharply relative to sales in the year under review and amounted to EUR 10,344 million; the cost of sales ratio dropped to 82.2 percent. In addition, productivity improvements roughly offset further rises in material prices and personnel costs. Our selling expenses increased by EUR 18 million, and the ratio in relation to sales also rose slightly to 4.7 percent. Among other factors, this was due to high expenses arising from expedited freight and effects connected with the change to the consolidation group. By contrast, general administrative expenses in 2018 remained unchanged at the previous year's level. At EUR 751 million or 6 percent of sales, our research and development expenses stayed at their high level and reflect the targeted implementation of our dual strategy. Our profit figures benefited greatly from the fact that the balance from operating income and expenses rose significantly from EUR 107 million to EUR 409 million, primarily driven by high levels of income from portfolio adjustments. With the exception of research and

## CONSOLIDATED INCOME STATEMENT

in EUR million	2018	in %	2017	in %
Sales	12,581	100.0	12,788	100.0
Cost of sales	-10,344	-82.2	-10,653	-83.3
<b>Gross profit on sales</b>	<b>2,237</b>	<b>17.8</b>	<b>2,135</b>	<b>16.7</b>
Selling expenses and general administrative expenses	-1,109	-8.8	-1,091	-8.5
Research and development expenses	-751	-6.0	-748	-5.9
Other operating income and expenses	409	3.3	107	0.9
Financial result	-172	-1.4	-141	-1.1
<b>Result from business activities</b>	<b>614</b>	<b>4.9</b>	<b>262</b>	<b>2.1</b>
Taxes on income	-136	-1.1	-125	-1.0
<b>Result after taxes</b>	<b>478</b>	<b>3.8</b>	<b>137</b>	<b>1.1</b>
Other taxes	-32	-0.3	-35	-0.3
<b>Consolidated net income</b>	<b>446</b>	<b>3.5</b>	<b>102</b>	<b>0.8</b>
<b>EBIT</b>	<b>773</b>	<b>6.1</b>	<b>355</b>	<b>2.8</b>
<b>EBITDA</b>	<b>1,377</b>	<b>10.9</b>	<b>960</b>	<b>7.5</b>

development expenses, all cost items were adversely impacted by the effects of purchase price allocations. In total, these amounted to EUR 134 million and include EUR 48 million relating to planned amortization of goodwill.

The development of the items in the income statement outlined above resulted in a substantial rise in EBIT from EUR 355 million to EUR 773 million. Accordingly, the EBIT margin improved significantly to 6.1 percent (previous year: 2.8 percent), mainly due to the disposal gains. Adjusted for the effects of the purchase price allocations and the amortization of goodwill, the EBIT margin was at 7.2 percent.

The financial result worsened in 2018—largely owing to higher expenses from the discounting of future pension payments and the negative market development of pension assets. This was partially offset by the effects from the sale of the shares in BMTS. For example, the expenses from the profit and loss transfer were much lower than in the previous year. In the year under review, we have thus achieved an overall considerable increase in the result from business activities to EUR 614 million.

Despite the significantly improved result, taxes on income rose only moderately to EUR 136 million. This was mainly because the income from the sale of the shares in HBPO did not increase the tax base to the same extent as it did the commercial result. Our income tax rate therefore reduced significantly in comparison with the previous year to 22.1 percent. Other taxes were slightly below the previous year's level at EUR 32 million. As a result, we improved our net income for the year substantially from EUR 102 million to EUR 446 million.

### Net assets position

As at the balance sheet date of December 31, 2018, our balance sheet total had risen slightly to EUR 8,272 million. Fixed assets

increased to EUR 3,779 million in the 2018 business year, primarily due to the expansion of our tangible fixed assets, because our investments substantially exceeded depreciation. By contrast, financial assets fell owing to the sale of the shares in BMTS, while intangible assets were at the previous year's level as at December 31, 2018.

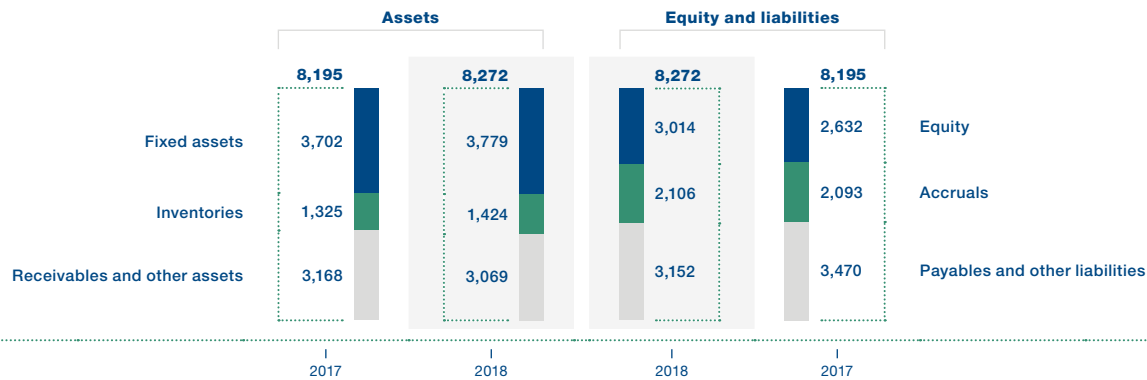
At EUR 4,167 million, current assets of the MAHLE Group corresponded to the level of the previous year. Our inventories rose substantially by EUR 100 million to EUR 1,424 million, which was mainly attributable to an increase in raw materials, consumables, and supplies. On the other hand, receivables and other assets remained at the previous year's level as at the balance sheet date. Although trade receivables decreased as a consequence of the abovementioned changes to the consolidation group, the effect was nevertheless offset by a rise in other assets—in particular due to tax refund claims. Our liquid funds decreased primarily owing to the repayment of loans and, together with securities, amounted to EUR 407 million as at the balance sheet date.

The positive development of earnings allowed us to significantly increase the MAHLE Group's equity by EUR 382 million to EUR 3,014 million in the year under review. This led to a corresponding rise in our equity ratio, from 32.1 percent to 36.4 percent. As at the reporting date, accruals amounted to EUR 2,106 million, thereby slightly exceeding the previous year's figure. The notable rise in accruals for pensions—largely owing to interest effects—was partially offset by a decline in other accruals, which in turn was overwhelmingly attributable to changes to the consolidation group. Furthermore, our warranty and risk accruals decreased, as did personnel accruals. Trade payables also experienced a slight decline in the year under review, which was entirely due to the change to the consolidation group. Other liabilities reduced significantly to EUR 407 million. The main cause of the decrease is the repayment of liabilities in



## BALANCE SHEET STRUCTURE OF THE MAHLE GROUP

in EUR million



connection with warranty claims that do not relate to 2018. As a result of the early repayment of German private placement loans (Schuldscheindarlehen), liabilities to banks fell to EUR 716 million. Since no bonds were either issued or repaid in the business year, the corresponding liabilities as at the balance sheet date still amounted to EUR 829 million. Overall, we have decreased our net debt to EUR 1,137 million in the year under review.

Equity ratio increased significantly to

**36.4%**  
in 2018

Besides the circumstances depicted in the balance sheet, we recorded the following significant off-balance-sheet transactions as at December 31, 2018: on the one hand, rental and leasing agreements particularly for land and buildings to a total sum of EUR 125 million (previous year: EUR 130 million) and, on the other, factoring amounting to EUR 108 million (previous year: EUR 129 million), which we are utilizing to diversify financing sources.

### Investments

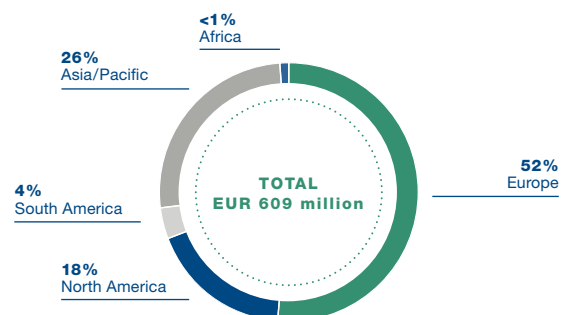
At EUR 609 million, our investments in tangible fixed assets in the 2018 business year were largely unchanged and at a high level (previous year: EUR 612 million). The investment ratio, which shows the relationship between investments and sales, remained constant at 4.8 percent. Investments thereby notably exceeded the depreciation on tangible fixed assets: with a ratio of 136 percent in relation to depreciation, we substantially expanded tangible fixed assets (previous year: 137 percent).

From a regional perspective, we focused our investments in the year under review in Europe, Asia/Pacific, and North America. More than half of our investments were made in Europe. We in-

vested heavily in plant expansions and in the upgrade of production facilities in Poland, Slovenia, and Spain as well as in our locations in Germany – at our thermal management plant in Mühlacker, for example. In Hungary, we realized an additional, important investment project linked to the opening of our production plant for electric compressors. More than one-quarter of our total investment was directed toward the Asia/Pacific region. In line with our business development, the majority of these investments affected our Chinese locations, where plants were developed and capacity expanded – alongside investments connected with customer projects. We also invested in existing production facilities in Japan. Almost one-fifth of our investments were made in North America, with priority given to investments in production facilities and customer projects at our US locations and to the relocation of capacity to Mexico.

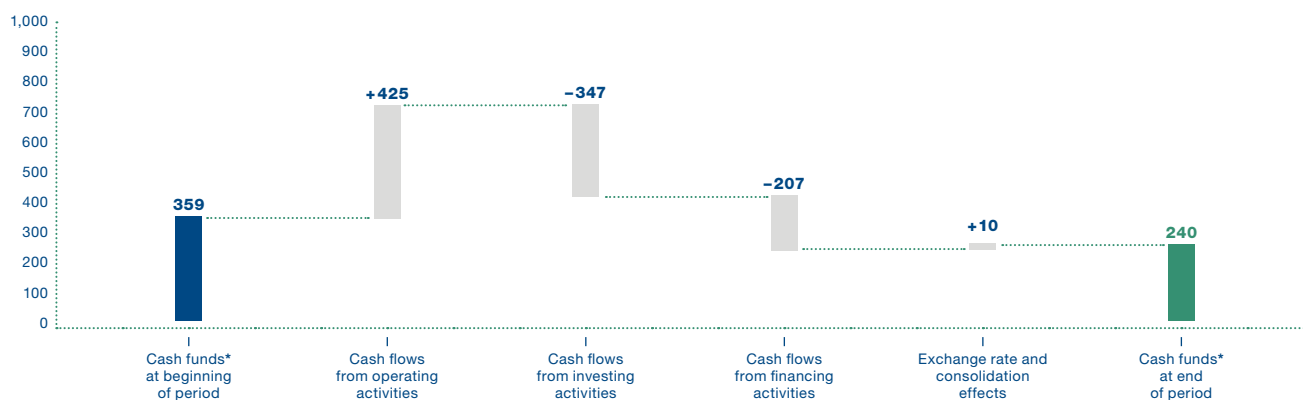
In addition to capital expenditure on tangible fixed assets, we also took advantage of strategic acquisitions during the year under review to expand our business activities as part of our dual strategy. On the one hand, we increased our participation in MAHLE Behr to strengthen our thermal management business.

### INVESTMENTS BY REGION



## CASH FLOWS

in EUR million



\* Cash-in-hand, bank balances with an initial term less than 3 months, and checks less liabilities to banks with an initial term of less than 3 months

On the other hand, we took over the diagnostics specialist Brain Bee and are thereby gradually evolving into a holistic solutions provider for the aftermarket.

### Financial position

In line with its global growth, MAHLE has established a broad basis for its group financing over the past few years and improved its diversification. Our financing portfolio not only includes syndicated credit lines, German private placement loans, and bilateral loans, but also euro-denominated corporate bonds. With our conservative financing policy, we are pursuing the objective of an implicit investment grade risk. This positioning is also reflected in the moderate leverage and solid equity ratio.

In the 2018 business year, we extended the term of the existing syndicated credit line of EUR 1,600 million with our core banks by one year to July 2023. We repaid matured German private placement loans of EUR 15 million on November 30, 2018, at which time we also repaid German private placement loans of EUR 139 million that were not yet due. As at the end of the year, the unused but firmly committed credit lines amounted to EUR 1,745 million, which, along with the liquid funds, contributed to the financial stability of the group. Our cash holding is diversified across various banks that are selected according to rating criteria.

Due in part to the abovementioned repayment of German private placement loans, we closed the 2018 business year with negative cash flows of EUR 129 million. By contrast, cash flows from operating activities amounted to EUR 425 million and were thus noticeably lower than the previous year's value. This is primarily due to high cash outflows in connection with warranty claims from the previous year. At EUR 347 million, the net cash outflow arising from our investing activities was, conversely, much less negative than in the previous year, because effects resulting from disposals carried out in 2018 led to a high level of cash income. Nevertheless, high capital expenditure on tangible fixed assets and on strategic acquisitions continued unchanged in the year under review. Overall, we were able to completely cover the cash requirements for investments in fixed assets through cash flows from operating activities. Cash flows from financing activities showed net cash outflows of EUR 207 million, which — in addition to interest and dividend payments — were primarily due to the use of liquid funds to repay financial liabilities.

↓

We want to secure the long-term success of our company. In the year under review, we therefore employed an additional 1,300 new staff.

↓

As well as optimizing the combustion engine, we are driving forward the development of alternatives such as hybrid or battery electric powertrains and fuel cells.

↓

We are seizing the opportunities presented by digitalization in a wide range of areas, including, for example, purchasing and production.

# Additional key performance indicators

## HUMAN RESOURCES

As at the reference date of December 31, 2018, the MAHLE Group employed 79,564 people worldwide and therefore 1.6 percent more than in the previous year, 2017. The increase of 1,287 employees resulted on the one hand from the positive development in demand, which was accompanied by greater staffing requirements, and on the other hand from the takeover of the diagnostics specialist Brain Bee and the full consolidation of the former joint venture Behr Thermot-tronik Italia. Our headcount was, however, reduced as a consequence of the sale of our shares in the joint venture HBPO and the closure of our location in Wellingborough/Great Britain.

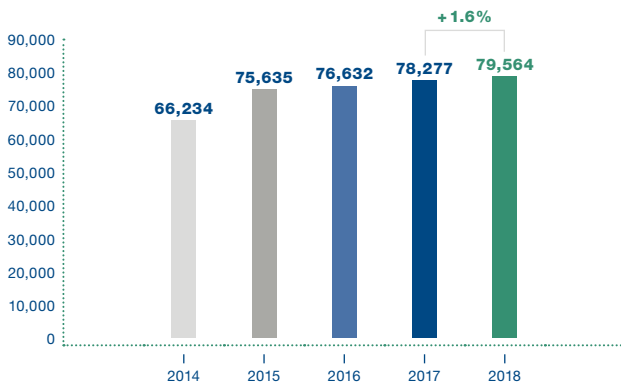
Our employees are the key to the future viability of the MAHLE Group. Their know-how, motivation, and commitment are the foundation of our successful development. This is why we once

again invested heavily in the training and further education of our staff to the sum of EUR 12 million in the year under review (previous year: EUR 13 million). In addition to a variety of workplace-related briefings, our employees took part in 93,835 qualification activities in the year under review. The global absence rate (excluding joint ventures) fell slightly in the year under review, amounting to 3.8 percent (previous year: 4 percent).

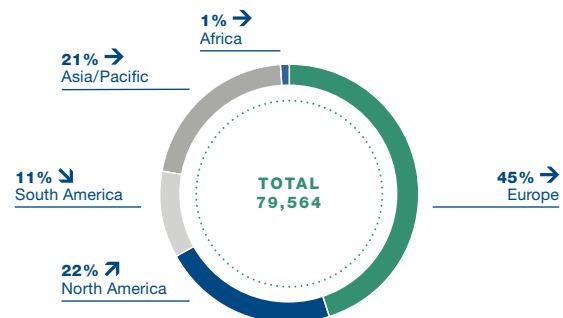
### Headcount by region

In Europe, the staffing level rose slightly by 746 people (or 2.1 percent) in the year under review to 35,655 employees in total. This was mainly due to new appointments at the locations of our Mechatronics division in Slovenia and Spain as well as the further expansion of the shared service center in Poland. The acquisition of Brain Bee in Italy saw 97 new employees join the MAHLE Group. By contrast, the number of employees in Europe fell by 306 following the sale of our shares in the joint venture

### HEADCOUNT DEVELOPMENT 2014 2018

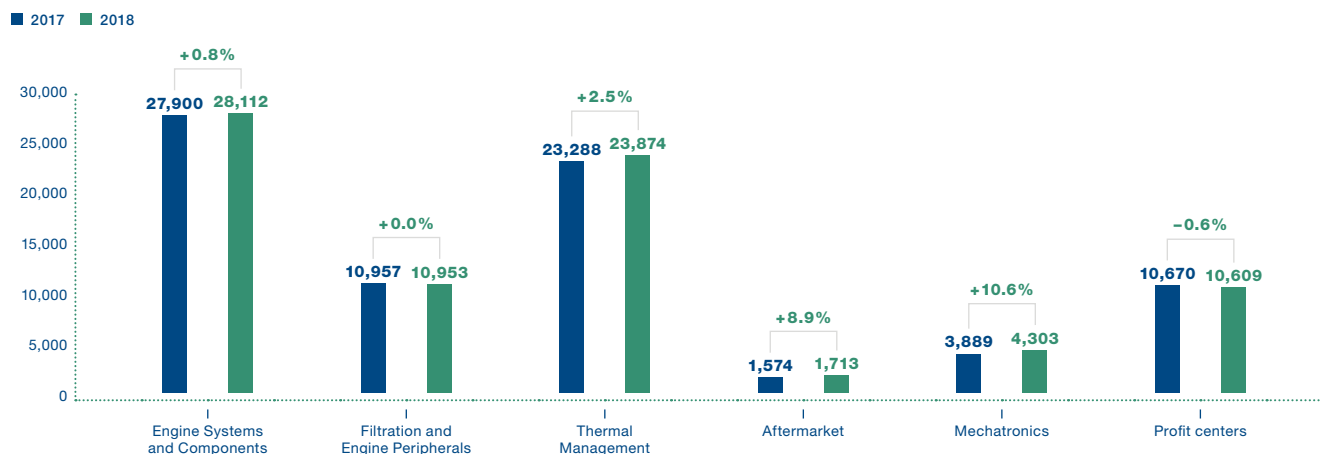


### HEADCOUNT BY REGION



The directional arrows (↗ → ↘) show the change in the proportion of employees compared with the previous year

## HEADCOUNT BY BUSINESS SEGMENT



HBPO and by a further 115 due to the closure of our location in Wellingborough/Great Britain. Despite the decline in staffing levels in certain areas, our headcount in Europe grew overall.

In North America, we recorded a total of 17,090 employees as at the reference date of December 31, 2018, and thus 621 (or 3.8 percent) more people than in the previous year. The rise resulted both from the positive order levels in Mexico and from the high capacity utilization arising from the introduction of new products in the USA, which was associated with the recruitment of 260 additional employees.

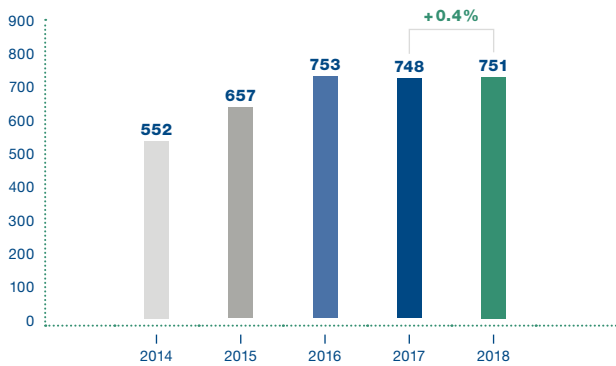
In South America, the number of staff declined slightly by 2 percent compared with the previous year, to a total of 9,074 employees. In the Asia/Pacific region, personnel growth was moderate in the year under review with an additional 100 employees (+0.6 percent) bringing us up to a total of 16,697. In Africa, our headcount remained constant.

### Headcount by business segment

In our Engine Systems and Components business unit, the staffing level rose by 212 employees. At around 35 percent at the close of the year under review, the majority of our group's employees worked at one of its total of 44 locations. We employed around 30 percent of our total workforce at the 38 locations of the Thermal Management business unit. With an additional 586 employees, this is where we saw the greatest growth in absolute terms in comparison with the previous year. The Filtration and Engine Peripherals business unit employed around 14 percent of the entire group workforce in its 36 plants. The number of employees in this business unit remained unchanged in comparison with the previous year. With a 8.9 percent rise, Aftermarket, our smallest business unit in terms of personnel, saw its staffing level grow relatively strongly in comparison with the previous year. At 10.6 percent, the Mechatronics division also experienced a sharp increase in its headcount and reached a 5.4 percent share of the total workforce. The staffing level in our profit centers reduced by 0.6 percent. This figure was particularly impacted by the sale of the Front-end Modules profit center as a result of the disposal of our shares in the joint venture HBPO.

## R&D EXPENDITURE 2014–2018

in EUR million



## TECHNOLOGY AND INNOVATION

In the year under review, we maintained our group-wide research and development (R&D) activities at a high level, investing EUR 751 million in this area—following EUR 748 million of investment in the 2017 business year. The ratio in relation to sales also remained virtually stable at 6 percent. The high level is an impressive demonstration of the relevance and significance of research and development to the MAHLE Group. In terms of personnel, we have slightly expanded the R&D function and hired new development engineers and technicians. As at the end of 2018, we employed 6,116 R&D staff. The quality of our research can also be seen in the more than 320 first filings of patents that we entered in the year under review. In addition, there were around 550 records of inventions. At the same time, MAHLE supports flexible cooperation in global teams in order to push R&D projects ahead more quickly in the future.

### Number of R&D staff

# 6,116

as at December 31, 2018

MAHLE also continued to pursue a dual strategy during the past business year. This means that, on the one hand, we are further optimizing the combustion engine to make it even cleaner and more efficient. And on the other hand, we are driving forward the development of alternative drive concepts—hybrids, battery electric powertrains, and fuel cell technologies. In this context, particular note should be made of MEET, our forward-looking vehicle concept for urban mobility, which combines efficiency, comfort, and agility. Electronic systems are becoming increasingly important in modern vehicles. The powertrain of the future

is a system consisting of hardware and software that communicates and interacts within the vehicle in an intelligent and interconnected manner. As a pioneer of future mobility solutions, MAHLE is therefore continuously expanding its activities in the area of electronics, with the company's new research and development center for electronics, opened by MAHLE in Valencia/Spain in November 2018, representing a significant element of this approach. In the future, around 250 employees in Valencia will work on developing new products and concepts for sustainable mobility. At almost the same time—late October 2018—MAHLE commissioned its very first production plant in the world for e-compressors. Compressors are the heart of air conditioning systems—and the electric compressor that MAHLE has finished developing in the last few years will remove the link between air conditioning systems and combustion engines.

MAHLE also aims to push forward the technology used in the commercial vehicle market by means of a future-oriented drive mix. Specifically, we are working toward being able to offer the market a perfect mix of various types of drive—combustion engines, hybrids, and electric drives through to fuel cell technology—whose operation will also be as low in emissions and as low cost as possible. With regard to the combustion engine, we recently presented the e-Waste Heat Recovery System, which converts exhaust gas heat into electrical energy, thereby enabling economically efficient hybrid technology for long-distance hauling and distribution transport with significant fuel savings. To achieve even greater levels of efficiency in commercial vehicle combustion engines, we also presented an innovative valve train system with which MAHLE integrates functions such as engine braking or exhaust gas temperature management into the valve train. We are advancing the field of hybrid technology with our Visco® hybrid fan drive. This solution, which has been specially designed for hybrid drives, results in greater efficiency and enables energy recovery at the same time. The fuel cell drive is an increasingly promising alternative to the combustion engine—particularly for heavy-duty commercial vehicles. In recent years, MAHLE has specifically developed near-series solutions for these systems, which it is now adapting for use in commercial vehicles. For example, we showcased a flat membrane humidifier at IAA, which aims to ensure that the supplied air is humidified reliably—essential to the efficiency and service life of a fuel cell. At the same event, we also presented our production-ready solutions for the temperature control of batteries, electronics, and electric motors as well as our solutions for monitoring the fuel cell stack.

Which technology concepts and drive mix will ultimately prevail on the market is a question both of the cost to operators of vehicle fleets and of legislation, especially with regard to CO<sub>2</sub> regulations. For this reason, we are working on the assumption that the drive mix for commercial vehicles will be subject to an ongoing process of change and diversification, and that the combustion engine will continue to play a supporting role for some time to come. Diversification between the combustion engine, hybrid and electric drives, and hydrogen technology on the basis of a systems approach thus remains a major theme of research and development at MAHLE. In the process, we are consciously making advance investment in this area and want to

supply our customers today with all the technologies that they need to operate successfully. In doing so, we are proactively seizing the opportunities currently offered by the dynamic vehicle markets.

## PURCHASING

As was already the case in the 2017 business year, we also faced a difficult raw materials market in the year under review. In particular, the rising prices of steel, aluminum, and resins proved a challenge on the supply side — these raw materials are very important to MAHLE. In addition, the procurement of the required resources was hampered by shortages as well as trade barriers and isolationism. This resulted in escalating purchase prices, a decrease in the proportion of procurement from low-wage countries, and the relocation of purchasing volumes from China to the USA, for example. Furthermore, the procurement of raw materials and preproducts was impaired by unfavorable currency trends, especially in the US dollar, the Brazilian real, and the Turkish lira. Ultimately, the availability of raw materials was also affected, because some of our suppliers struggled with strike action and other force majeure events. The associated challenges — primarily to ensure security of supply — were successfully overcome by MAHLE's Purchasing function. We also made preparations in the year under review to supply our plants after Brexit and in the event of a no-deal Brexit.

In the future, our procurement team intends to concentrate to an even greater extent on guaranteeing capacity and on the security of supply to our production locations. Another objective is to focus more strongly on improving our working capital. We are therefore making efforts to extend payment terms and consignment storage agreements. Finally, we want to organize our purchasing processes to be more efficient overall, by, for example, increasing the digitalization of processes, pooling our purchasing volumes more systematically, and increasingly handling transactional and purely operational activities via shared service centers.

## PRODUCTION, QUALITY, AND ENVIRONMENT

### MAHLE Production System

All of MAHLE's approximately 160 production locations and business areas are involved in a continuous improvement process. We are constantly advancing this process and sharing successful practices around the world. On the basis of this exchange, a global team has identified the most important principles, methods, and standards for the MAHLE Production System (MPS) to systematically eliminate waste in manufacturing and thus make it more efficient.

This global core team was enlarged in the year under review and now employs 40 additional MPS staff. We also established additional lighthouse plants in North America, Europe, and the Asia/Pacific region in 2018 in order to drive forward the production system's implementation across the group. With the MAHLE Production System, we aim not only to establish excellent as well as efficient processes and methods throughout the group, but also to bring about a sustainable change of culture at the same time — toward even more transparency, solution-oriented thinking, and responsiveness. In doing so, the MAHLE Production System is contributing to the competitiveness of our production operations — and thus to the sustainable and profitable growth of our company.

In the year under review, we also introduced a new function intended to push forward the subject of Industry 4.0 within the context of the MAHLE Production System. The manager responsible is a central contact for all questions relating to Industry 4.0. He pools together and coordinates all related activities, connects those involved, and encourages the global exchange of knowledge at MAHLE.

### Quality management at MAHLE

Innovative, defect-free, and reliable products and systems are the foundation of our long-term success. Quality targets are therefore a fundamental element of our annual business plan: they are regularly defined from the top down, fleshed out from the bottom up, and consolidated across the operational business areas. In addition, a group-wide quality management system has been in use at MAHLE for many years and is integrated into all our business processes. This system was expanded during the business year. The risk management process was defined in more detail, and we introduced a more precise evaluation process into our contingency plan.

We launched the group-wide MAHLE Quality Improvement Program in the 2017 business year and continued it in the year under review. We are consistently advancing the quality of our products and processes in eleven projects dealing with various aspects of quality management. The overarching goals are to

achieve best-in-class quality and zero defects. We therefore want to eliminate potential sources of defects as early as the product development phase, and the quality management system also supports series production. Supplier quality, training, and further education are included in the program as well. Our employees around the world take part in quality round tables to discuss the results delivered by the MAHLE Quality Improvement Program and the upcoming challenges facing quality management. The findings thus obtained then feed into and improve our process flows.

MAHLE received around

80

quality awards in 2018

The 2018 business year was also marked by a new automotive standard (IATF 16949:2016). This was introduced and certified on schedule by September 2018 at all production locations working in the automotive sector. The aim of the standard is to raise customer satisfaction and continually optimize all our process flows by means of regular audits. Our development centers and nonautomotive locations likewise successfully passed the recertification audit to ISO 9001:2015. Here too, we review and audit our process flows at regular intervals in order to identify potential for improvement.

Data relating to our quality performance is presented in a variety of ways in our customers' portals. For this reason, we are currently working to develop a group-wide database featuring consistent reporting. The aim is to standardize the information relevant to MAHLE that originates from the various customer portals and thereby make more targeted use of any potential for improvement it offers.

Our efforts with regard to quality are paying off: We achieved further reductions in the number of customer complaints, and the number of faulty delivered parts did not increase despite growing volumes in the year under review. In 2018, we once again received awards from numerous customers in recognition of the quality of our products.

Number of customer complaints reduced by

7%

compared with the previous year

## Environment and safety at work

From research and development to production and recycling, we take a holistic approach to the protection of our staff as well as to the health of our employees and that of the environment. In 2018, we made further progress with the implementation of our corresponding group-wide guidelines and requirements. In this context, we also further developed our reporting system in order to better monitor the impact and success of our measures taken.

One of our areas of focus in 2018 was the continuation of the safety at work offensive, which we began in the previous year. As a first result, we were able to substantially reduce the accident rate. We want to establish this important issue even more firmly in all our employees' minds.

Accident rate fell by

16%

in comparison with the previous year

To achieve this, we are running training programs for executives and employees and offering round-table discussions on the subject of safety. We also began to introduce safety at work management systems, certified according to ISO 45001, in the year under review, which we intend to gradually extend to all locations.

When it comes to environmental protection, our focus also continues to be on energy management, with the aim of making the operation of all our locations as energy efficient, as low in emissions, and therefore as environmentally friendly as possible. By using our database, which documents lessons learned and successful processes, we are striving to tap areas of energy efficiency potential. Furthermore, we are encouraging dialog on energy-related topics through meetings held at a national and, increasingly, also at a regional and global level.



The opportunities and risks identified by our risk management system are the guidelines on which our corporate activities are consistently based.



We are using our dual strategy to counter the risks posed by possible shifts in technology.



We do not currently see any risks that could endanger MAHLE's continued existence.

# Opportunity and risk report

We use a management system to evaluate the opportunities and risks associated with our business operations. In this way, we gain knowledge from which we draw conclusions and adapt our actions accordingly. Our globally active internal audit regularly verifies the compliance and efficiency of our processes and control systems by means of an audit plan, which changes on an annual basis. Because our group will continue to grow in the years ahead, we are constantly developing our risk management system – with the following areas of focus.

## MARKET AND TECHNOLOGICAL TRENDS

We identify long-term market and technological trends using a systematic scenario approach. As a framework, it provides a baseline scenario including the developments in our business areas, regions, products, and markets until 2030. On this basis,

Extreme scenarios for

# 2030

*Stress test for market and technology trends*

and using “extreme scenarios 2030,” we implement stress tests for our company on various aspects – such as markets, regions, drive types, quantities, and technologies. By taking market and

technological trends into account in this systematic way, we ensure that we identify opportunities and risks at an early stage. The findings from these analyses are used to make decisions about future business segments and new production processes; we include the measures derived in our strategic and budget planning. In the course of preparing management reports, we monitor whether and how the agreed steps are implemented.

Opportunities and risks arise from the markets' increasing awareness of environmental considerations and from new standards to reduce emissions, for example. We therefore include all relevant topics in our international research and development activities at an early stage and focus our attention on a wide range of technologies to increase the efficiency of the combustion engine, on alternative drive configurations, and on a holistic, intelligent thermal management system. As a result, we are able to offer our customers competitive, innovative products. With our steadily growing portfolio of electric drives and auxiliary components, we are benefiting from the expanding market for electric vehicles. We have specifically strengthened these activities through multiple acquisitions, which have been pooled within our Mechatronics division and are now integrated into the group. Through acquisitions made in recent years, we have significantly expanded our thermal management business and our product portfolio to include air conditioning compressors. MAHLE therefore has the necessary resources to develop electric air conditioning compressors for the growing plug-in hybrid and electric vehicle market.

Impediments to trade such as Brexit and the tariff dispute between the USA and China, economic fluctuations, changes to the political framework in individual regions or countries, and



the growing number of competitors from Asia in particular can have a major impact on market developments and thus on the business development of our company. On the subject of Brexit, we have set up a working group that is continually monitoring the developments relating to the possible exit of the United Kingdom from the European Union and drawing up and maintaining appropriate response options. As things stand at present, the various scenarios are not expected to result in any significant effects on business activities. In general, our broad market base and global presence serve as important stabilizing factors and help us to counter market and customer risks. Our highly diversified customer and product portfolio also has a corresponding impact. Consequently, possible declines in demand in individual markets or from individual customers can at least be partially offset. We therefore consider a global market slump — as in the economic crisis of 2009 — with a major adverse effect on profit, as one of the greatest risks for our group. We limit the repercussions by means of appropriate early warning systems and action plans. The discussions about diesel emissions and possible bans on older diesel models are significant uncertainty factors for the whole automotive industry. By implementing suitable measures, we aim to mitigate at an early stage the potential economic effects of a shift in technology. These effects could also be due to possible legislative changes — such as a ban on combustion engines in passenger cars applicable from a certain point in time. Through our dual strategy of maintaining our position as a technology leader in the ongoing development of the combustion engine while also driving forward innovative solutions for alternative powertrain technology, we are readying ourselves for future developments of this kind. Business segments that are independent of the OEM business for the passenger car combustion engine today already account for more than 50 percent of group sales. We want to continuously increase this proportion of sales that is unrelated to the passenger car combustion engine.

Proportion of sales by business segments

>50%

*independent of the OEM business  
for the passenger car combustion engine*

## PROCUREMENT AND PRODUCTION

Our risk management system is also focused on minimizing the negative impacts stemming from the procurement markets. Regular supplier assessments prevent unexpected supply bottlenecks and/or price increases in purchasing. We have stepped up these activities in recent years and are making sure that the independence of our suppliers is maintained. In addition, we have been using a tool to monitor risks worldwide, which enables a rapid overview of the impact of natural disasters, strikes, and insolvencies. This increases transparency and thus decreases risk in the supply chain. Appropriate safety stocks and

OTC hedging transactions also serve to reduce procurement risks. To optimize our business processes further, our production plants all around the world cooperate with each other on an ongoing basis. Our Safety First campaign, launched in 2017 and comprising extensive measures to guarantee safety at work, continued in the business year. By means of improved production processes and high quality standards, we aim to ensure that operational risks — such as unforeseen circumstances, unexpected technical issues, accidents, and human error — hinder production operations as little as possible. Thus far, the increasing number of extreme weather events, such as floods, inundations, and droughts, have impacted our production locations only in isolated cases. MAHLE counters the associated risks using an established environmental management system.

Our group has been audited and certified in accordance with current external standards and specifications relevant to our industry — for example, ISO standards for quality, environmental protection, and safety at work — and is thus subjected to important external checks that serve to limit risks. We have arranged an economically prudent degree of cover by means of insurance policies for the disruption of operations resulting from damage as well as liability risks. However, there were again very significant quality incidents and warranty claims in 2018. To improve our ability to avoid similar risks in the future, we have defined cross-functional countermeasures. In this way, development processes in particular will be scrutinized and optimized in more detail. Financial burdens incurred in the year under review are fully included in the group result. Where legally required, financial burdens resulting from quality incidents and warranty claims originating and known as at the balance sheet date, and which are expected to result in cash outflows, are covered by accruals as part of risk provisioning.

## FINANCE MANAGEMENT

Using our systematic and group-wide finance management system, we aim to ensure our optimized use of financing opportunities from the banking and capital market. The liquidity risk is covered by diversified financing facilities with staggered maturity profiles that considerably exceed our group's foreseeable financial requirements. When designing our financing mix, we take security, flexibility, and cost factors into account. Our aim is to secure the financial independence of our group, limit the financing risks, and ensure we are able to exploit business opportunities at all times. We detect currency risks by means of our group-wide planning and reporting system. In accordance with standardized group-wide principles, we counter these risks extensively using nonpredictive hedging transactions over a horizon of up to 24 months. As a rule, hedging transactions relate to OTC FX forwards or swaps in the form of portfolio hedges. The use of derivative financial instruments is necessarily linked to the existence of an operational underlying transaction; expected and not yet invoiced currency risks are thereby covered with continuously declining hedging grades. The resulting hedging relationship generates valuation units in accordance with the critical term match method. The interest rate risk is subjected to value-at-risk analyses. OTC hedging activities and other

financial transactions give rise to counterparty risks with financial institutions, which we identify and evaluate across the group in our uniform reporting system. If predefined thresholds are exceeded, the counterparty risk is influenced by the targeted spread of risks.

## **HUMAN RESOURCES, IT, AND ACCOUNTING**

Highly qualified and motivated employees are a cornerstone of our success both today and in the future. That is why it is important for us to attract suitable staff, support them on a continuous basis, help them gain further qualifications, and retain them in our company over the long term. We have developed a comprehensive personnel marketing concept and set up a recruitment organization in order to establish direct contact with potential candidates at an early stage and recruit qualified employees. We are thereby reducing the risk of not filling vacant positions or filling them only after some delay. In order to guarantee our group's long-term success and take advantage of the opportunities arising from market and technological changes, our personnel requirement planning is geared toward developments in the relevant markets as well as strategically significant technologies and business segments. Performance-related remuneration systems, modern pension schemes, and advanced training activities counter the risk of losing employees in strategically important positions. In the IT function, security technologies protect against unauthorized access to or misuse of data by internal and external parties. Server and storage systems are set up in such a way that they can be restored at short notice in the event of a disaster and in crisis situations. Defined security standards not only encompass the technical specifications of the hardware and software, but also the functional security

structures and organizational provisions. Detailed backup and recovery procedures reduce the risk of severe disruptions, for example, by securing access procedures as well as mirroring and archiving data on a daily basis. With regard to the accounting process, the internal control and risk management system is aimed at ensuring the compliance and effectiveness of accounting and financial reporting. Besides guidelines and principles, the system also includes measures to prevent and uncover reporting errors. The consolidated financial statements are compiled centrally with reporting data transferred from subsidiaries. We guarantee compliance with the MAHLE guidelines by means of systemic controls, specialist advice, and manual checks as well as through the validation of data plausibility by the group accounting function.

## **REGULATIONS AND LEGISLATION**

The introduction and implementation of directives alongside organizational and work instructions ensure that statutory requirements are observed. By integrating internal and external experts into the processes from an early stage, we minimize risks and exploit opportunities that could arise, for example, from fiscal, occupational, competition, patent, antitrust, and environmental regulations and legislation as well as from trade rules. Key elements of our compliance structure include the MAHLE Business Code, a global compliance organization, a training concept for risk areas relevant to compliance, and preventive measures.

## **OVERALL ASSESSMENT**

Overall, no risks are currently observable that could endanger the continued existence of our group.



We anticipate overall stable development in the vehicle markets for the 2019 business year.



We expect slight organic sales growth. The result from business activities is likely to fall significantly as the special effects that boosted the result no longer apply.



Cooperation between our business segments, functions, and regions will become even more intensive in 2019, allowing us to offer our customers even better solutions.

# Outlook

## OVERALL ECONOMIC DEVELOPMENT

In its January report, the International Monetary Fund (IMF) projects generally subdued economic prospects for 2019. According to the IMF's estimates, the rate of growth in the global economy is likely to be below that of previous years, with growth driven mainly by developing and emerging markets, and to a lesser extent by industrial nations. Overall, worldwide economic development could be weakened by economic risks, such as trade barriers and restrictive financing conditions, as well as by political uncertainties.

In the European Union and the euro zone, growth in the year ahead is anticipated to fall slightly below the 2018 rate at just under 2 percent. Sustained strong demand, falling unemployment, and continued relaxed monetary policy are expected to contribute to growth. While growth in Italy, Spain, and Germany is likely to deteriorate, the IMF anticipates stable expansion in the French economy compared with the previous year.

At a good 2 percent, the IMF also projects less dynamic growth than in 2018 for the USA. Here, fiscal incentives are likely to be scaled back in 2019, which will probably also impact the USA's trading partners. According to the IMF, South America's largest national economy Brazil will continue to expand by over 2 percent in 2019, essentially as a result of growing private consumption.

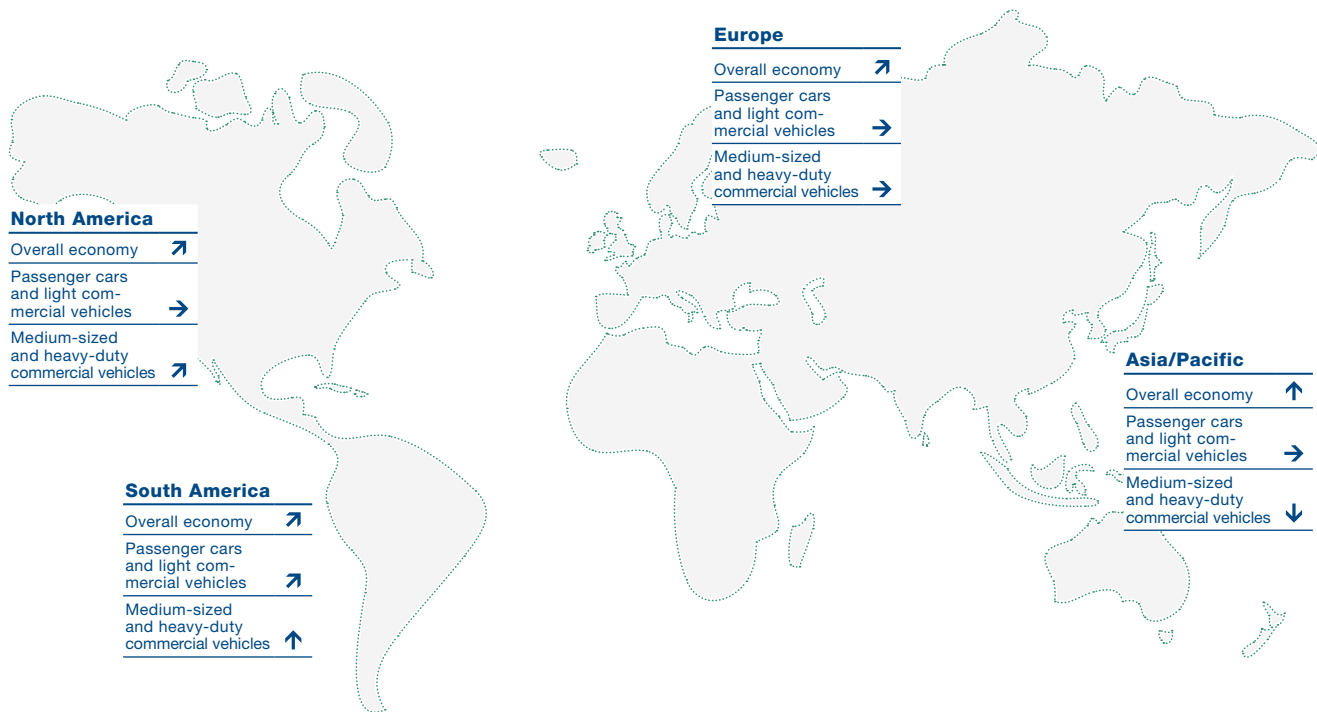
IMF forecast

3.5%

*economic growth in 2019*

In the Asia/Pacific region, India's strong economy remains one of the drivers of growth — not only in the region, but also worldwide. The expansion of the Chinese economy, by contrast, is continuing to slow down — with one reason being the trade dispute with the United States. Conversely, slightly higher growth than in the previous year is expected in Japan in 2019.

## DEVELOPMENT OF THE MARKETS – FORECAST FOR 2019



## DEVELOPMENT OF THE VEHICLE MARKETS

In the 2019 business year, we expect the global production of passenger cars and light commercial vehicles to maintain its sideways trend. The international market for medium-sized and heavy-duty commercial vehicles will, however, probably contract as a result of the anticipated downturn in the Chinese market.

Vehicle production in Europe is likely to develop at the previous year's level. This applies to passenger cars and light commercial vehicles as well as to medium-sized and heavy-duty commercial vehicles. We expect western European markets to weaken slightly. It is unlikely that this trend can be offset by Russia, since the market here is also likely to normalize.

Passenger car and light commercial vehicle sales in North America will probably continue to shrink in 2019, although production will still benefit from the relocation of capacity to the region. As regards the medium-sized and heavy-duty commercial vehicle class, we predict that the cyclical upturn in heavy-duty commercial vehicles will reach its peak in 2019 and therefore expect only limited growth. In South America, we anticipate a normalization of demand in both vehicle categories.

In the Asia/Pacific region, production figures for passenger cars and light commercial vehicles are expected only to reach the previous year's level. For China in particular, we predict a restrained development, and a continued contraction in produc-

tion is forecast in Japan. By contrast, a continuation of the positive trend is expected in India. For the region, however, we anticipate a significant decline in the medium-sized and heavy-duty commercial vehicles market segment. Nevertheless, demand for commercial vehicles in India is likely to benefit from a new emissions standard, which is expected to lead to vehicle purchases being brought forward and thus a rise in production. However, this will probably only partially compensate for the cyclical downturn in the largest market, China.

## DEVELOPMENT OF THE MAHLE GROUP

For the 2019 business year, we anticipate a slight organic increase in sales (when adjusted for changes to the consolidation group as well as exchange rate effects) – subject to a stable global automotive market. We expect a marked decline in the result from business activities in 2019, because factors such as the one-time effects that boosted the result in 2018 no longer apply.

We will proceed with our dual strategy in 2019. We intend to continue to expand and push forward the areas of growth that we have already opened up in previous years. Using venture capital, we will therefore further additional innovative projects related to our dual strategy and initiatives beyond the scope of our core business. We will additionally cooperate with start-ups to develop new ideas and solutions. Our MAHLE Incubator projects and the MAHLE Innovation Hub ideation platform likewise provide our employees with an environment in which they can

propose product solutions as well as new processes and business models, and drive these forward in an agile manner. With these initiatives, we are also supporting group-wide dialog and networking between our innovative staff.

Focus for

# 2019

*intensive collaboration for  
innovative solutions*

The latter example in particular shows the direction that we want to take to a greater extent in 2019. We are focusing more strongly on closer cooperation between the business segments, functions, and regions, so that we are able to develop even better solutions for our customers. Among other measures, we are using our Manufacturing Days for this purpose—events that we have been running on an international basis since the fall of 2018. In this way, we are encouraging dialog between business segments with regard to pilot projects and processes as well as to the subject of shared standards and best practices. Owing to its great success, we will continue this series of events in 2019. A further initiative to promote closer cooperation is the MAHLE Top Thinkers Circle, where highly innovative employees from all MAHLE regions and business segments are brought together in cross-functional teams to devise new business models and work together to tackle relevant issues. Finally, our acquisition teams will cooperate more closely across functions and regions with the goal of strengthening our sales expertise and further improving our response time for the benefit of our customers.

Another important issue for our company is and will remain the digital transformation, which is progressing with tremendous momentum and is one of the most important drivers of economic development—for MAHLE and beyond. In the 2018 business year, we were still focused on formulating our digitalization strategy—in 2019, we aim to realize the targets we have set. Our approach is highly oriented toward benefits, and we always have the creation of value in mind—for MAHLE and for our customers. By digitalizing all our business areas, our goal is both to open up new business activities and to make our processes more efficient. Digital technologies should, on the one hand, improve products and, on the other, streamline production processes and optimize administrative workflows. For example, MAHLE is investing in artificial intelligence in the form of a fully automated quality inspection process based on camera systems in order to save costs and time and increase production quality from the perspective of the customer. In addition, we are taking advantage of big data technologies in a pilot project to optimize production with regard to Industry 4.0.

Our economic success is the foundation on which we realize our future strategies. It enables us to invest in research and development, establish new business areas, and make acquisitions that complement our portfolio with a view to the future. With this in mind, and to maintain and enhance this strong foundation, we are striving for further sales growth while at the same time increasing profitability. Our financial independence and ability to withstand potential crises are always our priorities. We therefore set great store by a healthy balance sheet structure and moderate net gearing. The mainstays of our financial policy are thus a solid equity base and liquidity that is secured over the long term and built on stable operating cash flows as well as diversified financing sources and instruments.

This report contains forward-looking statements that rely on current estimates of future developments and are therefore subject to risks and uncertainties that are beyond our control or precise assessment. Consequently, the actual results may differ from the statements made here.

CHAPTER

# Consolidated financial statements

→ 98 – 128

*Consolidated balance sheet* ..... 100

*Consolidated income statement* ..... 103

*Consolidated cash flow statement* ..... 104

*Consolidated statement  
of changes in equity* ..... 106

*Notes to the consolidated  
financial statements* ..... 108

- Consolidation group – 108
- Exemption provisions for domestic companies – 109
  - Method of consolidation – 109
  - Accounting and valuation principles – 109
  - Currency conversion – 111
- Notes to the consolidated balance sheet – 111
- Notes to the consolidated income statement – 113
  - Other notes – 114
- Consolidated statement of fixed assets – 118
  - Shareholdings – 120

*Auditor's report* ..... 126

*Imprint/contact* ..... 129

# Consolidated balance sheet

## CONSOLIDATED BALANCE SHEET AS AT DECEMBER 31, 2018

in EUR '000	Dec. 31, 2018	Dec. 31, 2017
<b>ASSETS</b>		
<b>A. Fixed assets</b>		
<b>I. Intangible assets</b>		
1. Purchased concessions, industrial and similar rights and assets, as well as licences in such rights and assets	223,551	246,455
2. Goodwill	317,688	296,642
3. Prepayments	611	745
	<b>541,850</b>	<b>543,842</b>
<b>II. Property, plant, and equipment</b>		
1. Land, leasehold rights, and buildings including buildings on third-party land	951,255	939,316
2. Technical equipment and machinery	1,575,813	1,532,812
3. Other equipment, fixtures, and furniture	139,695	131,615
4. Prepayments and assets under construction	469,827	405,163
	<b>3,136,590</b>	<b>3,008,906</b>
<b>III. Financial assets</b>		
1. Shares in affiliated companies	2,504	4,948
2. Shares in associated companies	39,114	111,496
3. Equity investments	10,145	8,065
4. Loans to companies in which participations are held	0	32
5. Long-term securities	4,908	7,480
6. Other loans	43,974	17,128
	<b>100,645</b>	<b>149,149</b>
	<b>3,779,085</b>	<b>3,701,897</b>
<b>B. Current assets</b>		
<b>I. Inventories</b>		
1. Raw materials, consumables, and supplies	593,349	529,566
2. Work in process	216,199	225,199
3. Finished goods and merchandise	678,221	637,085
4. Prepayments	14,198	17,594
5. Prepayments received	-77,503	-84,744
	<b>1,424,464</b>	<b>1,324,700</b>
<b>II. Receivables and other assets</b>		
1. Trade receivables	1,948,907	1,980,232
2. Receivables from affiliated companies	1,054	721
3. Receivables from companies in which investments are held	2,212	9,411
4. Other assets	383,127	351,229
	<b>2,335,300</b>	<b>2,341,593</b>
<b>III. Securities</b>	<b>32</b>	<b>429</b>
<b>IV. Cash in hand, bank balances, and checks</b>	<b>407,197</b>	<b>503,126</b>
	<b>4,166,993</b>	<b>4,169,848</b>
<b>C. Prepaid expenses</b>	<b>26,278</b>	<b>23,599</b>
<b>D. Deferred tax assets</b>	<b>235,547</b>	<b>226,413</b>
<b>E. Excess of plan assets over post-employment benefit liability</b>	<b>64,161</b>	<b>73,392</b>
	<b>8,272,064</b>	<b>8,195,149</b>



in EUR '000	Dec. 31, 2018	Dec. 31, 2017
<b>EQUITY AND LIABILITIES</b>		
<b>A. Equity</b>		
I. Subscribed capital	150,000	150,000
II. Capital reserves	166,430	166,430
III. Revenue reserves	2,343,108	2,039,704
IV. Equity impact from currency translation	-153,307	-169,564
V. Consolidated unappropriated retained earnings	13,568	7,594
VI. Non-controlling interests	494,301	437,940
	<b>3,014,100</b>	<b>2,632,104</b>
<b>B. Accruals</b>		
1. Accruals for pensions and similar obligations	657,605	577,797
2. Accruals for taxes	70,000	77,980
3. Other accruals	1,378,694	1,437,206
	<b>2,106,299</b>	<b>2,092,983</b>
<b>C. Liabilities</b>		
1. Bonds	829,000	829,000
2. Liabilities to banks	715,521	830,270
3. Payments received on account of orders	6,743	9,820
4. Trade payables	1,200,471	1,233,929
5. Liabilities on bills accepted and drawn	41,186	39,987
6. Liabilities to affiliated companies	1,121	3,899
7. Liabilities to companies in which investments are held	4,900	9,198
8. Other liabilities	286,379	438,954
<i>thereof from taxes 82,302 (prev. yr.: 92,625)</i>		
<i>thereof relating to social security and similar obligations 32,705 (prev. yr.: 31,932)</i>		
	<b>3,085,321</b>	<b>3,395,057</b>
<b>D. Deferred Income</b>	<b>66,344</b>	<b>75,005</b>
	<b>8,272,064</b>	<b>8,195,149</b>



# Consolidated income statement

## CONSOLIDATED INCOME STATEMENT FROM JANUARY 1 TO DECEMBER 31, 2018

in EUR '000	2018	2017
<b>1. Sales</b>	<b>12,580,768</b>	<b>12,788,045</b>
2. Cost of sales	-10,343,944	-10,652,852
<b>3. Gross profit on sales</b>	<b>2,236,824</b>	<b>2,135,193</b>
4. Selling expenses	-597,311	-579,060
5. General administrative expenses	-511,938	-511,614
6. Research and development expenses	-750,798	-748,114
7. Other operating income	771,842	485,200
<i>thereof from currency translation 188,488 (prev. yr.: 180,420)</i>		
8. Other operating expenses	-362,582	-378,181
<i>thereof from currency translation -232,670 (prev. yr.: -207,771)</i>		
	-1,450,787	-1,731,769
	<b>786,037</b>	<b>403,424</b>
9. Investment income	1,118	500
<i>thereof from affiliated companies 41 (prev. yr.: 232)</i>		
10. Income from profit transfer agreements	0	189
11. Income from other securities and long-term loans	149	542
12. Result from associated companies	-2,417	-38,982
13. Other interest and similar income	9,889	18,285
<i>thereof from affiliated companies 10 (prev. yr.: 18)</i>		
<i>thereof income from discounting 251 (prev. yr.: 205)</i>		
14. Impairment of financial assets and of securities	-27,444	-257
15. Interest and similar expenses	-153,133	-121,241
<i>thereof to affiliated companies -10 (prev. yr.: -56)</i>		
<i>thereof expenses from discounting -64,489 (prev. yr.: -50,505)</i>		
	-171,838	-140,964
<b>Result from business activities</b>	<b>614,199</b>	<b>262,460</b>
16. Taxes on income	-135,700	-124,879
<i>thereof income from deferred income taxes 35,878 (prev. yr.: 60,109)</i>		
<b>17. Result after taxes</b>	<b>478,499</b>	<b>137,581</b>
18. Other taxes	-32,138	-35,370
<b>19. Consolidated net income</b>	<b>446,361</b>	<b>102,211</b>
20. Consolidated unappropriated retained earnings prior year	7,594	6,109
21. Dividend distribution	-7,500	-6,000
22. Transfer to revenue reserves	-304,450	-169,265
23. Profit applicable to non-controlling interests	-205,439	-104,951
24. Loss applicable to non-controlling interests	77,002	179,490
<b>25. Consolidated unappropriated retained earnings</b>	<b>13,568</b>	<b>7,594</b>

# Consolidated cash flow statement

## CONSOLIDATED CASH FLOW STATEMENT FROM JANUARY 1 TO DECEMBER 31, 2018

in EUR '000

2018

### 1. Cash flows from operating activities

Profit for the period (consolidated net income including profit and loss applicable to non-controlling interests)	446,361
+/- Depreciation, amortization, and write-downs of fixed assets/reversals of write-downs of fixed assets	631,110
+/- Increase/decrease in provisions	-14,408
+/- Other non-cash expenses/income	-23,952
Increase/decrease in inventories, trade receivables, and other assets	
-/+ not related to investing or financing activities	-224,171
Increase/decrease in trade payables and other liabilities	
+/- not related to investing or financing activities	32,561
-/+ Gain/loss on disposal of fixed assets	-31,592
+/- Interest expense/interest income	137,299
- Other investment income	1,299
+/- Expenditure/income of exceptional size or incidence	-342,825
+/- Interest payments/receipts related to interest other than for the provision of capital	-886
+/- Income tax expense/income	171,577
- Cash payments relating to expenditure of exceptional size or incidence	-164,500
-/+ Income taxes paid	-193,291
	<b>424,582</b>

### 2. Cash flows from investing activities

+ Proceeds from disposal of intangible fixed assets	211
- Payments to acquire intangible fixed assets	-18,638
+ Proceeds from disposal of tangible fixed assets	24,379
- Payments to acquire tangible fixed assets	-608,546
+ Proceeds from disposal of long-term financial assets	43,225
- Payments to acquire long-term financial assets	-5,866
- Payments to acquire entities included in the basis of consolidation	-146,490
+ Cash receipts from the investment of cash funds for short-term cash management	145,988
- Cash payments for the investment of cash funds for short-term cash management	-155,306
+ Cash receipts relating to income of exceptional size or incidence	367,218
+ Interest received	5,041
+ Dividends received	2,163
	<b>-346,621</b>

in EUR '000	<b>2018</b>
<b>3. Cash flows from financing activities</b>	
+ Proceeds from the issuance of bonds and from borrowings	191,205
- Cash repayments of bonds and borrowings	-316,051
+ Proceeds from grants/subsidies received	2,984
- Interest payment due to leasing agreements	-23
- Interest paid	-50,292
- Dividends paid to shareholders of the parent entity	-7,500
- Dividends paid to minority shareholders	-27,493
	<b>-207,170</b>
<b>4. Cash funds at end of period</b>	
Net change in cash funds (subtotals 1-3)	-129,209
+/- Effect on cash funds of exchange rate movements and remeasurements	9,864
+ Cash funds at beginning of period	359,091
	<b>239,746</b>
Cash-in-hand, bank balances, and checks	503,126
- Bank balances with an initial term of more than 3 months	-4,642
+ Liabilities to banks with an initial term of less than 3 months	-139,393
<b>Cash funds at beginning of period</b>	<b>359,091</b>
<i>thereof from proportionately consolidated companies</i>	40,912
Cash-in-hand, bank balances, and checks	407,197
- Bank balances with an initial term of more than 3 months	-4,139
+ Liabilities to banks with an initial term of less than 3 months	-163,312
<b>Cash funds at end of period</b>	<b>239,746</b>
<i>thereof from proportionately consolidated companies</i>	-8,771

The short term liabilities which were netted against cash balances contained EUR 110,768k (previous year: EUR 86,599k) which were related to short term liabilities based on a committed credit line with a remaining tenor of more than one year.

Cash funds amounting to EUR 751k that are restricted on disposal are included.

# Consolidated statement of changes in equity

## CONSOLIDATED STATEMENT OF CHANGES IN EQUITY FROM JANUARY 1 TO DECEMBER 31, 2018

in EUR '000	PARENT COMPANY		
	Subscribed capital	Capital reserves	Revenue reserves
<b>As at December 31, 2016</b>	<b>150,000</b>	<b>166,430</b>	<b>1,872,395</b>
Adjustment acc. to GAS 23.148 without effect on net income	0	0	524
Capital increase	0	0	0
Transfer to revenue reserves	0	0	169,265
Dividend distribution	0	0	0
Currency translation	0	0	0
Other items	0	0	-489
Changes in the consolidation group	0	0	-1,991
Consolidated net income	0	0	0
<b>As at December 31, 2017</b>	<b>150,000</b>	<b>166,430</b>	<b>2,039,704</b>
Capital increase	0	0	0
Transfer to revenue reserves	0	0	304,450
Dividend distribution	0	0	0
Currency translation	0	0	0
Other items	0	0	23
Changes in the consolidation group	0	0	-1,069
Consolidated net income	0	0	0
<b>As at December 31, 2018</b>	<b>150,000</b>	<b>166,430</b>	<b>2,343,108</b>

<sup>1</sup> Including effects from hyperinflation adjustments for the country Argentina in accordance with IAS 29

	Equity impact from currency translation <sup>1</sup>	Consolidated unappropriated retained earnings	Total	Non-controlling interests <sup>1</sup>	Consolidated equity
	<b>-35,496</b>	<b>6,109</b>	<b>2,159,438</b>	<b>562,507</b>	<b>2,721,945</b>
	0	0	524	0	524
	0	0	0	3,682	3,682
	0	-169,265	0	0	0
	0	-6,000	-6,000	-35,388	-41,388
	-136,398	0	-136,398	-22,704	-159,102
	339	0	-150	0	-150
	1,991	0	0	4,382	4,382
	0	176,750	176,750	-74,539	102,211
	<b>-169,564</b>	<b>7,594</b>	<b>2,194,164</b>	<b>437,940</b>	<b>2,632,104</b>
	0	0	0	172	172
	0	-304,450	0	0	0
	0	-7,500	-7,500	-27,387	-34,887
	15,669	0	15,669	-10,690	4,979
	-481	0	-458	-54,204	-54,662
	1,069	0	0	20,033	20,033
	0	317,924	317,924	128,437	446,361
	<b>-153,307</b>	<b>13,568</b>	<b>2,519,799</b>	<b>494,301</b>	<b>3,014,100</b>

# Notes to the consolidated financial statements

## CONSOLIDATION GROUP

The consolidated financial statements include MAHLE GmbH (parent company), with the registered office and district court in Stuttgart (commercial register number 638) as well as 24 domestic and 134 foreign subsidiaries. Furthermore, 17 companies were consolidated proportionately according to the percentage of shares, and seven companies were valued according to the equity method. The consolidated companies are included in the list of shareholdings.

During 2018, the following companies were fully consolidated for the first time due to the acquisition of additional shares. The acquisitions did not affect the comparability of the consolidated financial statements with the previous year.

- MAHLE Behr Verwaltung GmbH, Germany, as of January 1
- MAHLE Aftermarket Italy S.p.A. (formerly Brain Bee S.p.A.), Italy, as of May 1
- MAHLE Aftermarket Deutschland GmbH (formerly Brain Bee Deutschland GmbH), Germany, as of May 1
- MAHLE Aftermarket Iberica S.A.U. (formerly Brain Bee Iberica S.A.U.), Spain, as of May 1

In the previous years these companies were excluded from the valuation according to the equity method due to their immateriality.

- MAHLE Ebikemotion S.L.U. (formerly Ebikemotion Technologies S.L.), Spain, as of October 31

The following companies were newly incorporated and fully consolidated for the first time during 2018:

- MAHLE Engineering Services India Private Limited, India, as of January 1
- MAHLE Automotive Technologies (Suzhou) Co., Ltd., China, as of November 15

In addition, the following company, which was excluded from consolidation due to immateriality in the previous year, was fully consolidated for the first time:

- MAHLE Shared Services Mexico, S. de R.L. de C.V., Mexico, as of January 1

The following proportionately consolidated companies were no longer consolidated as of June 26, 2018 due to the divestiture of the HBPO subgroup:

- HBPO Beteiligungsgesellschaft mbH, Germany
- HBPO Asia Ltd., South Korea
- HBPO Automotive Hungária Kft., Hungary
- HBPO Automotive Spain S.L.U., Spain
- HBPO Beijing Ltd., China
- HBPO Brasil Automotive Servicos Ltda., Brazil
- HBPO Canada Inc., Canada
- HBPO Czech s.r.o., Czech Republic
- HBPO Germany GmbH, Germany
- HBPO GmbH, Germany
- HBPO Ingolstadt GmbH, Germany
- HBPO Management Services Mexico S.A. de C.V., Mexico
- HBPO Manufacturing Hungary Kft., Hungary
- HBPO Mexico S.A. de C.V., Mexico
- HBPO North America Inc., USA
- HBPO Pyeongtaek Ltd., South Korea
- HBPO Rastatt GmbH, Germany
- HBPO Regensburg GmbH, Germany
- HBPO Services Mexico S.A. de C.V., Mexico
- HBPO Slovakia s.r.o., Slovakia
- HBPO UK Ltd., Great Britain
- HBPO Vaihingen/Enz GmbH, Germany
- SHB Automotive Modules Company Ltd., South Korea

For one company occurred an upward change from proportionate consolidation to full consolidation.

Five companies were merged in the reporting year.

One proportionately consolidated company was liquidated in the business year 2018.

In the business year, nine companies were excluded from the consolidated financial statements due to immateriality. Five companies were not valued according to the equity method due to their immateriality.



## Key changes to the consolidation group

During 2018, the HBPO subgroup was divested. Due to the divestiture the assets, liabilities, and deferred income were excluded from the MAHLE Group balance sheet at the time of sale in the following amounts:

in EUR '000	
<b>Fixed assets</b>	<b>31,074</b>
<b>Current assets</b>	<b>135,457</b>
<b>Prepaid expenses</b>	<b>1,519</b>
<b>Deferred tax assets</b>	<b>6,819</b>
<b>Accruals</b>	<b>41,897</b>
<b>Liabilities</b>	<b>100,758</b>

Sales decreased due to the divestiture by approximately EUR 360,000k. Other immaterial items in the income statement have changed accordingly.

## EXEMPTION PROVISIONS FOR DOMESTIC COMPANIES

The following subsidiaries are applying the exemption according to Sec. 264, Para. 3, respectively Sec. 264b of the German Commercial Code (HGB), with regard to the disclosure of their annual financial statements and/or the preparation of the management reports:

MAHLE Aftermarket GmbH, Stuttgart; MAHLE Amovis GmbH, Berlin; MAHLE Beteiligungen GmbH, Stuttgart; MAHLE Brandenburg GmbH, Wustermark; MAHLE Filtersysteme GmbH, Stuttgart; MAHLE Immobilien GmbH, Stuttgart; MAHLE Industrial Thermal Systems GmbH & Co. KG, Stuttgart; MAHLE Industriebeteiligungen GmbH, Stuttgart; MAHLE Industriemotoren-Komponenten GmbH, Stuttgart; MAHLE International GmbH, Stuttgart; MAHLE Kleinmotoren-Komponenten GmbH & Co. KG, Stuttgart; MAHLE Powertrain GmbH, Stuttgart; MAHLE Ventiltrieb GmbH, Stuttgart; MAHLE Versicherungsvermittlung GmbH, Stuttgart.

## METHOD OF CONSOLIDATION

Consolidated subsidiaries, using the book value method prior to December 31, 2009, will continue to be consolidated under the same method as in prior years. Thereby, the value of the investment held by the parent company, at the time of acquisition and first consolidation, is to be offset against the attributable share of the subsidiary's equity book value. In the case of companies that were consolidated for the first time from 2010 onward, the assets, liabilities, prepaid expenses, and deferred income acquired were revalued at fair value as part of the purchase price allocation at the time that the company became a subsidiary.

At the balance sheet date, a total goodwill of EUR 317,688k is disclosed which contains a goodwill of EUR 42,680k that occurred in the financial statements of the entities included in the consolidation group. Goodwill is amortized over ten years due to the relevant markets which are dominated by a small number of suppliers and have high barriers to market entry. These markets have shown that the average useful life of acquired goodwill is historically ten years. Additionally, the recoverability of goodwill is tested (impairment test) at least once a year to determine if an impairment exists according to GAS 23.129 Sentence 1. Thereby, the amount of the write-down is determined by comparing the fair value of the investment in the subsidiary with the total of the carrying amount of the net assets held by the subsidiary in the consolidated financial statements and the net carrying amount of goodwill. Goodwill impairments in 2018 totaled EUR 879k.

The first consolidation of the Brain Bee Group (consisting of MAHLE Aftermarket Italy S.p.A., MAHLE Aftermarket Deutschland GmbH, and MAHLE Aftermarket Iberica S.A.U.) resulted in goodwill of EUR 7,224k and the first consolidation of MAHLE Ebikemotion S.L.U. resulted in goodwill of EUR 4,059k. In addition, MAHLE Beteiligungen GmbH increased its shareholding in MAHLE Behr GmbH & Co. KG from 50.71 percent to 55.71 percent and its shareholding in MAHLE Behr Verwaltung GmbH from 23.08 percent to 55.71 percent as of January 1, 2018 by the acquisition of shares from non-controlling shareholders. This resulted in goodwill of EUR 54,282k. Thereby, the increase in shares in subsidiaries without affecting their status as subsidiaries were recognized as acquisition.

The transition from proportional consolidation to full consolidation of MAHLE Behr Grugliasco S.p.A. (formerly Behr Thermotronic Italia S.p.A.) as of August 1, 2018 resulted in a negative consolidation difference with equity characteristic of EUR 449k which was recognized as income in the business year 2018.

The intra-group supply of goods and services as well as mutual receivables and liabilities were offset, and intercompany profits and losses were eliminated.

Deferred taxes resulting from consolidation measures with effect on income were recorded using a tax rate of 23 percent.

## ACCOUNTING AND VALUATION PRINCIPLES

The existing accounting and valuation methods were retained and were also applied by the material associated companies.

Acquired intangible assets and property, plant, and equipment are valued at acquisition costs or manufacturing costs minus depreciation or amortization. Depreciation was performed on a straight-line basis using standard useful lives. If lower valuations were provided, impairments were recorded. Internally developed trademarks and similar rights and assets were not capitalized. Furthermore, the intangible assets contain hidden reserves disclosed as part of the purchase price allocation of the acquisitions. These comprise of trademark rights, customer relationships, technological licenses, and development services. Depending on the categories, the useful lives for intangible assets were based on 5 to 10 years.

Financial assets were stated at the lower of acquisition cost or fair value if the impairment is expected to be permanent.

Inventories are capitalized at acquisition cost or manufacturing cost. Unfinished and finished goods are valued by considering the appropriate share of material, production overhead, and depreciation of fixed assets. If the market prices or fair values were lower than the book values, or marketability was limited, devaluations were performed as necessary.

Receivables and other assets are recorded at nominal values. Appropriate write-downs are recorded to account for receivables with recognizable risks of nonpayment; a general valuation allowance is set up to cover the general credit risk.

Prepaid expenses were recorded for payments made before the balance sheet date for expenditures related to a specific time period after this date.

Accruals for taxes and other accruals are to adequately cover uncertain liabilities and anticipated losses from pending transactions. The valuation is based on the settlement amount taking into account necessary cost increases. Accruals with a remaining term of more than one year were discounted by using the average market interest rate of the past seven fiscal years provided by the German Central Bank. If appropriate, an average local market interest rate of the past seven years was determined for the remaining term in order to depict the actual economic situation for the discounting of obligations in foreign currency.

Accruals for pensions and similar obligations are calculated group-wide in accordance with actuarial principles (using the projected unit credit method) and discounted with the average rate of ten years in accordance with Sec. 253 of the German Commercial Code (HGB) to present value. In 2018, the calculation was based on the following discount rates: domestic 2.69–3.33 percent; foreign 0.98–4.43 percent. The option to assume a standardized remaining term of 15 years was not utilized. Expected salary increases of 1.50–3.50 percent and anticipated labor turnover rates of 2.00–3.68 percent were taken into consideration. The mortality tables recognized in each country were used as a basis for the calculation.

Assets that serve exclusively to settle pension-related obligations and cannot be utilized to settle claims of any other creditors (plan assets in the form of long-term securities) were offset against the accruals at their fair value. Excess amounts are recorded within the position “Excess of plan assets over post-employment benefit liability”.

Liabilities are stated at their settlement amount.

Receivables, bank balances, and liabilities in foreign currency with a remaining term of less than one year were valued using the mid spot rate applicable at the balance sheet date. If the remaining term was more than one year, the valuation was based on the exchange rate applicable at the acquisition date or the lower or higher exchange rate at the balance sheet date.

Changes in exchange rates, commodity price variations, and interest rates represent a risk to operational business that is very difficult to estimate. To minimize this risk, appropriate hedging transactions such as derivatives are used. These transactions are only established with banks that have a prime credit rating. Their use is based on standard guidelines, subject to strict internal controls, and restricted to the hedging of operational business as well as that of related investments and financing activities.

If effective hedging relationships existed between the underlying operating transactions and/or highly probable transactions (basically future deliveries of goods and services) and the hedging transaction, they were combined into a hedge accounting evaluation unit and valued together under the so-called “frozen value method” (“Einfrierungsmethode”).

Deferred income has been recorded for payments received prior to the balance sheet date for income related to a specific time period after this date.

Deferred tax assets and liabilities are set up to account for all temporary and quasi-permanent differences between the tax and German Commercial Code (HGB) values. Furthermore, deferred taxes for tax loss and interest carry forwards and tax credits were capitalized, provided the tax benefit was reasonably recoverable within the next five years. Deferred taxes were determined using tax rates that are expected to apply at the time of recovery and are based on the regulations adopted at the balance sheet date. Deferred tax assets and liabilities are presented as a net value. The tax rates fall within a range of 10.00–34.00 percent.

## CURRENCY CONVERSION

The financial statements of foreign companies were, if not prepared in Euro, converted as follows:

### Equity:

Exchange rate at the date of acquisition (or first consolidation)

### Other balance sheet items:

Mid spot rate at the balance sheet date

### Income statement items:

Average exchange rate for the year

Exchange rate differences in connection with the use of the closing rate method were shown as "currency translation Jan 01" within the consolidated statement of fixed assets. Differences arising from the conversion of movements during the current year were shown in a separate column.

Any difference arising from the translation of the balance sheet items into Euro was included under "Equity impact from currency translation" in the consolidated shareholders' equity.

The "thereof" information on currency conversion in the income statement includes both unrealized and realized exchange rate differences.

For the company in the hyperinflation country Argentina, the financial statements were prepared based on a general price index in accordance with IAS 29.

## NOTES TO THE CONSOLIDATED BALANCE SHEET

### Receivables and other assets

in EUR '000	Dec. 31, 2018	
	Carrying amount	Thereof with a remaining term of more than 1 year
Accounts receivables		
Trade receivables	1,948,907	2,207
Receivables from affiliated companies	1,054	0
Receivables from companies in which investments are held	2,212	0
Other assets	383,127	12,211
<b>Total</b>	<b>2,335,300</b>	<b>14,418</b>

During the previous year, trade receivables (EUR 217k) as well as other assets (EUR 11,684k) had a remaining term of more than one year.

Trade receivables are included in the amount of EUR 152k (previous year: EUR 91k) from affiliated companies and EUR 1,482k (previous year: EUR 7,140k) from companies in which investments are held.

Only other assets contain receivables against shareholders amounting to EUR 6k (previous year: EUR 127k). Prepaid expenses include, among others, the differences between net loan proceeds and liabilities to banks (debt discounts) amounting to EUR 1,046k (previous year: EUR 1,391k).

### Equity

The consolidated unappropriated retained earnings equal that of the parent company and contain the amount carried forward from the previous year of EUR 94k.

### Accruals for pensions and similar obligations as well as other accruals

Notes for offsetting pursuant to Sec. 246, Para. 2, Sentence 2 of the German Commercial Code (HGB):

in EUR '000	Dec. 31, 2018
	Carrying amount
Settlement amount of offset liabilities	522,495
Acquisition costs of assets	244,572
Fair value of assets	357,191
Offset income	315
Offset expenses	40,598

The difference for discounting with the seven-year average rate according to Sec. 253, Para. 6, Sentence 1 of the German Commercial Code (HGB) amounts to EUR 89,140k.

Other accruals primarily relate to outstanding credit notes and rebates and outstanding purchase invoices, guarantee and warranty risks, as well as obligations arising from employment contracts.

## Liabilities

in EUR '000	Dec. 31, 2018	With a remaining term of up to 1 year	With a remaining term of more than 1 year	Thereof with a remaining term of more than 5 years
	Carrying amount			
Bonds	829,000	29,000	800,000	0
Liabilities to banks	715,521	185,298	530,223	193,099
Payments received on account of orders	6,743	6,736	7	0
Trade payables	1,200,471	1,199,131	1,340	0
Liabilities on bills accepted and drawn	41,186	41,186	0	0
Liabilities				
<i>to affiliated companies</i>	1,121	1,121	0	0
<i>to companies in which investments are held</i>	4,900	4,900	0	0
Other liabilities	286,379	253,724	32,655	19,531
<b>Total</b>	<b>3,085,321</b>	<b>1,721,096</b>	<b>1,364,225</b>	<b>212,630</b>

During the previous year, liabilities to banks (EUR 140,373k), payments received on account of order (EUR 9,813k), trade payables (EUR 1,232,567k), liabilities on bills accepted and drawn (EUR 39,987k), liabilities to affiliated companies (EUR 3,899k), liabilities to companies in which investments are held (EUR 9,198k), and other liabilities (EUR 403,531k) had a remaining term of up to one year.

The liabilities to affiliated companies contain trade payables EUR 239k (previous year: EUR 216k). The liabilities to companies in which investments are held contain trade payables EUR 1,564k (previous year: EUR 5,059k).

The liabilities contain payables to shareholders amounting to EUR 7k (previous year: EUR 0k).

No liabilities to banks are secured by property liens or similar rights.

### Deferred taxes

Deferred tax assets arise predominantly from differing accounting treatment in intangible assets, property, plant, and equipment, and accruals. The temporary differences in accruals essentially include different carrying amounts between the tax balance sheet and the consolidated balance sheet related to accruals for pensions and similar obligations and accruals that are not tax-deductible, such as accruals for anticipated losses.

The deferred tax liabilities result predominantly from temporary differences relating to tangible fixed assets due to different carrying amounts and depreciation methods in the tax and consolidated balance sheet. In addition, the identified fair values disclosed as part of the purchase price allocations of the acquisitions lead to deferred tax liabilities, in particular in intangible and tangible fixed assets.

Deferred tax assets of EUR 421,689k were set up as tax loss carry forwards of EUR 83,428k that are recoverable within five years. EUR 181,499k of deferred tax assets were written off as of December 31, 2018, as their realization is not deemed sufficiently likely.

## Off-balance-sheet transactions

As of the balance sheet date, off-balance-sheet transactions exist in connection with significant rental and leasing agreements in particular for buildings and land (EUR 124,705k). Moreover, off-balance-sheet transactions are in place in connection with factoring (EUR 108,351k). These off-balance-sheet transactions led to a diversification of financing sources as of the balance sheet date. Through these transactions cash outflows are generally postponed into the future.

No material risks are anticipated from these transactions.

## Contingent liabilities

	Dec. 31, 2018
in EUR '000	Carrying amount
Contingents from notes	39,061
Guarantees	320
<i>thereof to associated companies</i>	120
Warranties	163

To our knowledge, the underlying obligations can be fulfilled in all cases by the companies concerned. We do not expect the contingent liabilities to be claimed. The contingent liabilities include EUR 31,501k from proportionately consolidated companies.

The contingent liabilities do not include any obligations concerning retirement benefits.

## Other financial obligations

	Dec. 31, 2018
in EUR '000	Carrying amount
Purchase commitments from investments	290,435
Financial obligations resulting from rent and lease agreements	60,137
Others	50,315
<i>thereof to affiliated companies</i>	158

The other financial obligations include EUR 16,741k from proportionately consolidated companies.

The other financial obligations do not include any obligations concerning retirement benefits.

## Contribution of proportionately consolidated companies

The balance sheet includes short-term assets of EUR 317,344k and long-term assets of EUR 135,146k belonging to proportionately consolidated companies. Current liabilities of EUR 204,742k as well as long-term debt of EUR 79,653k are recognized by proportionately consolidated companies.

## NOTES TO THE CONSOLIDATED INCOME STATEMENT

The income statement of the MAHLE Group has been prepared according to the cost of sales method. Sales are thus matched with the expenses incurred in their realization, which are allocated in principle to the functions production, sales, general administration, and research and development.

The cost of sales comprises of the material and production costs incurred in the realization of sales, the landed costs of the trade business, and the costs of the allocation to accruals for warranties. Furthermore, this item also contains depreciation and amortization on the hidden reserves disclosed as part of the purchase price allocations of the acquisitions. These include technologies, technical equipment and machinery, as well as land and buildings.

The selling expenses include, in particular, personnel and non-personnel expenses, depreciation allocated to the sales function, as well as logistics, market research, sales promotion, shipping and handling, and advertising costs. Furthermore, they also contain amortization on the hidden reserves disclosed as part of the purchase price allocations of the acquisitions. These include trademark rights and customer relationships.

The general administration expenses include personnel and non-personnel expenses as well as depreciation allocated to the administrative function.

The personnel, and non-personnel expenses, and depreciation allocated to the research and development function are substantial to the MAHLE Group. In order to present the economic situation of the group more clearly, they have been included as a separate item in the breakdown.

Other operating income contains EUR 108,004k income relating to other periods. This income is mainly related to the reversal of accruals. Income from financing includes gains of EUR 39,686k (previous year: EUR 58,314k) from currency translation and gains of EUR 0k (previous year: EUR 12k) from derivative financial instruments.

Other operating expenses contains EUR 10,694k expenses relating to other periods. This expense is mainly related to disposals of depreciable fixed assets. Expenses from financing include losses of EUR 87,438k (previous year: EUR 90,600k) from currency translation and expenses of EUR 266k (previous year: EUR 988k) from derivative financial instruments.

## Sales by area of operation

in EUR '000	2018
Engine Systems and Components business unit	2,781,150
Filtration and Engine Peripherals business unit	2,256,459
Thermal Management business unit	4,628,913
Aftermarket business unit	927,672
Mechatronics division	452,943
Profit centers and services	1,533,631
<b>Total</b>	<b>12,580,768</b>

## Sales by geographical market (target area)

in EUR '000	2018
Europe	5,860,985
North America	3,472,958
South America	578,834
Asia/Pacific	2,579,267
Africa	88,724
<b>Total</b>	<b>12,580,768</b>

## Personnel expenses

in EUR '000	2018
Wages and salaries	2,399,899
Social security costs and other benefits	528,339
Old age pension costs	47,323
<b>Total</b>	<b>2,975,561</b>

## Depreciation, amortization, and impairments of intangible and tangible fixed assets

in EUR '000	2018
<b>Total</b>	<b>604,067</b>
<i>thereof impairments</i>	7,297

## Subsequent valuation of the purchase price allocation for the acquisitions\*

in EUR '000	2018
Depreciation and amortization within cost of sales	74,841
Amortization within selling expenses	25,240
Release of subsidies within other operating income	13,432

\* Concerns MAHLE Behr, former Delphi Thermal entities, MAHLE Electric Drives, MAHLE Electronics and former Brain Bee entities

## Contribution of proportionately consolidated companies

The income statement includes income of EUR 1,035,662k and expenses of EUR 987,359k of proportionately consolidated companies.

## OTHER NOTES

### Average annual number of employees\*

	2018
Direct employees	43,181
Indirect employees	35,455
<b>Total</b>	<b>78,636</b>

\* Excluding apprentices

The total average annual number of employees includes a pro rata figure of 2,593 employees from proportionately consolidated companies.

## Derivatives

Derivatives in accordance with Secs. 285, 314 of the German Commercial Code (HGB) not yet settled as of the balance sheet date can be broken down as follows:

in EUR '000	Dec. 31, 2018	Dec. 31, 2018
	Nominal amounts*	Fair value**
Transactions relating to interest	5,486	-172
Transactions relating to currency	2,027,456	-7,369
Transactions relating to currency and interest	4,834	-202
Transactions relating to commodities	18,098	-2,002

\* The nominal amounts of the derivative financial instruments are based on absolute values, that means long & short positions are being added with their nominal values.

\*\* The fair value of currency and commodities related transactions corresponds to the market value of the derivatives as of the balance sheet date, which is identified in accordance with the net present value method. All interest related transactions are based on recognized financial/mathematical models.

The derivative contracts as of December 31, 2018 are placed in relation to third parties exclusively with banks. Evaluation units were established for hedging transactions with an effective relationship to the underlying transaction. Accruals of EUR 393k were set up for all other hedging transactions that have resulted in anticipated losses.

## Evaluation units

The following evaluation units were created from derivatives and are shown with their netted values:

in EUR '000	Type of evaluation unit	Dec. 31, 2018	Balance sheet item
		Amount of hedged transaction	
<b>Currency exposure</b>			
Recorded values	Portfolio hedge	102,699	Trade receivables
	Portfolio hedge	12,423	Bank balances
	Portfolio hedge	-6,913	Liabilities to banks
	Portfolio hedge	-48,004	Trade payables
Remaining currency exposure from eliminated transactions with affiliated companies	Portfolio hedge	622,743	
Future transactions	Portfolio hedge	-28,482	
<b>Currency and interest exposure (cross currency swap)</b>			
Recorded values	Micro hedge	0	Liabilities to banks
Remaining currency exposure from eliminated transactions with affiliated companies	Micro hedge	4,834	
<b>Interest exposure</b>			
Recorded values	Micro hedge	-2,424	Liabilities to banks
Remaining currency exposure from eliminated transactions with affiliated companies	Micro hedge	0	
<b>Commodity exposure</b>			
Future transactions	Portfolio hedge	18,098	

	<b>Dec. 31, 2018</b>
	Volume of hedges
<b>Currency exposure in transaction currency</b>	in '000
CAD	23,858
CNY	88,701
CZK	-88,502
EUR	-39,482
GBP	14,859
HUF	-2,210,000
JPY	10,176,706
MXN	-487,586
PLN	-34,000
RON	38,293
RUB	-929,997
THB	-407,007
TRY	15,704
USD	-786,211
<b>Currency and interest exposure in transaction currency</b>	in '000
CNY	-39,680
<i>Interest: fixed CNY/variable 3-month-Euribor</i>	
<b>Interest exposure in transaction currency</b>	in '000
IDR	40,000,000
<i>Interest: fixed IDR/variable 3-month-IDR Jibor</i>	
<b>Commodity exposure in reporting currency EUR</b>	in '000
Aluminum	-10,240
Copper	-4,374
Nickel	-3,075
Tin	-409

The changes in value in the underlying and hedging transactions are offset during the hedging horizon, since risk positions (underlying transactions recognized on the balance sheet) are immediately hedged by means of forward exchange transactions of the same amount, in the same currency, and with the same maturity period in accordance with the guidelines of the group risk management.

The risk of potential future changes in cash flows arising from highly probable underlying transactions, basically future deliveries of goods and services, is offset by using hedging transactions. The hedge ratio of such future transactions is reduced over time; the further such transactions are in the future. The hedging horizon for currency and commodities related hedging transactions which are included in hedge accounting relationships is generally two years and, in exceptional cases, can be extended up to three years for commodities hedging transactions. Past experience has shown that this strategy has led to an effective hedging of cash flows in forecast evaluation units.

The hedging quota of a planned exposure increases over its lifetime. When the planned exposure finally turns into a booked exposure it will have been hedged fully via consecutive individual hedging steps. At this stage the exposure is hedged via a portfolio of individual hedges which have been added gradually over time. At any given point in time a number of individual booked exposures can mature, each with their own portfolio of hedges covering the exposure. The entirety of several booked exposures with their respective hedges creates a portfolio hedge.

Currency and interest rate hedging transactions (cross currency swaps) are entered into with the same maturity profile as the respective underlying contracts and form a micro hedge with the corresponding financial liability.

The "critical term match method" is used to measure the effectiveness of the hedging relationship.

### Report on post-balance sheet date events

As of January 1, 2019 MAHLE Beteiligungen GmbH increased its share in MAHLE Behr GmbH & Co. KG and MAHLE Behr Verwaltung GmbH to 60.71 percent by the acquisition of shares from other shareholders.

MAHLE Behr Service GmbH plans to acquire all the shares in Behr Hella Service GmbH, its current joint venture with Hella, as of January 1, 2020. The planned transaction is still subject to the approval by the antitrust authorities.

Through the acquisition of the transmission specialist ZG-Zahnräder und Getriebe GmbH based in Eching near Munich in January 2019, MAHLE GmbH is expanding its expertise in the powertrain as a whole.



## Appropriation of earnings

### Unappropriated retained earnings

in EUR '000	2018
Net income MAHLE GmbH	68,874
Transfer to revenue reserves	-55,400
Amount carried forward from prior year	94
<b>Unappropriated retained earnings MAHLE GmbH</b>	<b>13,568</b>

### Proposed utilization of retained earnings

in EUR '000	2018
Unappropriated retained earnings	13,568
Dividend distribution to MAHLE-Stiftung GmbH	-13,400
<b>Carry forward to new account</b>	<b>168</b>

### Remuneration of the members of the Management Board of MAHLE GmbH (parent company)

in EUR '000	2018
Supervisory Board	851
Management Board	17,003

The total remuneration of the Management Board comprises fixed and variable components. The fixed portions for 2018 amounted to EUR 4,607k and the variable compensation for 2018 to EUR 11,225k. The remuneration shown also includes an adjustment for the previous year. The fixed portions include benefits in kind, which consist primarily of the noncash benefits of having company cars.

Remunerations paid to former members of the Management Board and their descendants totaled EUR 1,876k.

An amount of EUR 25,089k is set aside for this group of persons in the pension accrual as of December 31, 2018.

### Auditor's fee

The total auditor's fee for 2018 charged by the group auditor PricewaterhouseCoopers GmbH, pursuant to Sec. 314, Para. 1, No. 9 of the German Commercial Code (HGB) consists of the following:

in EUR '000	2018
Services for audit of financial statements	999
Other assurance services	36
Tax advisory services	870
Other services	72
<b>Total</b>	<b>1,977</b>

Stuttgart/Germany, March 19, 2019

The Management Board of MAHLE GmbH

  
Jörg Stratmann

  
Georg Dietz

  
Bernd Eckl

  
Wilhelm Emperhoff

  
Arnd Franz

  
Michael Frick

  
Michael Glowatzki

# Consolidated statement of fixed assets

## CONSOLIDATED STATEMENT OF FIXED ASSETS FROM JANUARY 1 TO DECEMBER 31, 2018

in EUR '000	Acquisition/manufacturing costs							Dec. 31, 2018
	Jan. 1, 2018	Jan. 1, 2018	BUSINESS YEAR 2018					
	Accumulated acquisition/manufacturing costs	Currency translation	Changes at the Group	Additions	Disposals	Reclassifications	Currency translation of current year <sup>3</sup>	
<b>I. Intangible assets</b>								
1. Purchased concessions, industrial and similar rights and assets, as well as licences in such rights and assets	791,988	-1,638	-14,056	85,967	7,412	-1,179	340	854,010
2. Goodwill	570,908	0	15,970	53,660	157,751	0	0	482,787
3. Prepayments	745	-4	0	453	108	-475	0	611
	<b>1,363,641</b>	<b>-1,642</b>	<b>1,914</b>	<b>140,080</b>	<b>165,271</b>	<b>-1,654</b>	<b>340</b>	<b>1,337,408</b>
<b>II. Property, plant, and equipment</b>								
1. Land, leasehold rights, and buildings including buildings on third-party land	1,607,092	11,959	981	26,658	22,095	34,695	1,908	1,661,198
2. Technical equipment and machinery	5,313,399	-918	-8,802	184,421	127,102	234,837	23,159	5,618,994
3. Other equipment, fixtures, and furniture	439,767	377	-14,876	45,918	14,205	10,192	1,116	468,289
4. Prepayments and assets under construction	410,977	1,100	-3,953	351,929	3,972	-278,070	333	478,344
	<b>7,771,235</b>	<b>12,518</b>	<b>-26,650</b>	<b>608,926</b>	<b>167,374</b>	<b>1,654</b>	<b>26,516</b>	<b>8,226,825</b>
<b>III. Financial assets</b>								
1. Shares in affiliated companies	28,340	-1,395	42	222	11,636	0	-7	15,566
2. Shares in associated companies	164,060	28	-8,943	2,262	114,518 <sup>1</sup>	0	-1,129	41,760
3. Equity investments	8,233	230	1	1,819	102	0	34	10,215
4. Loans to companies in which participations are held	32	0	-48	19	0	-3	0	0
5. Long-term securities	6,430	-7	0	4	0	0	0	6,427
6. Other loans	16,744	4	-1,204	53,189	751	3	8	67,993
	<b>223,839</b>	<b>-1,140</b>	<b>-10,152</b>	<b>57,515</b>	<b>127,007</b>	<b>0</b>	<b>-1,094</b>	<b>141,961</b>
	<b>9,358,715</b>	<b>9,736</b>	<b>-34,888</b>	<b>806,521</b>	<b>459,652</b>	<b>0</b>	<b>25,762</b>	<b>9,706,194</b>

<sup>1</sup> Includes results from continuation of equity approach as well as disposal due to dividend payments

<sup>2</sup> Thereof shares in affiliated companies measured according to the equity method: EUR 597k

<sup>3</sup> Including effects from hyperinflation adjustments for the country Argentina in accordance with IAS 29

Depreciation/amortization

Net book values

BUSINESS YEAR 2018										
Jan. 1, 2018	Jan. 1, 2018							Dec. 31, 2018	Dec. 31, 2018	Dec. 31, 2017
Accumulated depreciation/amortization	Currency translation	Changes at the Group	Depreciation/amortization of the business year	Write-ups of the business year	Disposals	Reclassifications	Currency translation of current year <sup>3</sup>	Accumulated depreciation/amortization	Net book values	Net book values
545,533	-969	-14,894	107,738	0	7,276	-46	373	630,459	223,551	246,455
274,266	0	0	48,585	0	157,752	0	0	165,099	317,688	296,642
0	0	0	0	0	0	0	0	0	611	745
<b>819,799</b>	<b>-969</b>	<b>-14,894</b>	<b>156,323</b>	<b>0</b>	<b>165,028</b>	<b>-46</b>	<b>373</b>	<b>795,558</b>	<b>541,850</b>	<b>543,842</b>
667,776	6,331	652	50,445	38	15,069	-960	806	709,943	951,255	939,316
3,780,587	2,105	145	351,452	0	114,243	3,367	19,768	4,043,181	1,575,813	1,532,812
308,152	717	-8,383	41,662	0	12,864	-1,760	1,070	328,594	139,695	131,615
5,814	-72	-5	4,185	0	816	-601	12	8,517	469,827	405,163
<b>4,762,329</b>	<b>9,081</b>	<b>-7,591</b>	<b>447,744</b>	<b>38</b>	<b>142,992</b>	<b>46</b>	<b>21,656</b>	<b>5,090,235</b>	<b>3,136,590</b>	<b>3,008,906</b>
23,392	-1,465	0	223	138	8,943	0	-7	13,062	2,504	4,948
52,564	0	0	0	0	49,918	0	0	2,646	39,114 <sup>2</sup>	111,496
168	8	0	0	103	0	0	-3	70	10,145	8,065
0	0	0	0	0	0	0	0	0	0	32
-1,050	-1	0	2,570	0	0	0	0	1,519	4,908	7,480
-384	-125	0	24,651	122	1	0	0	24,019	43,974	17,128
<b>74,690</b>	<b>-1,583</b>	<b>0</b>	<b>27,444</b>	<b>363</b>	<b>58,862</b>	<b>0</b>	<b>-10</b>	<b>41,316</b>	<b>100,645</b>	<b>149,149</b>
<b>5,656,818</b>	<b>6,529</b>	<b>-22,485</b>	<b>631,511</b>	<b>401</b>	<b>366,882</b>	<b>0</b>	<b>22,019</b>	<b>5,927,109</b>	<b>3,779,085</b>	<b>3,701,897</b>

# Shareholdings

Shareholdings in companies included in consolidation, associated companies, proportionately consolidated companies, and other companies which serve the permanent business operations.

## AS AT DECEMBER 31, 2018

NAME AND LOCATION	Share in equity in %	Equity in EUR '000	Result of the last business year in EUR '000
<b>PARENT COMPANY</b>			
MAHLE GmbH, Stuttgart/Germany			
<b>1. Fully consolidated subsidiaries</b>			
<b>a) Fully consolidated subsidiaries of MAHLE GmbH with direct shareholding quota</b>			
Conso, LLC, Wilmington, Delaware/USA	100.00		
MAHLE Aftermarket Deutschland GmbH, Gunningen/Germany	100.00		
MAHLE Aftermarket France SAS, Décines/France	100.00		
MAHLE Aftermarket GmbH, Stuttgart/Germany	100.00		
MAHLE Aftermarket Iberica S.A.U., Terrassa/Spain	100.00		
MAHLE Aftermarket Inc., Farmington Hills, Michigan/USA	100.00		
MAHLE Aftermarket Italy S.p.A., Parma/Italy	80.00		
MAHLE Aftermarket Ltd., Bilston/Great Britain	100.00		
MAHLE Aftermarket Pte. Ltd., Singapore/Singapore	100.00		
MAHLE Aftermarket S. de R.L. de C.V., Lerma/Mexico	100.00		
MAHLE Aftermarket S.L.U., Alcalá de Henares/Spain	100.00		
MAHLE Aftermarket SAS, Poissy/France	100.00		
MAHLE Amovis GmbH, Berlin/Germany	100.00		
MAHLE ANAND Filter Systems Private Limited, Gurgaon/India	50.00 <sup>1</sup>		
MAHLE Anéis Participações Ltda., Mogi Guaçu/Brazil	100.00		
MAHLE Automotive Technologies (China) Co., Ltd., Shanghai/China	100.00		
MAHLE Automotive Technologies (Suzhou) Co., Ltd., Changshu/China	100.00		
MAHLE Behr GmbH & Co. KG, Stuttgart/Germany	57.46		
MAHLE Behr Verwaltung GmbH, Stuttgart/Germany	55.71		
MAHLE Beteiligungen GmbH, Stuttgart/Germany	100.00		
MAHLE Brandenburg GmbH, Wustermark/Germany	100.00		
MAHLE Componente de Motor SRL, Timisoara/Romania	100.00		
MAHLE Componentes de Motor de México, S. de R.L. de C.V., Ramos Arizpe/Mexico	100.00		
MAHLE Componentes de Motores S.A., Murte de Portugal	100.00		
MAHLE Componenti Motori Italia S.p.A., La Loggia/Italy	100.00		
MAHLE Composants Moteur France SAS, Chavanod/France	100.00		
MAHLE Compresores, S. de R.L. de C.V., Juarez/Mexico	100.00		
MAHLE Compressores do Brasil Ltda., Jaguariúna/Brazil	100.00		
MAHLE Compressors (Suzhou) Co., Ltd., Changshu/China	100.00		
MAHLE Compressors Hungary Kft., Balassagyarmat/Hungary	100.00		
MAHLE de México S. de R.L. de C.V., Ramos Arizpe/Mexico	100.00		
MAHLE Donghyun Filter Systems Co., Ltd., Hwaseong/South Korea	100.00		
MAHLE Donghyun Filter Systems (Tianjin) Co., Ltd., Tianjin/China	100.00		
MAHLE Ebikemotion S.L.U., Palencia/Spain	100.00		
MAHLE Electric Drives (Taicang) Co., Ltd., Taicang City/China	99.64		
MAHLE Electric Drives Bel OOO, Grodno/Belarus	100.00		
MAHLE Electric Drives Bosnia d.o.o., Laktaši/Bosnia and Herzegovina	100.00		
MAHLE Electric Drives Bovec d.o.o., Bovec/Slovenia	100.00		
MAHLE Electric Drives Italy S.r.l., Reggio Emilia/Italy	100.00		
MAHLE Electric Drives Japan Corporation, Numazu-shi, Shizuoka/Japan	100.00		

## AS AT DECEMBER 31, 2018

NAME AND LOCATION	Share in equity in %	Equity in EUR '000	Result of the last business year in EUR '000
MAHLE Electric Drives Komen d.o.o., Komen/Slovenia	100.00		
MAHLE Electric Drives Slovenija d.o.o., Šempeter pri Gorici/Slovenia	100.00		
MAHLE Electronics S.L.U., Motilla del Palancar/Spain	100.00		
MAHLE Engine Components (Chongqing) Co., Ltd., Chongqing/China	100.00		
MAHLE Engine Components (Nanjing) Co., Ltd., Nanjing/China	100.00		
MAHLE Engine Components (Thailand) Co., Ltd., Bangkok/Thailand	99.75		
MAHLE Engine Components (Yingkou) Co., Ltd., Yingkou/China	100.00		
MAHLE Engine Components India Private Limited, Pithampur/India	100.00		
MAHLE Engine Components Japan Corporation, Okegawa-shi/Japan	100.00		
MAHLE Engine Components Slovakia s.r.o., Dolný Kubín/Slovakia	100.00		
MAHLE Engine Components USA, Inc., Morristown, Tennessee/USA	100.00		
MAHLE Engine Systems UK Ltd., Kilmarnock/Great Britain	100.00		
MAHLE Engineering Services India Private Limited, Pune/India	40.00 <sup>5</sup>		
MAHLE Filter Systems Canada, ULC, Tilbury/Canada	100.00		
MAHLE Filter Systems Japan Corporation, Tokyo/Japan	100.00		
MAHLE Filter Systems Land Corporation, Cavite/Philippines	66.67		
MAHLE Filter Systems North America, Inc., Troy, Michigan/USA	100.00		
MAHLE Filter Systems Philippines Corporation, Cavite/Philippines	100.00		
MAHLE Filter Systems UK Ltd., Telford/Great Britain	100.00		
MAHLE Filtersysteme Austria GmbH, St. Michael ob Bleiburg/Austria	100.00		
MAHLE Filtersysteme France SAS, Seboncourt/France	100.00		
MAHLE Filtersysteme GmbH, Stuttgart/Germany	100.00		
MAHLE Filtration Systems (Hubei) Co., Ltd., Wuhan/China	100.00		
MAHLE Filtre Sistemleri A.S., Gebze/Turkey	100.00		
MAHLE France SAS, Rouffach/France	100.00		
MAHLE Guangzhou Filter Systems Co., Ltd., Guangzhou/China	100.00		
MAHLE Holding (India) Private Limited, Gurgaon/India	100.00		
MAHLE Holding Austria GmbH, St. Michael ob Bleiburg/Austria	100.00		
MAHLE Holding España S.L.U., Montblanc/Spain	100.00		
MAHLE Immobilien GmbH, Stuttgart/Germany	100.00		
MAHLE Immobilien Schweiz AG, Grenchen/Switzerland	100.00		
MAHLE Indústria e Comércio Ltda., Mogi Guaçu/Brazil	100.00		
MAHLE Industrial Thermal Systems GmbH & Co. KG, Stuttgart/Germany	60.00 <sup>5</sup>		
MAHLE Industriebeteiligungen GmbH, Stuttgart/Germany	100.00		
MAHLE Industriemotoren-Komponenten GmbH, Stuttgart/Germany	100.00		
MAHLE Industries UK Ltd., Rugby/Great Britain	100.00		
MAHLE Industries, Incorporated, Farmington Hills, Michigan/USA	100.00		
MAHLE International GmbH, Stuttgart/Germany	100.00		
MAHLE Japan Ltd., Tokyo/Japan	100.00		
MAHLE Kleinmotoren-Komponenten GmbH & Co. KG, Stuttgart/Germany	100.00		
MAHLE Konya Motor Parçaları San. ve Tic. A.Ş. Izmir/Turkey	100.00		
MAHLE Luxembourg Sàrl, Foetz/Luxembourg	100.00		
MAHLE Manufacturing Management, Inc., Farmington Hills, Michigan/USA	100.00		
MAHLE Manufacturing Service Japan Corporation, Tokyo/Japan	100.00		
MAHLE Maquiladora LLC, Farmington Hills, Michigan/USA	100.00		

**AS AT DECEMBER 31, 2018**

<b>NAME AND LOCATION</b>	<b>Share in equity in %</b>	<b>Equity in EUR '000</b>	<b>Result of the last business year in EUR '000</b>
MAHLE Metal Leve S.A., Mogi Guaçu/Brazil	70.00		
MAHLE Motor Parçaları San. ve Tic. A.Ş., Izmir/Turkey	100.00		
MAHLE Polska Spółka z o.o., Krotoszyn/Poland	100.00		
MAHLE Powertrain, LLC, Plymouth, Michigan/USA	100.00		
MAHLE Powertrain GmbH, Stuttgart/Germany	100.00		
MAHLE Powertrain Ltd., Northampton/Great Britain	100.00		
MAHLE RUS, OOO, Dobrino/Russia	100.00		
MAHLE S.A.U., Vilanova i la Geltrú/Spain	100.00		
MAHLE Services (Thailand) Ltd., Samut Prakan/Thailand	100.00		
MAHLE Shanghai Filter Systems Co., Ltd., Shanghai/China	95.00		
MAHLE Shared Services Mexico, S. de R.L. de C.V., Monterrey/Mexico	100.00		
MAHLE Shared Services Poland Spółka z o.o., Wrocław/Poland	100.00		
MAHLE Siam Electric Drives Co. Ltd., Samut Prakan/Thailand	100.00		
MAHLE Siam Filter Systems Co., Ltd., Samut Prakan/Thailand	74.90		
MAHLE Sistemas de Filtración de México S.A. de C.V., Monterrey/Mexico	100.00		
MAHLE Technologies Holding (China) Co., Ltd., Shanghai/China	100.00		
MAHLE Trading (Shanghai) Co., Ltd., Shanghai/China	100.00		
MAHLE Trading Japan Co., Ltd., Tokyo/Japan	100.00		
MAHLE Tri-Ring Valve Train (Hubei) Co., Ltd., Macheng/China	65.00		
MAHLE Ventiltrieb GmbH, Stuttgart/Germany	100.00		
MAHLE Versicherungsvermittlung GmbH, Stuttgart/Germany	100.00		
MAHLE Vöcklabruck GmbH, Vöcklabruck/Austria	100.00		
MG Immobilienentwicklungs- und Ansiedlungsgesellschaft mbH, Wolfsberg/Austria	100.00		
OSCON, LLC, Wilmington, Delaware/USA	100.00		
PT. MAHLE Filter Systems Indonesia, Pasirranji/Indonesia	100.00		
PT. MAHLE Indonesia, Pasirranji/Indonesia	100.00		
S.C.I. Daudet, Décines/France	100.00		
<b>b) Fully consolidated subsidiaries of MAHLE Behr GmbH &amp; Co. KG with direct shareholding quota</b>			
IQENTO GmbH, Stuttgart/Germany	100.00		
MAHLE Behr Berga GmbH, Berga/Germany	100.00		
MAHLE Behr Charleston Inc., Charleston, South Carolina/USA	100.00		
MAHLE Behr Components Spain S.L.U., L'Espluga de Francolí/Spain	100.00		
MAHLE Behr Dayton L.L.C., Dayton, Ohio/USA	100.00		
MAHLE Behr France Hambach S.A.S., Hambach/France	100.00		
MAHLE Behr France Rouffach S.A.S., Rouffach/France	100.00		
MAHLE Behr Gerenciamento Térmico Brasil Ltda., Arujá/Brazil	100.00		
MAHLE Behr Grugliasco S.p.A., Grugliasco/Italy	100.00		
MAHLE Behr Holding Deutschland GmbH, Stuttgart/Germany	100.00		
MAHLE Behr Holding GmbH, Stuttgart/Germany	100.00		
MAHLE Behr Holýšov s.r.o., Holýšov/Czech Republic	100.00		
MAHLE Behr India Private Limited, Pune/India	60.00		

**AS AT DECEMBER 31, 2018**

<b>NAME AND LOCATION</b>	<b>Share in equity in %</b>	<b>Equity in EUR '000</b>	<b>Result of the last business year in EUR '000</b>
MAHLE Behr Italy s.r.l., Grugliasco/Italy	100.00		
MAHLE Behr Japan K.K., Tokyo/Japan	100.00		
MAHLE Behr Kirchberg GmbH, Kirchberg/Germany	100.00		
MAHLE Behr Korea Inc., Busan/South Korea	100.00		
MAHLE Behr Kornwestheim GmbH, Kornwestheim/Germany	100.00		
MAHLE Behr Luxembourg Sàrl, Foetz/Luxembourg	100.00		
MAHLE Behr Manufacturing Management, Inc., Troy, Michigan/USA	100.00		
MAHLE Behr Maquiladora, LLC, Wilmington, Delaware/USA	100.00		
MAHLE Behr Mexico, S. de R.L. de C.V., Ramos Arizpe/Mexico	100.00		
MAHLE Behr Mnichovo Hradiště s.r.o., Mnichovo Hradiště/Czech Republic	100.00		
MAHLE Behr Námestovo s.r.o., Námestovo/Slovakia	100.00		
MAHLE Behr Ostrava s.r.o., Mošnov/Czech Republic	100.00		
MAHLE Behr Ostrov s.r.o., Mnichovo Hradiště/Czech Republic	100.00		
MAHLE Behr Ostrów Wielkopolski Sp. z o.o., Ostrów Wielkopolski/Poland	100.00		
MAHLE Behr Rio Bravo, S. de R.L. de C.V., Ramos Arizpe/Mexico	100.00		
MAHLE BEHR RUS LLC, St. Petersburg/Russia	100.00		
MAHLE Behr Senica s.r.o., Senica/Slovakia	100.00		
MAHLE Behr Service America L.L.C., Troy, Michigan/USA	100.00		
MAHLE Behr Service Asia Co., Ltd., Shanghai/China	100.00		
MAHLE Behr Service GmbH, Stuttgart/Germany	100.00		
MAHLE Behr Service Mexico, S. de R.L. de C.V., Ramos Arizpe/Mexico	100.00		
MAHLE Behr South Africa (Pty) Ltd., Durban/South Africa	100.00		
MAHLE Behr Spain S.A.U., Montblanc/Spain	100.00		
MAHLE Behr Thermal Systems (Jinan) Co., Ltd., Jinan/China	100.00		
MAHLE Behr Thermal Systems (Qingdao) Co., Ltd., Qingdao/China	100.00		
MAHLE Behr Troy Inc., Troy, Michigan/USA	100.00		
MAHLE Behr USA Inc., Troy, Michigan/USA	100.00		
MAHLE Engineering Services India Private Limited, Pune/India	60.00 <sup>5</sup>		
MAHLE Industrial Thermal Systems GmbH & Co. KG, Stuttgart/Germany	40.00 <sup>5</sup>		
<b>c) Fully consolidated subsidiaries of MAHLE Metal Leve S.A. with direct shareholding quota</b>			
MAHLE Argentina S.A., Rafaela/Argentina	100.00		
MAHLE Filtroil Indústria e Comércio de Filtros Ltda., Mogi Guaçu/Brazil	60.00		
MAHLE Hirschvogel Forjas S.A., Queimados/Brazil	51.00		
MAHLE Metal Leve GmbH, St. Michael ob Bleiburg/Austria	100.00		
<b>d) Fully consolidated subsidiaries of MAHLE Industrial Thermal Systems GmbH &amp; Co. KG with direct shareholding quota</b>			
MAHLE Industrial Thermal Systems (Tianjin) Co., Ltd., Tianjin/China	100.00		
MAHLE Industrial Thermal Systems America, L.P., Belmont, Michigan/USA	99.00		

**AS AT DECEMBER 31, 2018**

<b>NAME AND LOCATION</b>	<b>Share in equity in %</b>	<b>Equity in EUR '000</b>	<b>Result of the last business year in EUR '000</b>
<b>2. Affiliated companies, not consolidated on account of their immateriality for the presentation of the net assets, financial position and results of operations</b>			
<b>a) Affiliated companies of MAHLE Behr GmbH &amp; Co. KG with direct shareholding quota</b>			
MAHLE Behr Sweden AB, Gothenburg/Sweden	100.00 <sup>3,6</sup>	74	17
<b>b) Other affiliated companies with direct shareholding quota</b>			
Compañía Rosarina S.A., Rosario/Argentina	99.99 <sup>3,6</sup>	276	-139
Eito Denki Co. Ltd., Gojōme-machi, Akita/Japan	66.75 <sup>3</sup>	203	62
MAHLE Engine Components Australia Pty Ltd., Melbourne/Australia	100.00 <sup>4</sup>	597	16
MAHLE Industrial Thermal Systems America, Inc., Belmont, Michigan/USA	100.00 <sup>3</sup>	61	0
MAHLE Industrial Thermal Systems Verwaltung GmbH, Stuttgart/Germany	100.00	454	9
MAHLE Kleinmotoren-Komponenten Verwaltungs GmbH, Stuttgart/Germany	100.00	27	0
MAHLE Thermoelektronik GmbH, Duisburg/Germany	100.00	116	2
Retromotion GmbH, Stuttgart/Germany	100.00	-430	-465
Ueno Industry Co. Ltd., Tokyo/Japan	100.00 <sup>3</sup>	545	29
<b>3. Proportionately consolidated companies</b>			
<b>a) Subgroup Behr-Hella Thermocontrol that is managed by MAHLE Behr GmbH &amp; Co. KG and another company</b>			
<b>PARENT COMPANY</b>			
Behr-Hella Thermocontrol GmbH, Stuttgart/Germany	50.00		
<b>Companies included in subgroup accounts of Behr-Hella Thermocontrol GmbH with direct shareholding quota</b>			
Behr-Hella Thermocontrol (Shanghai) Co., Ltd., Shanghai/China	100.00		
Behr-Hella Thermocontrol EOOD, Bozhurishte/Bulgaria	100.00		
Behr-Hella Thermocontrol Inc., Wixom, Michigan/USA	100.00		
Behr-Hella Thermocontrol India Private Limited, Pune/India	100.00		
Behr-Hella Thermocontrol Japan K.K., Atsugi/Japan	100.00		
BHTC Finland Oy, Tampere/Finland	100.00		
BHTC Mexico S.A. de C.V., San Miguel de Allende/Mexico	100.00		
<b>b) Subgroup Behr Hella Service that is managed by MAHLE Behr GmbH &amp; Co. KG and another company</b>			
<b>PARENT COMPANY</b>			
Behr Hella Service GmbH, Schwäbisch Hall/Germany	50.00		
<b>Companies included in subgroup accounts of Behr Hella Service GmbH with direct shareholding quota</b>			
Behr Hella Comércio de Peças Automotivas S.A., Arujá/Brazil	100.00		
Behr Hella Service North America L.L.C., Peachtree City, Georgia/USA	100.00		
Behr Hella Service South Africa (Pty) Ltd., Johannesburg/South Africa	100.00		
Behr Service IAM USA Inc., Troy, Michigan/USA	100.00		



**AS AT DECEMBER 31, 2018**

<b>NAME AND LOCATION</b>	<b>Share in equity in %</b>	<b>Equity in EUR '000</b>	<b>Result of the last business year in EUR '000</b>
<b>c) Proportionately consolidated group of companies that is managed by MAHLE Behr GmbH &amp; Co. KG and another company</b>			
<b>PARENT COMPANY</b>			
Shanghai MAHLE Thermal Systems Co., Ltd., Shanghai/China	50.00		
<b>Subsidiaries with direct shareholding quota</b>			
Chengdu MAHLE Automotive Thermal Systems Co., Ltd., Chengdu/China	100.00		
Shenyang MAHLE Automotive Thermal Systems Co., Ltd., Shenyang/China	100.00		
<b>d) Other proportionately consolidated companies with direct shareholding quota that are managed by MAHLE Behr GmbH &amp; Co. KG and another company</b>			
Dongfeng MAHLE Thermal Systems Co., Ltd., Wuhan/China	50.00		
<b>4. Associated companies, consolidated using the equity method</b>			
<b>a) Associated companies of MAHLE Behr GmbH &amp; Co. KG with direct shareholding quota</b>			
Dongfeng-Paninco Automobile Aluminum Heat Exchanger Co. Ltd., Shiyang/China	50.00		
<b>b) Associated companies of MAHLE Metal Leve S.A. with direct shareholding quota</b>			
Innoferm Tecnologia Ltda., Mogi Guaçu/Brazil	33.33 <sup>2,3</sup>	2,707	-79
<b>c) Other associated companies with direct shareholding quota</b>			
Cofap Companhia Fabricadora de Peças Ltda., Mogi Guaçu/Brazil	31.65		
India Nippon Electricals Ltd., Chennai/India	20.52 <sup>2,3</sup>	47,365	6,931
LangFang Kokusan Electric Co., Ltd., Langfang/China	40.00		
Letrika Sol d.o.o., Šempeter pri Gorici/Slovenia	41.57 <sup>2,3</sup>	566	-94
MAHLE König GmbH, Rankweil/Austria	50.00		
MAHLE König Kommanditgesellschaft GmbH & Co. KG, Rankweil/Austria	50.00		
MAHLE Letrika Roots India Private Limited, Coimbatore/India	50.00 <sup>2,3</sup>	415	-148
Pt Federal Izumi Manufacturing, Bogor/Indonesia	36.94		
SiEVA d.o.o., Šempeter pri Gorici/Slovenia	20.00 <sup>2,3</sup>	7,248	54

<sup>1</sup> Shareholding 50% + 1 share

<sup>2</sup> The company was not measured using the equity method on account of its immateriality for the presentation of the net assets, financial position and results of operations

<sup>3</sup> Local financial statements

<sup>4</sup> Affiliated company, consolidated using the equity method

<sup>5</sup> From the Group's perspective, company is included by 100%

<sup>6</sup> Previous year figures according to last available financial statements

# Auditor's report

This audit report is issued on financial statements prepared in German language.

## INDEPENDENT AUDITOR'S REPORT

To MAHLE GmbH, Stuttgart

### Audit Opinions

We have audited the consolidated financial statements of MAHLE GmbH, Stuttgart, and its subsidiaries (the Group), which comprise the consolidated balance sheet as at 31 December 2018, and the consolidated income statement, consolidated cash flow statement, and consolidated statement of changes in equity for the financial year from 1 January to 31 December 2018, and notes to the consolidated financial statements, including the presentation of the recognition and measurement policies. In addition, we have audited the group management report of MAHLE GmbH for the financial year from 1 January to 31 December 2018.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the requirements of German commercial law and give a true and fair view of the assets, liabilities and financial position of the Group as at 31 December 2018 and of its financial performance for the financial year from 1 January to 31 December 2018 in compliance with German Legally Required Accounting Principles, and
- the accompanying group management report as a whole provides an appropriate view of the Group's position. In all material respects, this group management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development.

Pursuant to § [Article] 322 Abs. [paragraph] 3 Satz [sentence] 1 HGB [Handelsgesetzbuch: German Commercial Code], we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the group management report.

### Basis for the Audit Opinions

We conducted our audit of the consolidated financial statements and of the group management report in accordance with § 317 HGB in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Group Management Report" section of our auditor's report. We are independent of the group entities in accordance with the requirements of German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions on the consolidated financial statements and on the group management report.

### Other Information

The executive directors are responsible for the other information.

The other information comprises the annual report – excluding cross-references to external information – with the exception of the audited consolidated financial statements, the audited group management report and our auditor's report.

Our audit opinions on the consolidated financial statements and on the group management report do not cover the other information, and consequently we do not express an audit opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in so doing, to consider whether the other information

- is materially inconsistent with the consolidated financial statements, with the group management report or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

## Responsibilities of the Executive Directors and the Supervisory Board for the Consolidated Financial Statements and the Group Management Report

The executive directors are responsible for the preparation of the consolidated financial statements that comply, in all material respects, with the requirements of German commercial law, and that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with German Legally Required Accounting Principles. In addition the executive directors are responsible for such internal control as they, in accordance with German Legally Required Accounting Principles, have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the executive directors are responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting, provided no actual or legal circumstances conflict therewith.

Furthermore, the executive directors are responsible for the preparation of the group management report that, as a whole, provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements, and appropriately presents the opportunities and risks of future development. In addition, the executive directors are responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a group management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the group management report.

The supervisory board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the group management report.

## Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Group Management Report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the group management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our audit opinions on the

consolidated financial statements and on the group management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with § 317 HGB and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this group management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the group management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our audit opinions. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the group management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an audit opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- Conclude on the appropriateness of the executive directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the group management report or, if such disclosures are inadequate, to modify our respective audit opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner

that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with German Legally Required Accounting Principles.

- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express audit opinions on the consolidated financial statements and on the group management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinions.
- Evaluate the consistency of the group management report with the consolidated financial statements, its conformity with German law, and the view of the Group's position it provides.
- Perform audit procedures on the prospective information presented by the executive directors in the group management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by the executive directors as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate audit opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Stuttgart, March 19, 2019

**PricewaterhouseCoopers GmbH**

Wirtschaftsprüfungsgesellschaft

**sgd. Jürgen Berghaus**

Wirtschaftsprüfer

(German Public Auditor)

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Wirtschaftsprüferin

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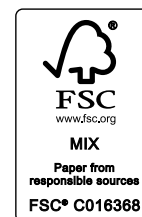
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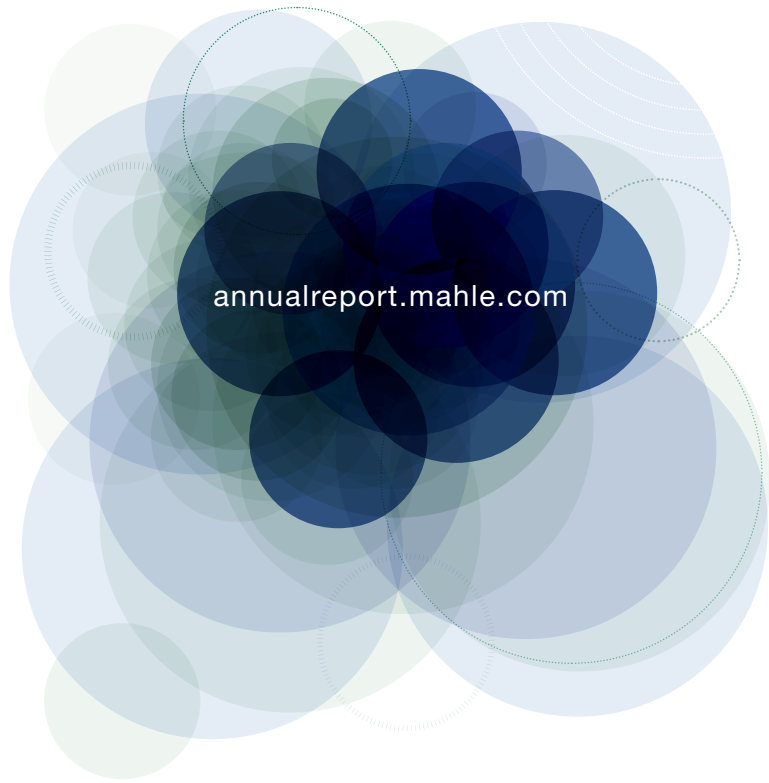
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