

MAHLE

Industrial Filtration

PARTNER
FOR CLEAN SOLUTIONS

INDUSTRIAL FILTRATION





EXPERTISE AND EXPERIENCE
FOR YOUR APPLICATION

An innovative solution partner in your industry

There is hardly any industry that could do without our innovative solutions in fluid filtration, dust removal, and process technology. From the automotive industry to chocolate-making, MAHLE Industrial Filtration has been developing and producing high-quality industrial filters for any application for decades. They are just as efficient and economical in the machine and system building, chemical, pharmaceutical, and food industries as in environmental, drive, and energy technology, as well as maritime and mobile machinery systems.

Your leading partner with all-around filter expertise

As one of the world's leading **fluid filtration** partners, we provide machine builders and users of mobile and stationary hydraulic systems with highly effective filters and filter systems, units, and accessories to keep hydraulic and lubricant fluids clean.

Whether in surface technology, chemical, food, and pharmaceutical industry, machinery construction, tooling machines or energy technology, our filters, units, and systems for **dust removal** from air and gases increase productivity, support product recycling, and contribute to increased environmental protection and workplace safety.

Our **automatic filters** have become indispensable in countless applications. They are used for gross through fine filtration of fluids, pastes, and similar materials, and for homogenization. The advantage to you is rational 24-hour, non-stop operation with automatic cleaning and disposal processes. The cosmetics, plastics, and paint industries rely on them, as do food producers and the petroleum industry.

For the mechanical processes of **filtration and separation**, we provide complete, tailored solutions, from oil separation, fuel and oil care, to process water, wastewater, and cooling water treatment.

MAHLE filter systems are also specified as mandatory in the plant requirements of many industrial fields, including automotive manufacturers.

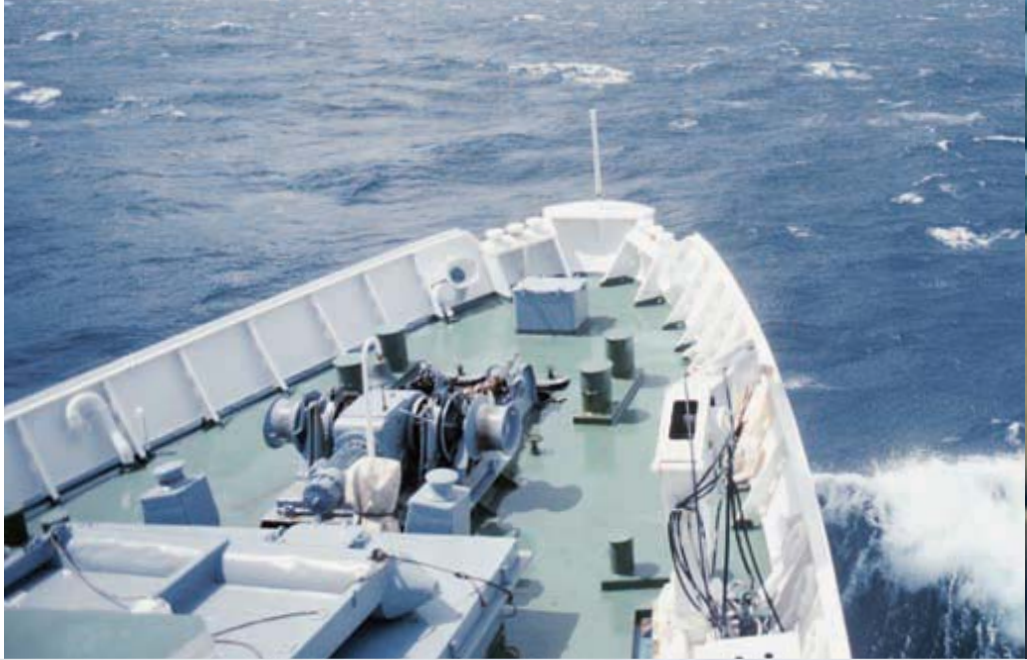
Our **services** range from analysis to engineering, commissioning, diagnostics, and repair. Our service team is on the spot for you. We also provide extensive analysis, expertise, conditioning, and monitoring in conjunction with leading institutions.

Whatever the application – we are there for you

Based on our experience across many industries, we combine all our expertise in a worldwide network, use synergies, and, as your partner, use the power of innovation to develop the optimal solution for your application, from filter elements to modules. With certified quality, of course. Designed and tested to DIN and ISO standards, with associated industrial approvals. In short, an engineering partnership for complete system solutions, with the extra service. For more functionality, more safety, more reliability and efficiency.

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WORLDWIDE LEADER

DRIVEN BY PERFORMANCE



MAHLE Industrial Filtration is an independent service area with its own engineering, production, and sales teams, integrated in the MAHLE Group, and thus is backed by the strength of a worldwide market leader.

The **MAHLE Group** is one of the top 3 systems suppliers in the world for piston systems, cylinder components, valve train systems, air manage-

ment systems, and fluid management systems. As one of the 30 largest corporate suppliers, and worldwide engineering partners of the automotive and engine industries, MAHLE has unique systems expertise in the areas of internal combustion engines and their periphery. From small engines, to large industrial and ship engines, to motorsports.



IN TECHNOLOGY



MAHLE is present in every important market in the world. Over 40,000 employees are engaged at seven research and development centers and 110 production locations. Around 2,300 development engineers and technicians around the world are at work on forward-looking concepts, products, and systems to further develop the internal combustion engine.

Above-average enthusiasm for performance, precision, perfection, and the power of innovation – that's what the MAHLE brand stands for. We have been pushing technical development forward, together with our customers, and setting new standards for over 80 years. Driven by performance. Worldwide.



CUSTOMER KNOWS NO BOUNDARIES

Our customers are at home all over the world. That's why we are on site for you worldwide. We are globally organized, and are expanding our strategically networked presence in important core and future markets in many industries. Through regional proximity, we can work together closely and efficiently with our customers on projects around the world.





ORIENTATION



Expertise for plant and machinery construction

- Return-line filters
- Low-pressure filters
- Medium-pressure filters
- High-pressure filters
- Duplex-filters
- Fine dirt discharge with automatic filters
- Filter devices for dry dust removal
- Air breathers
- Oil aerosol filters
- Filters for cleaning fluids
- Separators and filters
- Automatic filters
- Line filters
- Oil aerosol separator units
- Turbidity sensors
- Coalescer-filters

Purity law: efficient filter solutions for technical fluid applications

In plant and machinery construction, highly sensitive systems require effective filtration of fluid media, to remove solid or liquid impurities that cause abrasion, wear, and corrosion. The prescribed purity levels of the fluid media must be maintained under all conceivable circumstances. We provide a unique filter program for this purpose, in both a standard version and a DIN 24550 compliant version. Our filters separate water from oil circuits, and oil from water circuits. They reduce solid contamination to the prescribed contamination level, prevent intrusion of extraneous dirt, and maintain the properties of the pressure fluid over the long term. The clear advantage: longer service life, increased reliability, operational cost savings, and increased efficiency and profitability of your systems.

This is why we are in demand as a partner in important key industries, such as the auto industry, with superior technical capability. In the area of cooling lubricant processing, our fluid filters are used as safety filters. And for the separation of cooling lubricant emulsions from the air – in machine tools, for instance – our innovative oil aerosol separation unit (LGA 600) is the efficient solution.

Less dust – more effective

In the particularly challenging area of dust removal, MAHLE industrial filters exceed all requirements for air quality in work areas, and for allowable exhaust air emissions. They are therefore the first choice for plant and machinery builders, and for end users. Our filter elements are optimized, based on technical application experience, so that we can provide you with compact, reliable filter systems together with specially developed cleaning systems, with extremely economical service lives. For example,



MORE OPERATIONAL RELIABILITY FOR
YOUR PLANT AND

for dry processing in machine tools; as mixer accessory filters for ventilating silos, containers, and mixers; for automotive industry applications; and for pneumatic conveyance. Our systems have been tried and tested around the world in surface technology, powder coating systems, and blasting plants. They make short work of any type of dust load: flame spraying, grinding and polishing, or wet paint overspray exhaust in large painting lines.

Non-stop reliability: automatic filters for plants and machinery

Industrial production processes have to run without interruption. Even for maintenance and disposal actions. Our automatic filters allow rational, highly efficient non-stop operations – with automatic cleaning and disposal operations. For example, when filtering liquids in metal processing, or washing, degreasing, paint stripping, and rustproofing in industrial part cleaning, they meet the strictest environmental regulations.



Hydraulic filter



Duplex-filter



Oil aerosol separator unit



Automatic filter



Dust removal unit

MACHINERY



MORE EFFICIENCY ALL THROUGH THE PROCESS CHAIN

Expertise for plant and machinery operations

- Return-line filters
- Low-pressure filters
- Medium-pressure filters
- High-pressure filters
- Duplex-filters
- Air breathers
- Oil aerosol filters
- Aerosol separator units
- Filters for cleaning fluids
- Separators and filters
- Process filters
- Automatic filters
- Automatic return-line filters
- Line filters
- Turbidity sensors
- Coalescer-filters
- Bag filter replacement with adapters
- Central and distributed dust removal systems

Process quality starts with the right filter technology

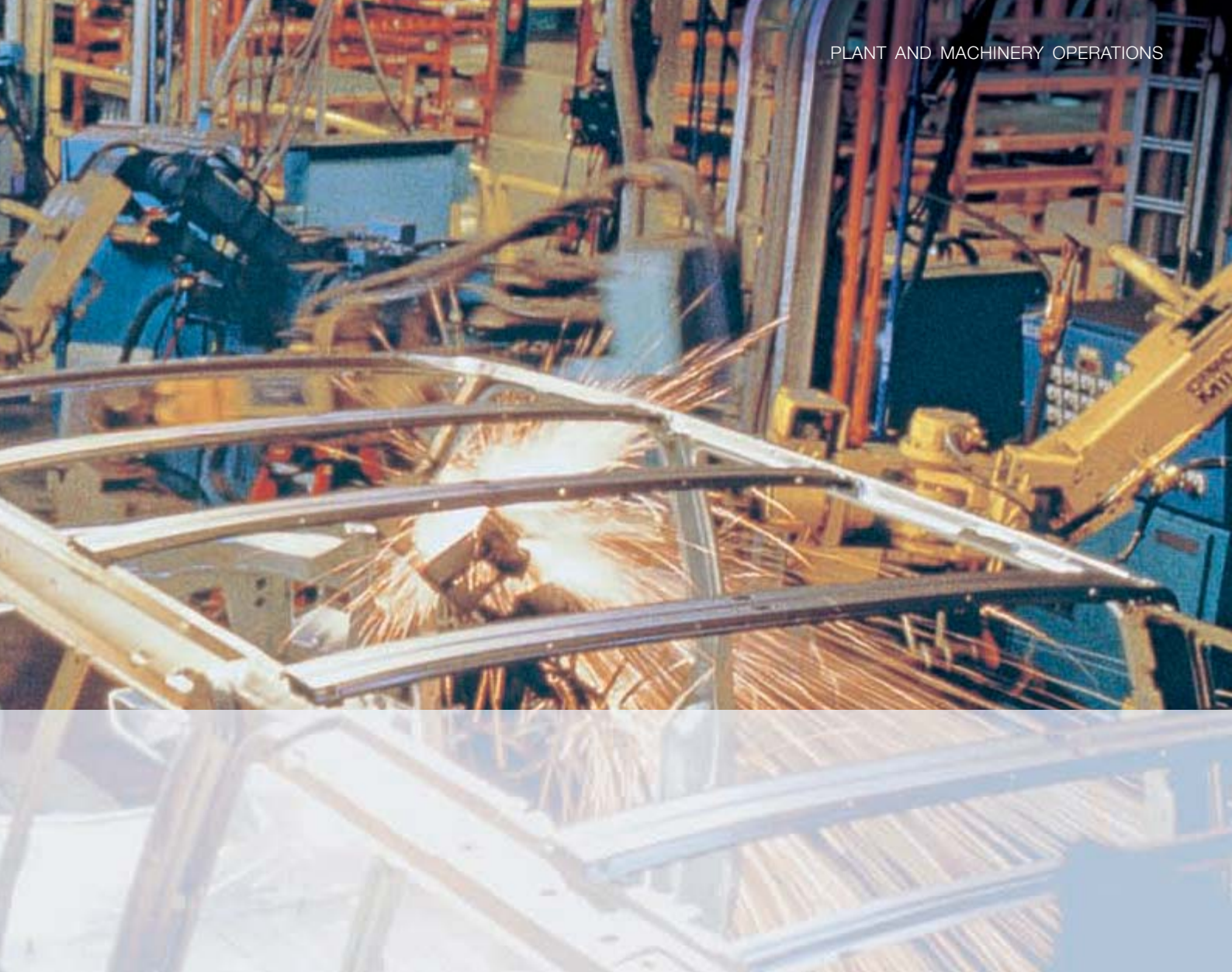
Wherever manufacturing and industrial processes need high reliability and operational efficiency, operators can rely on our filter systems. They play an efficient role in the optimized use of production materials, and help to conserve resources, reduce wear, and increase machine utilization. MAHLE filter systems have been tried and tested in many branches of industry: in machine building, the automotive industry, and aerospace, where the highest quality standards are set. They filter washing substances in a washing system just as reliably as printing inks, paraffins, and caustic soda.

Worldwide service and reliable spare parts delivery

Our replacement filter elements are available all over the world. The same high quality standards apply to them as to the original equipment. There are no compromises. Our partner vendors in every country ensure quick delivery of original filter elements, wherever they are needed. There are also identical filter elements to other manufacturers – at MAHLE quality levels, of course.

Fluid filters: original performance – available worldwide

Our fluid filter solutions ensure the functionality of modern hydraulic systems under all operating conditions, with long service life at all prescribed purity levels. We use our extensive systems expertise to optimally match filter systems to your application.



Perfect solutions for every type of dust load

Not all dust is created equal. Each process has a very specific dust load. Based on decades of experience, we provide a bonus in expertise in designing, selecting, and integrating the right filter system, which gives you more reliability.

Washed in all “waters”: automatic filters

Our automatic filters show long-term cleaning performance in filtering washing fluids for metal components, and cleaning process water, washing materials, solvents, inks, and countless other materials that need to be filtered in plant and machinery operations. For process filtration, such as filtration of cleaning fluids, paints, inks, etc., we provide a newly developed series of filters, cartridge filter elements, and bag filter replacement elements with high filtration performance.



Central dust removal unit



Line filter



Automatic filter elements



YOUR DRIVING FORCE FOR
HIGH AVAILABILITY





Duplex-filter



Oil separators



Maintenance indicators

Expertise for drive technology

- Automatic filters
- Suction filters
- Low-pressure filters
- Medium-pressure filters
- High-pressure filters
- Duplex-filters
- Bypass filters
- Return-line filters
- Air breathers
- Maintenance indicators
- Service units
- Mobile filter units
- Filter elements
- Oil separators
- Air filters
- Turbidity sensors
- Coalescer-filters
- Inlet air filters

Smoothly economical in the flow

Complex, challenging systems, such as stationary internal combustion engines, drives, and air compressors, require availability and reliability – often around the clock. Induction air for engines, as well as fuels and lubricants, must be effectively filtered. As your partner, MAHLE Industrial Filters provides convincing filter solutions all around the internal combustion engine.

For lubricating large drives, our user-friendly lubricant oil filters ensure the required oil purity over a long service life. In compressors, our systems clean the compressed air to remove lubricants, and reduce energy losses at the same time.

Pure materials, around the clock

They are relatively small, but have big performance: our automatic filters are in constant use for fuel and lubricant filtration in the large diesel and gas engines of well-known customers. They cover the variable load and safety requirements of drive technology with effective cleaning systems. Tailor-made for their applications, they help to increase reliability.

Clean inlet air

Clean inlet air is the foundation of low wear in operations. Our filter systems and cleaning systems, effectively tuned to their high quality filter elements, ensure high availability.

YOUR ENERGY GETS FLOWING ECONOMICALLY

Expertise for energy technology

- Suction filters
- Low-pressure filters
- Medium-pressure filters
- High-pressure filters
- Duplex-filters
- Bypass filters
- Return-line filters
- Air breathers
- Maintenance indicators
- Oil separators
- Air filters
- Turbidity sensors
- Coalescer-filters
- Filter elements
- Cleaning systems
- Cleanable inlet air filters
- Automatic filters

Uninterrupted availability

No one, especially in the energy industry, can afford to have a hydraulic system shut down. Fluid filtration systems are put to use only if they guarantee absolute reliability in long-term operation. Whether in power plants, gas turbines, wind energy systems, or emergency power generators, operators and manufacturers trust our industrial filters. As the leader in technology, we provide a range of fluid filters for controlling and regulating hydraulic systems, and for lubricating turbines and drives, that have been tried and tested a million times over around the world.

For continuous, powerful performance

In the energy industry, uninterrupted performance is the goal, using gas turbines or large diesel engines, for example. To accomplish this, inlet air must always be optimally conditioned. Especially for inlet air filtration in areas with high dust levels, our cleanable cartridge filters provide high performance density with their compact and robust construction. The use of high quality, optimized filter materials for dust removal leads to long service life, low pressure loss, and very good separation performance. Thus your energy plants never run out of steam.

High performance as a matter of fact

Our reliable automatic filters are used in power generation, including in power plants, to filter fuels and lubricants. High reliability is especially important here, and non-stop operation is understood to be a necessity for the plant to run economically. It is just as vital that our systems meet all the specifications and performance levels needed in operations. Exactly tailored to your specific requirements.



Return-line filters

Flange-mounted filter



Expertise for maritime operations

- Lubricant oil filters
- Hydraulic filters
- Transmission fluid filters
- Fuel filters (diesel and MBO)
- Process and cooling water filters
- Inlet air filters
- Bilge water filters
- Grey and black water filters
- Water treatment filters
- Coalescer-filters
- Turbidity sensors

Systems expertise for maritime operations

Whether on the Aida cruise ship or large container vessels: our innovative filter systems stand for clean performance, without compromise – from fuel and air treatment for drives and hydraulic and lubrication operations, to cleaning and treatment of water.

Full speed ahead: fuel, inlet air, and dust filters

MAHLE filter systems, approved by various classification agencies, ensure long-term, trouble-free, low-maintenance fuel care operations for drive systems. In large engines, for instance, our duplex-filters, with patented one-hand diversion, or our modular filter systems, ensure better performance. Automatic variable filter systems are ideally tuned for the demands of large diesel engines and gas turbines. Single variable filters clean up to 24 tons of fuel per day – in parallel circuits, they can do many times that amount.

For clean air: MAHLE inlet air and dust filters

With low flow resistance and high dust collection capacity, our inlet air and dust filters continuously provide clean air for compressors, vacuum pumps, internal combustion engines, and turbines.

Hydraulics and lubrication: everything runs smoothly

Long service life, high operational reliability, less maintenance, and resource savings – our maritime operations systems pay off in the care, cleaning, and filtration of hydraulic, lubricating, and control fluids. They reduce particle contamination in your systems to the required purity class level, in compliance with international standards.



A CLEAN PROGRAM
RELIABILITY ON BOARD

Water filters: all-around reliability for operations and the environment

Our bilge water oil removal systems make a prominent contribution to water protection worldwide – tailored to each type of ship. Bilge water separators clean bilge water so efficiently that the strictest civil and military limit levels and protective regulations can be met, today and into the future. MAHLE automatic filters clean all kinds of water, such as for the treatment of grey and black water into process water. We provide efficient treatment technologies for cooling water circuits, pretreatment and post-treatment sys-

tems for the treatment of process and waste water, and additional sterilization, metering unit, membrane, and activated charcoal filters. MAHLE turbidity sensors reliably detect water in hydraulic and fuel systems. Coalescer-filters economically separate free water from oils and fuels. And our mechanical demulsifiers achieve the highest purity levels for all oil-in-water applications, washing lye, and cooling lubricant emulsions.



*Automatic filter
variable series*



Coalescer-filter



Turbidity sensor



*Multiphase demulsifier for
bilge water oil removal*



Fluid filtration for reliable “workflow”

MAHLE fluid filtration systems do the whole job, in large concrete pumps and other construction equipment, in agricultural machinery, cranes, industrial trucks, mobile lift platforms, forklifts, fire engines, railway and underground vehicles, and in many other types of mobile machinery. Filter solutions of the highest quality are needed everywhere, since any machinery stoppage means loss of productivity and increased costs. Our customer-oriented systems are optimally tailored to the tight working spaces in mobile machinery. They are notable for their light-weight, energy-saving design, and high reliability in the toughest conditions.

Module development

We develop customer-specific modular solutions for your special requirements. By integrating plastic components, such as inlet lines, or tanks with special filters, you get a complete, fully assembled module.

A lot gets caught – and the work goes on

Construction machines, such as rock drilling machines, have to work reliably even under high dust loads. The inlet air for their engines is continuously cleaned by our cleanable inlet air filters. We have developed special cartridge filters with a compact, space-saving form factor, for use in

Expertise for mobile machinery systems

- Suction filters
- Pressure filters
- Return-line filters
- Bypass filters
- Air breathers
- Filter elements
- Cleaning systems

We provide hydraulic filters in special mobile versions, such as inlet air filters and return-line filters that serve as internal tank filters or line filters to protect the hydraulic system. Our changeout filters, with high-efficiency filter inserts, guarantee high dirt holding capacity. Inlet air filters ensure that internal combustion engines, compressors, and vacuum pumps are always provided with clean inlet air. With outstanding knowledge of plastics processing, we are developing entirely new filter designs with improved performance. However different your range of applications may be, we can provide you with complete modular solutions for filters, containers, and systems.



mobile machinery. These high-performance filter elements and matching cleaning systems ensure high operational reliability; for instance, in building cleaning, track washing, and suction excavators.



High-pressure filters with cold start valve



Pressure filters



Spin-on cartridges

FILTER SYSTEMS FOR PRODUCTIVE MOBILITY



FOR EVERY PROCESS THE RIGHT CHEMISTRY

FOR THE ENVIRONMENT, TOO

Dust removal – approved for the chemical, pharmaceutical, and food industries

In the chemical industry, pharmaceuticals, and food production, the highest requirements are set for process quality, purity, safety, and environmental protection. We provide ecologically

and economically convincing solutions that will continue to meet worldwide increasing requirements. Our high-quality filter elements, with FDA-approved filter materials for dust removal from air and gases, achieve high filtration performance and economical service life for trouble-



Filter elements for dust removal



Dust removal unit



Automatic filter

free operations, through the use of effective cleaning systems combined with PTFE membrane filter elements.

Our solutions range from washable filter elements, through compact, robust, and easily integrated small dust removal systems, such as mixer accessory filters and product separators, to large central exhaust systems and filters for potentially explosive areas. They meet and even partially exceed the latest ATEX directives.

Whether for manufacturing processes in the pharmaceutical and food industries, the production of inks, paints, and plant preservatives, in filling and packaging machines, transport processes, drying in fluidized bed or spray dryers – our filters and cleaning systems ensure reliable dust removal and clean process performance everywhere.

Automatically reliable: process optimization

Well-known companies around the world rely on our automatic filters in the production and processing of fats, oils, pastes, adhesives, fluids, and products such as chocolates, doughs, or fruit pomaces. Because they filter particularly efficiently and reliably – in continuous 24-hour operations – in the chemical and food industries, in refineries, and extraction and ink production of low to high viscosity products.

Using a wide range of cleaning systems, filter materials, and optional combinations, compact automatic filters can be set up in a variety of ways to meet the filtration needs of various materials and requirements. The advantage: you adjust to changing operational conditions, clean without interrupting the filtering process, reduce maintenance costs, and increase system life of safety filters in series. Our automatic metal-edge filters, with radial scraper cleaning, for example, are right in their element in adhesive or chocolate production.

Expertise for chemical, food, and environmental technology

- Filter elements
- Cleaning systems
- Small dust removal systems
- Attachment and insert filters
- Product separators
- Sack pouring
- Individual exhaust
- Central dust removal
- Filters for explosion proof areas
- Automatic filters
- Automatic metal-edge filters



STEEL OR PAPER – YOUR PLANT
RUNS RELIABLY

Ensuring that your production runs smoothly

In steel and paper manufacturing, production processes have to run economically without interruption. With increasing cost pressures, the smooth interaction of process steps is important to ensure that rationalization potential is utilized to the full. MAHLE filter technology helps you achieve this.

For complex processes: Hydraulic filter solutions

Our fluid filter systems have mastered challenging filter tasks, not just in the paper industry. In foundries, roll forming plants, and casting machines, they protect the highly-stressed hydraulic systems from contaminants, thus ensuring system reliability. We have developed completely new filter solutions in the area of fluid filtration to meet the increased requirements for cleanliness of components and media. For example, a new series of cartridge filter elements optimized by application – for the highest purity requirements, with filter performance that has never before been achieved. Add to this a completely new series of innovative stainless steel filter housings for cartridge filter elements. And, for the commonly used bag filter, whose filter quality no longer meets today's increased requirements, we provide more efficient replacement solutions.

Relief from dust

Our modern filter elements and distributed filter systems represent an efficient and reliable reduction of dust loads in foundries and steelworks, casting plants, and in the galvanic industry. Due to their high separation performance and economical operation, the pulp and paper industry also counts on them around the world.

Cleaning without interruption

MAHLE automatic filters have had a solid position in the cooling water and process water circuits of the steel and paper industries for many years. Because our automatic filters allow rational, highly efficient non-stop operations, with automatic cleaning and disposal.

Expertise for steel and paper production

- Return-line filters
- Low-pressure filters
- Medium-pressure filters
- High-pressure filters
- Duplex-filters
- Fine dirt discharge with automatic filters
- Filter devices for dry dust removal
- Air breathers
- Oil aerosol filters
- Filters for cleaning fluids
- Separators and filters
- Automatic filters
- Line filters
- Oil aerosol separator units
- Turbidity sensors
- Coalescer-filters
- Bag filter replacement with adapters
- Process filters
- Automatic return-line filters



Filter for cleaning fluids



Duplex-filter



Backflush filter



Filter elements for cleaning fluids



WELL FILTERED – THE SUBSTANCE FOR MORE PERFORMANCE

Expertise for fuel processing

- Automatic return-line filters
- Automatic filters
- MAHLE NFV fuel filters
- MAHLE NFV automatic filters
- MAHLE NFV separators
- MAHLE AKO automatic filters
- MAHLE AKO backflush filters

For clean, high-performance power development

Without fuel filters, nothing would work in a modern internal combustion engine or turbine. Water, contaminant particles, and other undesired impurities in fuels lead to corrosion and wear in the fuel system, impede combustion, and compromise reliability. MAHLE filter systems for fuel care and processing ensure low-maintenance, trouble-free operations in mobile and stationary applications, from small gasoline engines to the largest diesel power plant. Worldwide.

MAHLE fuel filters are approved by various classification agencies. We adapt our fuel filters to a wide range of applications, in type, quality, and design. A wide range of filter materials and favorable flow filter housings are available for any conceivable application.



Against water and other fuel system contaminants

For example, our tailor-made filters and water separators ensure the best fuel quality. Our double diversion switch filters provide high filter performance, with a patented one-hand switch and modular filter systems, for separation in the range of 25 µm – 2 µm. And compact MAHLE automatic variable filter systems can be ideally tuned for the demands of large diesel engines and gas turbines. This is how we have stuck up for clean performance in many areas around the world.



Fuel care system



Automatic filter



Chained low-pressure filter

Setting standards with knowledge, capability, experience, and curiosity

The thoroughness with which we perfect solutions down to the smallest detail, and tune them to our customers' individual applications, is surely one of the reasons for our worldwide success. Because we know the complex interactions of filter technology better than anyone, from many industries and from our own research and development activities. That is why we always look at the complete system so as to develop a technically and economically optimized filter design. We take into consideration a great deal of information, data, and system parameters in order to tailor everything to your needs, from the fineness to the location of the filter.

In our own research and development lab, we create the foundation for groundbreaking innovations. Using modern applications technology, we carry out basic experiments, volume flow measurements, sample tests, particle size analy-

Performance that can be measured

In order to evaluate the efficiency of filtration, we can provide a wide range of experiments in our lab. For example, overall contamination levels with particle counts, or as a concentration, gravimetric sieve analysis, automatic particle counting, microscopic analysis and testing with a raster electron microscope or microprobe. For mobile online measurement of impurities in fluids and for sampling, we have mobile measurement systems available.

Service, from spare parts supply to training

Our extensive filter technology program also includes high-performance spare parts service for worldwide availability. The replacement filter elements are manufactured according to the same strict quality criteria as the original MAHLE filter elements. Customer-specific special versions available upon request. We teach professional service and maintenance in practical training sessions. And for commissioning or maintenance on

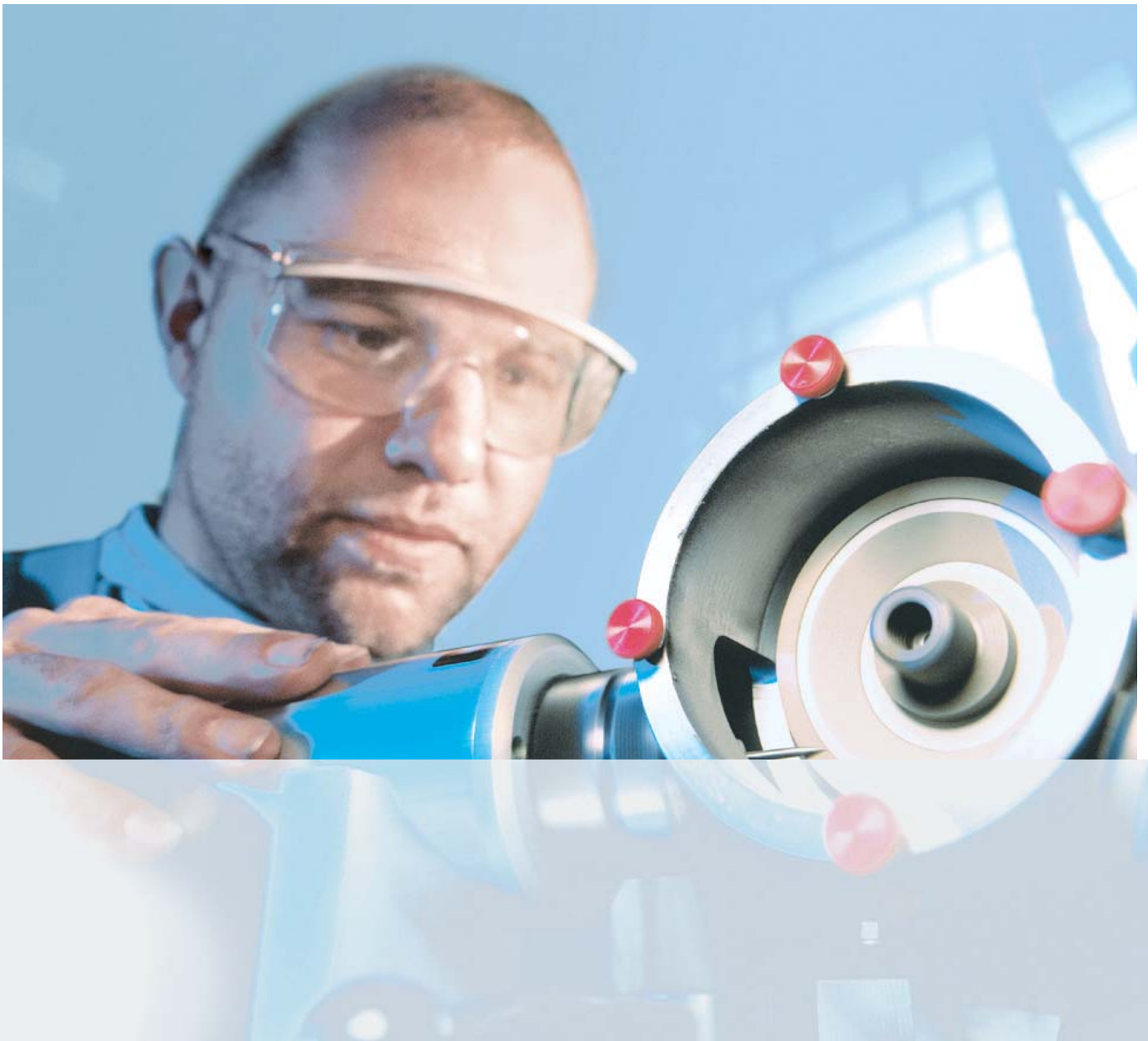
MORE INNOVATION, MORE PERFORMANCE THOROUGHNESS

FROM DETAILS TO THE COMPLETE SYSTEM

ses, and pressure and leak testing. The knowledge gained flows continuously into new material and product developments, which will need to stand up to the most severe daily conditions at our customers. To do this, for example, we start with practical principle experiments with test filters at our customers' sites. With the continuous further development of materials and production technologies, we are pursuing a clear goal: optimal products for trouble-free, economical operations.

site, our service technicians are available worldwide.

The result: more reliability, more efficiency, and more performance for you.



Service vehicle



Portable contamination measuring systems



Sampling case



Filter elements

MAHLE

Industrial Filtration

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