Contents

About us
- Competence 4
- Services 5
- Business areas 5
- Engineering 6
- Installation and servicing 8
- Spare parts service 9

Technology
- Dedusting technology 10
- Flue gas purification 11
- Modernisation and rebuilding 12

Industry sectors
- Steel and metal industries 13
- Coal preparation and coking plants 14
- Energy sector 15
- Cement, lime and gypsum plants 16
- Chemical and food industries 17

Products
- TurboJetPulse filters 18
- TurboCyclone 20
- TurboSpark 20
- TurboDry 21
- Pressure-resistant systems 21
- Mass coolers 22
- Evaporation coolers 22
- Vacuum dust collectors 22
Our core competence

Effective and economic filter technology

Turbofilter GmbH is a specialist for advanced air purification technology. The realisation of the most effective and economic dedusting and flue gas cleaning plants is based on a close cooperation with our clients.

From local to worldwide applications

Starting from local installations in the mining and steel industry in our neighbourhood our reputation early lead to international activities all over the world. With groundbreaking technologies and worldwide cooperations Turbofilter managed to become a global technology partner in environmental protection.

More than 50 years of experience

Already in 1958 the foundation of the successful history of Turbofilter GmbH was set: Company’s founder Fritz von Opel selected the city of Essen in the heart of the Ruhr area for its location.

For more than 50 years Turbofilter technology stands out for durable, individual and turnkey solutions.

The client’s requirements, ecological and economical considerations, safety standards as well as national and international environmental legislations are always in the focus of our project and product development.
**Sustainable solutions**

The way into a clean and safe environment is paved by modern filter technology. Turbofilter meets the challenge by offering a unique product and service portfolio.

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**Our services**

- analysis of the existing situations
- project planning
- design engineering
- installation / erection
- commissioning
- after-sales service
- planning / execution of studies
- project management
- project execution
- logistics
- trainings

**Our business areas**

- Steel and metal industries
- Coal processing and coking plants
- Energy sector
- Cement, lime and gypsum industries
- Chemical and food industries
Trendsetting throughout all planning phases

The precise evaluation of the individual application situation and the resulting requirements ensure an ideal starting point for all subsequent planning processes.

Thorough project management ensures professional customer involvement, minimal implementation times and coordination of all partners as well as optimised business and technical results. Risks of various interfaces are eliminated by project handling, design, supply and installation from one source only.

3D-CAD visualisation

Already during development of the initial ideas, 3D CAD specialists visualise the potentials of the equipment, thus assisting the decision-making process. At the same time, the three-dimensional design achieves improved planning safety and hence minimised investment risks. Turbofilter provides studies, planning, design, manufacture, installation and project management from one source, anywhere in the world.

BAT criteria

Customers and the environment benefit equally from the engineering services of Turbofilter GmbH. The BAT (Best Available Technology) criteria constitute the basis of consultation meetings – from standard solutions through to customised filter systems.

ISO 9001: 2000 and SCC

The ISO 9001:2000 and SCC certificates ensure the highest quality standards with respect to analysis, planning, design, delivery, installation and customer service, but also safety at work and environmental protection. Moreover, a focus is placed on energy aspects when designing the systems, e.g. by optimising pressure losses and by ensuring simple handling and low maintenance requirements.
Engineering

Turnkey and customized

Thanks to our longlasting know-how and wide ranging technologies, you as a Turbofilter client always benefit from our comprehensive engineering services, irrespective whether standards filter types, customized solutions or turnkey plants are concerned.

Special services

- Servicing and maintenance
- Differential pressure and volume flow measurements
- Residual dust measurements
- Design of filter systems, emission collection equipment and piping
- Extensive spare parts service
- Delivery and installation of system components (e.g. fans, sound absorbers or sound insulation cabinets, discharge devices such as screw conveyors or rotary gate valves)
Reliability in installation and maintenance

Turbofilter autonomously carries out installation and maintenance quickly and reliably with its own service staff.

In order to optimise the installation process and logistics (incl. material flows), planning and scheduling takes place in close cooperation with the customer. Our experienced staff members handle both the assessment of existing conditions and the development and implementation of the respective installation and servicing concepts.

Individual maintenance concepts

In order to keep operating costs constant or reduce them in the long run, Turbofilter has established an individual maintenance concept. Servicing, time intervals and other terms are defined and the necessary work is reliably performed by Turbofilter service staff members. We can also offer the optimisation and modernisation of third-party systems within the context of a servicing arrangement. As a result, such business factors as efficiency, safety and availability are easy to plan for the long term.

Turbofilter GmbH is certified according to SCC (Safety Certificate Contractors) for the installation, service, repair and maintenance of industrial dust collection systems. The SCC certification constitutes the rules and standards for a management system which combines aspects of safety at work, health and environmental protection.
Spare parts service
With our efficient Turbofilter spare parts management, we make sure that wear and tear as well as spare parts for your system are available in OEM quality as quickly as possible. As a result, cost-intensive downtimes can be reduced.

Turbofilter also ensures the supply of spare parts even years after the installation. Available upgrades and optimisation options are, of course, passed on to the customer. In addition to the quality and warranty standards, our focus in spare parts procurement is always on cost-effectiveness for our customers, too.

Installation
Moreover, as part of our services we also offer the installation of all required spare parts, which ensures their optimum functioning. This after-sales service from one source avoids interfaces and risks on the part of the customer.

Your benefits:
Fastest possible availability of spare parts, minimisation of downtimes, saving resources in logistics and human resources.
The TurboJetPulse filter which Turbofilter GmbH has developed constitutes the global dedusting standard. It is employed in many different industrial plants where dusts must be separated from gaseous carriers. Its multiply adaptable principle has demonstrated its value for decades and is consistently further advanced.

Simple principle with huge effect

The way it works is simple. The contaminated gas is loaded on the filter media from outside. The pollutants are separated at the filter medium by way of filtration so that purified gas escapes at the inside of the filter bag. The particles remaining on the outside have agglomerated to form a so-called filter cake. It is removed via a compressed air impulse which is either time-controlled or triggered by differential pressure.

The most important criterion for the lifetime of the filters and the purity of the filtered gas is the air-to-cloth ratio. This parameter is defined by the amount of raw gas which is purified by one square metre of filter area. The overall size of a filter is therefore determined by the required filter area, which depends on the individual tasks of the respective filter system.

The objective of the design is to achieve an ideal compromise between the required efficiency and the lifetime of the filter, on the one hand, and optimised investment costs, on the other. Numerous factors such as quality and behaviour of the dust and grain size distribution, operating conditions such as temperature, humidity and availability or filter media and filter system design determine the potential air-to-cloth ratio. Experience is a key requirement for determining the optimum concept.

Dedusting technology

International standard can be employed in many different ways

Fine and extremely fine dusts are generated in nearly all industrial production processes, for example in crushing, grinding, abrasion, in surface treatment and in transfer points of transport systems. Thanks to its more than 50 years of experience in the planning and design of dedusting plants, Turbofilter GmbH meets the increasing requirements and international emission standards at all times.
Flue gas purification

Employing trendsetting technologies

The Turbofilter systems are not only used for filtering dusts. When harmful gaseous substances occur such as hydrogen chloride, hydrogen fluoride, sulphur dioxide and sulphur trioxide, and volatile heavy metals (e.g. mercury) or dioxins and furans, filter systems from Turbofilter GmbH are used in combination with TurboDry dry sorbent injection systems. Since reactors are used to inject additives such as activated coal, lignite, sodium bicarbonate or lime hydrate, the filters serve not only as dedusting filters but also as reactor filters. In addition to the dust, the harmful substances are thus separated by way of several chemical processes as well as dry absorption and adsorption.

Complex requirements for chemical processes

All different kinds of combustion processes in facilities such as power plants which produce energy by burning fossil fuels, residual materials, waste materials or refuse derived fuels (RDF), but also such processes as the ones in sintering plants in the steel industry, are subject to high regulatory requirements for flue gas purification. Worldwide, more and more power- and heat-generating plants are also operated by burning biomass.

The continuous utilisation of these systems must allow for the use of different fuels with various specific properties. Consequently, there are also complex requirements for flue gas purification.

Technological diversity

Depending on the tasks to be performed, the heavily loaded flue gases are purified with the help of lime hydrate, sodium bicarbonate and activated coal or lignite. Adding other upstream or downstream processes, for example upstream TurboSpark separators, TurboCyclone high-efficiency cyclones, evaporation coolers, recirculation facilities as well as the separate disposal of the residuals in multi-stage flue gas cleaning processes, are further components of a safe flue gas purification plant. In multi-stage systems, different chemical processes in two consecutive systems reduce harmful substance peaks, for example, or allow separation at different temperature levels.
Fast and cost-efficient modernisation

New standards and laws concerning emission values force the industry to adjust its existing plants to the increasing requirements of the market. Economic dependencies and ongoing processes, however, do not always permit the new construction of adequate process systems.

Consequently, the modernisation or retrofitting of existing industrial plants can be an adapted, fast and cost-efficient alternative. The TurboJetPulse series offers a large variety of designs that provide the appropriate solution for any need. Even though it reduces investment costs, Turbofilter GmbH offers the implementation of the latest technical state-of-the-art.

Easy integration of existing system components

The TurboJetPulse filter system replaces vibration, shaker filters and electrostatic precipitators of any brand as easy as possible. The TurboJetPulse filters are designed in such a way that central components of the existing plants, such as housing or filter hoppers and discharge devices, can continue to be used.

Due to the stricter emission regulations for various processes, such as the use of altered fuels, it is necessary to retrofit existing gas cleaning plants like electrostatic precipitators. Especially in the cement industry and in combustion processes of biomass, residual materials, etc. Turbofilter has been able to minimise the required investment costs for the operators by continuing to use central parts of existing facilities.

Complex industrial plants are thus quickly switched to the ecological and economical TurboJetPulse filter technology requiring only limited amounts of material and little installation effort.
Steel and metal industries
Wide range of applications

In the steel and metal industries, large amounts of dusts from solid substances are generated. Transfer points, grinding mills and material preparation plants, as well as flame cutting and other treatment locations, require effective dust collection and dedusting systems in order to reduce dust emissions.

In this respect, the Turbofilter dedusting systems with TurboJetPulse filters and TurboCyclone high-efficiency cyclones are successful throughout the world. The high efficiency of the Turbofilter systems is the result of decades of research and (continued) development. The high-efficiency filter systems are used in all areas of the steel and metal industries: from raw materials exploitation and preparation, to iron and non-ferrous metal production, and through to further processing.

In the steel industry and in its supply industry, for instance, central application areas are in the ore, coal and other raw materials recovery, in pelleting and sintering plants, material handling and stockhouses, coking plants, hot metal production (e.g. blast furnaces), steel production (electric arc furnaces, BOF converters, alloy systems), secondary metallurgical processes (ladle furnaces, vacuum systems), further processing steps (e.g. rolling mills, continuous pickling lines, etc.) as well as all respective transport, transfer and loading facilities.

Filter plants of all dimensions

In primary and secondary dedusting applications, these production processes require volume flows up to far beyond 2,000,000 m³/h. For these and other production systems, Turbofilter filter systems provide the ideal components for the safe and optimized separation of solid particles and emissions. The effective systems from Turbofilter GmbH completely satisfy the legal requirements in the metal industry. (Emission monitoring according to TA Luft, 13th, 17th BImSchV)
In high-temperature areas of coking plants such as on the coke transfer side during coke pushing, special measures must be taken in the filter systems. The upstream integration of the Turbofilter mass cooler serves for cooling purposes during the short-term high-temperature peaks. The lower gas temperatures following the high-temperature peaks cool the heated mass down again.

This special cooling device constitutes a cost-efficient cooling method in terms of both investment and operating costs. Moreover, the mass cooler also works as a pre-separator and as protection against flying sparks.

Additional areas of application include coal pulverisation plants, coal charging, next to the coke transfer side, also on the coke pushing side, the coal and coke transport as well as coke screening. On the coke pushing side, optimised dust removal can be achieved with a TurboJetPulse filter system that is placed directly on the coke pushing machine. Here, space and weight limitations require a customised, particularly compact design.

Moreover, thanks to the cooperation between Turbofilter GmbH and partner companies within the CokeTec Group which cover additional areas of the facilities that are required in coking plants, customers can obtain complete solutions for numerous practical applications.
**Energy sector**

The generation of energy and the reduction of emissions

Combustion plants for the generation of power and heat energy are subject to the strictest international requirements concerning emission values. In addition to fossil fuels, biomasses, waste, sewage sludge and refuse derived fuels are burned to generate energy, which in turn are subject to strict legislation.

In the field of fossil fuel processing, for example, the 13th BImSchV (Federal Immission Control Ordinance) has applied in Germany to date. When using additional refuse derived fuels, however, the stricter 17th BImSchV must be adhered to. This necessitates further steps in flue gas purification. For this purpose, Turbofilter has expanded existing flue gas cleaning systems based on electrostatic precipitators with the TurboDry system, for instance. Comparable systems are operated in waste and biomass combustion plants.

The strict and different requirements concerning air purity are subject to national and international standards. The adjusted Turbofilter flue gas purification systems satisfy these standards and have become established in the market. Moreover, the use of conventional or new, particularly effective additives offers the option of customisation and optimisation.
Making cost-efficient production a safe bet

Extremely fine dusts are generated in nearly all processes of the industrial production of cement, lime and gypsum. To discharge these dusts in the best way possible during pulverising, screening, mixing and calcining, Turbofilter has developed filter systems which ensure the utmost safety.

In the cement industry, too, the ever-increasing use of secondary fuels, e.g. fuels from refuse, requires special knowledge about the reduction of noxious gas loads, for instance sulphur dioxide or hydrogen chloride. The Turbofilter flue gas purification systems that are used here are internationally proven and manufactured in accordance with the respective requirements.

For example, since refuse derived fuels are used, the gas purification systems must satisfy the stricter requirements of the 17th BImSchV (Federal Immission Control Ordinance). Consequently, the use of electrostatic precipitators is generally no longer sufficient. A frequent solution for this specific task is retrofitting an existing system to a TurboJetPulse filter system.

Turbofilter develops plants and systems required for gas purification in the areas of

- rotary kilns
- coal pulverising and drying plants
- raw grinding mills
- material handling
- retrofitting of electrostatic precipitators
- coal pulverising plants
- bypass systems
- secondary fuel delivery
- evaporation coolers
Chemical and food industries

First-rate customisation for highly sensitive systems

The chemical and food industries constitute sectors involving highly sensitive systems. Their complex and detailed production chains pose extraordinary challenges for the filter technology.

As a partner of both industries for many years, Turbofilter GmbH has developed filter systems from the sector-specific jobs which reliably meet the strict safety requirements. The TurboJetPulse filters are adapted to all different types of industry needs by way of unique customisation.

Here, attention must be paid to the use of toxic substances and ignitable dusts. The appropriate measures with respect to the selection of materials and regulations concerning explosion protection have to be observed.

Thanks to the use of high-grade materials for the production of the TurboJetPulse filters, they are an internationally successful product. For example, they are made from stainless steels of vastly different classifications and alloys, are shock pressure-resistant, high temperature-resistant and/or gas-proof. Moreover, Turbofilter uses the highest-grade filter media that are available in the market.

Depending on the needs, TurboJetPulse filters are:
- shock pressure-resistant
- high temperature-resistant
- gas-proof
TurboJetPulse filters

Based on the technological standard of the jet filters, TurboJetPulse filters represent a more advanced development stage of the success products from Turbofilter GmbH. Diverse customisation, supreme production quality and strict quality control, as well as countless constructive details, maintenance friendliness, reliability and cost-effectiveness are among the special properties of the TurboJetPulse filters.

They safely separate even extremely large dust loads in nearly all production processes – pulverising, screening, calcining, transporting, pickling and combustion. Despite these diverse types of use and the vastly different configurations of the TurboJetPulse filter system, it is extraordinarily cost-efficient, both in terms of investment and operation costs.

TurboJetPulse filter systems work as filtering dedusting units with fully automatic compressed-air impulse separation. Membrane valves for jet pulse cleaning and filter media, e.g. needle felts made of synthetic fibres such as polyester or polyamide, are employed. When using fibre-glass needle felts, gas temperatures of up to 270°C are possible.

Special characteristics of the TurboJetPulse filter systems are the easy accessibility to the clean gas chamber via the maintenance doors, simple installation and removal of the filter bags and support cages (which can be devided depending on the specific application) as well as the blowpipes using simple plug-in connections and the mounting of the filter bags with double bead design using ring clamps in the bag support plate. Moreover, the hopper inclination, bag length, filter material, cleaning method, design type, extent of insulation, etc. are adjusted to the specific needs.

In flue gas purification, special filter design with an additional sedimentation area and high-tech filter bags are used. These products, which were developed by Turbofilter GmbH, safely separate primary fine dusts.

In addition to the rectangular bag filter systems, round filters can also be used for specific applications. Round filters are predominantly employed when dealing with particularly high process pressures or high dust loads, e.g. in coal pulverisation in blast furnace coal injection plants.
Online / offline / semi-offline cleaning

The effective TurboJetPulse filter method

- safe compliance with emission values
- absorption of pollutant peaks
- high economic feasibility
- low use of operating resources
- easy handling
- operating safety
- low maintenance costs

TurboJetPulse system

Generally, the cleaning in the individual filter bags is optionally time- or differential-pressure-dependent. Pulses of compressed air are consecutively blown into the filter bags from the inside towards the outside using blowpipes. Injectors at the top end of the support cages increase the cleaning effect by drawing in secondary air from the clean gas chamber. The filter cake separated during this procedure drops into the dust hoppers and is removed via dust discharge devices.

Depending on the application and design, the TurboJetPulse cleaning system can be carried out online, offline or semi-offline.

With online cleaning, the dust discharge during cleaning is directed against the raw gas flow; there is no chamber isolation. This type of discharge suffices for most applications. It minimises the requirements of the system as well as potential pressure fluctuations and pressure losses.

With offline cleaning, individual chambers are completely separated from the gas flow by locking the raw gas and clean gas flaps. This allows for optimum filter bag cleaning even with the cleaning pressure being low. Depending on the number of chambers, shutting off individual chambers results in different pressure fluctuations.

Semi-offline cleaning constitutes a compromise solution and is performed when individual chambers are partially shut off. The shut-off flaps are only closed on the clean gas side, either partially (if more than one clean gas flap is used) or entirely. Due to the increased resistance, the raw gas flow in the respective chamber is largely reduced, which allows for improved filter bag cleaning while still keeping pressure fluctuations low as well.
Since obtaining first patents for its multi-cyclones early on, Turbofilter has installed numerous cyclone centrifugal separators of many different types – from simple pre-collectors to high-efficiency cyclones in the form of multi-cyclones and multiple-unit cyclones.

Depending on their intended use, a housing is equipped with a specific number of separator elements in case of the TurboCyclone multi-cyclones. Separation efficiencies of up to 99 per cent are possible. All wear and tear parts, for instance axial cyclones, clean gas pipes and whirl vane units, can be replaced separately.

Today, the robust centrifugal separators, which have different degrees of efficiency, are still used for the dry separation or pre-separation of dusts and gases, especially in the high-temperature range. Typical applications are biomass heating systems, wood / timber incineration and sewage sludge treatment, but also coke dry quenching plants, for instance.

**TurboSpark high efficiency cyclones**

Various applications, for example metallurgical high-temperature processes (coke, hot metal or steel production), but also such work processes as grinding and flame cutting, contain fire hazards for filter systems of the suction plants on account of flying sparks. The highly efficient, safe and robust TurboSpark separators were developed for the protection of the fabric filter bags in the filter systems.

Whirled-up glowing particles are safely separated from the exhaust air using the inertia force of masses. The downstream connected filter system is thus protected against fire damage and the filtering effect is fully maintained.

**TurboSpark spark separators**

Various applications, for example metallurgical high-temperature processes (coke, hot metal or steel production), but also such work processes as grinding and flame cutting, contain fire hazards for filter systems of the suction plants on account of flying sparks. The highly efficient, safe and robust TurboSpark separators were developed for the protection of the fabric filter bags in the filter systems.

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**TurboSpark Separator**

ArcelorMittal, Air volume: 240,000 m³/h
TurboDry sorption systems

Turbofilter GmbH has developed the TurboDry sorption systems for the tough requirements in flue gas purification. The first flue gas purification systems started operation as early as the 1980s already. Combustion systems of all kinds can be applied upstream of the Turbofilter systems, from biomass or residual combustion, to waste-fired heat and power stations, and through to sintering plants in the steel industry. TurboDry sorption systems meet the respective international guidelines and national norms and regulations such as the standards of the VGB guidelines for power plants and TRD guidelines.

By optimising the addition of such substances as lime hydrate and sodium bicarbonate, hydrogen chloride, hydrogen fluoride and sulphur oxides (SO2/SO3) can also be absorbed from the flue gas and separated in the TurboJetPulse filter as solid matter. This more or less also applies to the injection of activated coal and lignite for the separation of dioxins, furans and heavy metals.

Thanks to the good reactivity of the additives, hazardous gas freight can be safely approached. Thus not only pollutant peaks are absorbed, but emission limits are also reliably maintained when adding these substances.

Pressure-resistant systems

Turbofilter GmbH has developed special-design dedusting systems for mining for decades. Today, many industry sectors where explosion protection is crucially important benefit from this progress.

Pressure surge protected dedusting systems of shock pressure-resistant design withstand maximum explosion pressure. The purpose of concepts for reduced explosion pressure is to provide explosion pressure relief or to suppress explosions. All plants conform to the legal requirements and standards for explosion protection, e.g. the European (ATEX directives) and German (VDI Guideline 2263) standards.
Mass coolers

In metallurgical processes, e.g. melting with the addition of exothermal substances, pouring hot melts or discharging hot coke from coke batteries, temperature peaks of up to 500° C may occur. When these temperature peaks last only briefly, they can be buffered by integrating the Turbofilter mass coolers upstream the filter unit, which makes the use of cost-effective filter materials possible. The mass cooler also functions as a spark separator. At the same time, the Turbofilter mass cooler stores the heat it has absorbed during the temperature peaks, transmits it to the flue gas during the subsequent cooling phase and can thus prevent the corrosion of downstream connected components by keeping the temperature above the dew point level as the case may be. Depending on the required cooling performance and the available space, systems consisting of separate coolers or mass coolers which are integrated into the filter system may be used.

Evaporation coolers

The extremely robust and safe Turbofilter evaporation coolers are employed in industries with high gas temperatures, specifically in combustion processes, the chemical, cement, aluminium and steel sectors. The special safety of this cooling system is ensured because different variables such as spraying technology and flue gas distribution are considered.

The cooling process takes place by injecting fine water droplets into the hot process gas. Gas flow and dust particles can be cooled down to the desired outlet temperatures of, for example, 120° C before entering the downstream connected filter system.

Two-component jets with air pressure or one-component jet with high pressure are available for effective cooling. In addition, such parameters as the amount of liquid, duration of the cooling process (length of evaporation) and flow distribution determine the cooling plant design.

Vacuum dust collectors

Uncontrollable or problematical accumulations of dust can develop wherever loose bulk materials are produced, transported or stored. These dust deposits can be taken up and completely collected from even the tiniest of nooks and crannies with a Turbofilter vacuum dust collector.
<table>
<thead>
<tr>
<th>Cooperation</th>
<th>International</th>
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<tbody>
<tr>
<td><strong>CokeTec</strong></td>
<td>PT Ferrostaal Indonesia</td>
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<td>Innovatherm</td>
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<td>Members:</td>
<td>ROSenergomash</td>
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<td>Bellka Stahl- und Anlagenbau</td>
<td>Soil &amp; Enviro Industries</td>
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