



## Environmental Technology

## A strong group

The ENTECCOgroup – Environmental Technology, specialising in air purification, is our business.

The companies forming part of the ENTECCOgroup manufacture highly effective and efficient filter products, and use them to create turnkey systems for dust removal, exhaust gas purification, and ventilation in virtually every industry.

Our services also involve supplying power and other public utilities for production plants, including heat recovery systems.

## ENTECCO – Modelled on nature, our strong “swarm” principle

A flock consists of many individuals, yet it acts like a homogenous organism and displays amazing skills as a whole. This creates complex adaptive systems in nature, known as the emergence phenomenon.

As a specialised team of experts, the ENTECCOgroup benefits from numerous synergies, and draws on a wealth of experience. It also has access to a variety of contacts and co-operations, e.g. with the environmental ministries, universities, and research institutes.

The ENTECCOgroup responds quickly, acts responsibly, and uses a competent network to find leading solutions.

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Members of the  
**ENTECCO**group



BMD GARANT ooo  
Russland, Moskau

For decades the brand BMD-GARANT has stood for high-quality products and solutions in the asphalt and casting industry. As the owner of this brand, it was the obvious choice to apply this name to our company in Russia. Our experts in Moscow offer all ENTECCOgroup products.



ENTECCO Filter Technology, Inc.  
USA, High Point

ENTECCO filter technology Inc. USA was newly founded in Florida in 2016. With ENTECCO products and solutions specially tailored to customer needs for all industries, our specialists work the entire North American market from there. Together with our newly established reseller network and an industry experienced management, ENTECCO filter technology Inc. is already an important member of the ENTECCO family. This with the goal to continuously expand the large filter market USA for our group.



GARANT-Filter GmbH  
Deutschland, Lahr

This brand acts as an umbrella covering industry specialists with long-time experience in the field of industrial air purification. GARANT-Filter is also the ENTECCO competence centre for gas treatment and dust removal systems in the asphalt, foundry and aluminium industries, as well as the entire non-ferrous metals sector.

GARANT-Filter Ltd.  
Indien, Bengaluru

In the course of the internationalization of the ENTECCOgroup, it has long been a concern of ours to establish our own regional company in the prospering economy of India. Through many years of cooperation among DISA colleagues, the opportunity arose to win Mr. Joydip Ghosh as founder, co-partner and Managing Director for the group. With experienced specialists in the field of filtration and gas purification we are now able to offer all ENTECCO products and solutions in India and neighboring countries.



INFRA>PROCESS GmbH  
Deutschland, Stuttgart

INFRA>PROCESS builds, monitors and operates systems for production plant supplies and disposal. Water, compressed air, thermal heat and cooling are provided, as is the properly purified or conditioned process air. In addition, INFRA>PROCESS is a key component to the entire ENTECCOgroup as a service team.



LHS Clean Air Systems  
GmbH  
Österreich, Gaspoltshofen

For many years full-service provider LHS Clean Air Systems has been a market leader in the field of industrial ventilation plant engineering. The Austrian town of Gaspoltshofen is home to the ENTECCO competence centre for the wood industry, air management systems, and surface technology. Many ENTECCOgroup products are also manufactured here.

LHS Clean Air Systems  
Polska Sp. z o.o.  
Polen, Zielona Gora

LHS Clean Air Systems Polska Sp. z. o.o. was founded in 2000 as an engineering firm specialising in dust removal and industrial ventilation. Our team now provides the entire Polish market with the group's products and services.



TURBOFILTER GmbH  
Deutschland, Lahr

Founded in 1958 by Fritz von Opel, today TURBOFILTER GmbH is an expert in flue gas purification systems and dust-removal systems within the ENTECCOgroup. Originating in the mining and steel industries, the TURBOFILTER technology is distinguished by long-lasting, personalised, turnkey systems in numerous dust removal and flue gas treatment applications.

# ENTECCOgroup – History



1953

Patented TURBOFILTER  
MultiCyclone from the Wiesbaden  
engineering works

1958



TURBOFILTER GmbH founded

1967



First TURBOFILTER fabric filter  
based on the JetPulse principle

1971

AEROB® founded

1980

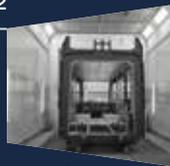
First flue gas treatment system  
with additives

1997



New JDR filter presented

2002



LHS surface technology/air manage-  
ment systems division established

2007



ATEX certification for pipe flap  
traps/rotary feeders

2006



First flue gas treatment system  
based on the TurboDry system

2011



Debut of the new S-type GARANT  
flat bag filter

2009

“LHS PDC Paintdry cleaning” patent  
application

2013



GARANT-Filter receives the 2013  
„Umwelttechnikpreis“ Environmental  
Technology Award

2013

INFRA>PROCESS GmbH combines  
traditional AEROB® and LTG brands



“What I particularly value about  
INFRA>PROCESS is the opportunity  
for development offered to me as a  
staff member.”



“From my point of view, LHS  
will always be the best team  
in the industry – ‘First in clean  
air systems!’”

## The people of the ENTECCOgroup

In order to form an innovative team, staff and managers must be open minded and authentic. Everybody has to become an enthusiastic supporter of the company. The “all of us” and the staff have to be the focus of the corporate philosophy. Values like trust, respect, and reliability must coincide with the principles of economic behaviour. Only with strong work and business relations, a good atmosphere at the work place, and profit sharing for employees, superior economic profit can be achieved.



“I believe TURBOFILTER will continue to be an innovative company which successfully implements new ideas in all areas.”



“I see INFRA>PROCESS becoming an optimally positioned brand in environmental technology, which constantly progresses.”



“I like the individuality of the staff, whose work highlights their distinctive features, but also contributes towards a common goal.”



“What I find particularly exciting at LHS is that the customers come from very different industrial sectors.”



“At GARANT, total customer focus is not a cliché; we’re aware that our customers want their money’s worth.”



“A particularly positive factor for me is the streamlined structures, which enable speed and flexibility.”



“TURBOFILTER’s long tradition of success is reliably perpetuated by this friendly and trustworthy team.”



“I like the way TURBOFILTER combines a casual atmosphere with highly professional work methods.”



“I like the fact that all GARANT staff focus on one goal: advancements in environmental technology.”



“For me, LHS will always be a company which takes into account the needs of its customers and staff.”



## From analysis to turnkey systems

The ENTECCOgroup provides complete dust removal, flue gas treatment, ventilation and surface technology systems for almost every industry. From the initial consultation to handover of keys, you'll be in safe, experienced hands. Upon request, we can also attend to your system for its entire lifetime, with a personalised full-service-maintenance and repairs programme.

### Four phases mean security

ENTECCOgroup projects are based on a tried-and-tested four-phase model: The BASIC phase is followed by the DESIGN engineering phase. Then comes system construction – the BUILD phase –, and finally there is the ongoing monitoring throughout the system's life. We call this phase CARE.

The customer advantage becomes apparent right from the first BASIC phase. In keeping with the “flock” concept, ENTECCOgroup specialists network with one another, and pool experience from different industries, markets and university activities, thereby developing optimum solutions with lowest cost as early as the start-up phase.

This means the fastest possible implementation times. System costs are assessed early on, and subjected to an economic comparison. The aim is to achieve a highly available system with minimum cost of operation. Having everything under one roof means fewer interfaces.

### ISO 9001:2000 and SCC

The ISO 9001:2000 and SCC certificates guarantee the highest quality standards in terms of analysis, planning, construction, delivery, assembly and customer service, but also occupational safety and environmental protection.

#### BASIC:

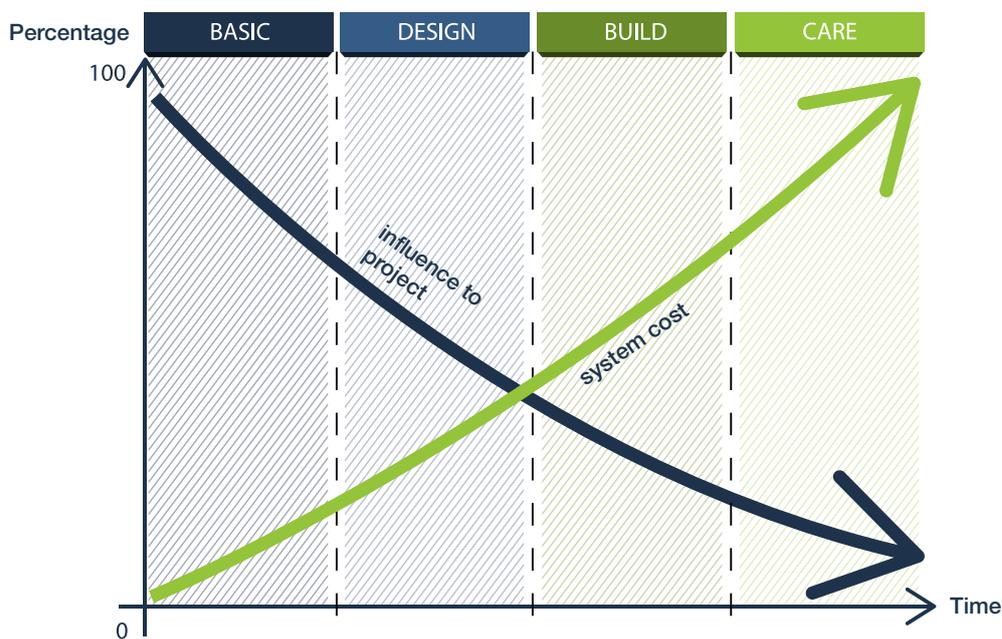
- Task definition
- System assessment
- Concept development
- Comparison of options
- Profitability assessment

#### DESIGN:

- Technical calculations
- Computational fluid dynamics
- Engineering services for public authorities
- Implementation planning
- 3D-CAD displays



### The ENTECCO 4-phase model



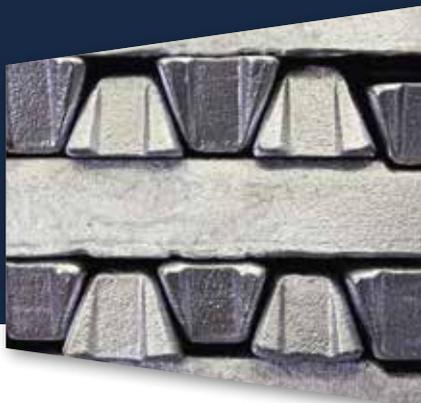
#### BUILD:

- Project management
- General contractor services
- Detail engineering
- Assembly and start-up
- Operator training

#### CARE:

- Inspection and maintenance
- Performance measurements
- Retro-fit and expansion
- Spare parts service
- Dismantling and disposal

Our products and services  
are used in virtually every industry.



## Aluminium

- Anode production
- Rodding shops
- Anode furnaces
- Smelting furnace exhaust systems
- Treatment furnaces
- Chip processing
- Loading stations
- Heat recovery/Recuperators



## Asphalt

- Stationary BMD-GARANT filters
- Semi-mobile BMD-GARANT filters
- Mobile BMD-GARANT filters
- Reduced corrosion risk
- Low-wear
- Low-maintenance
- Low power consumption



## Foundry

- Emission capturing for smelting furnaces
- Dust removal during sand conditioning
- Ventilation technology and dust removal for downstream casting treatment and cooling
- Energy-efficient ventilation systems
- Dust removal systems for blasting plants, cleaning stations and flame-cutting machines
- Filter systems for moulding plants



## Steel, metal

- Extraction and treatment of ore, coal and other raw materials, pelleting and sintering plants, stockhouses
- Coke ovens, iron production
- Smelting plants, steel production, (electric arc furnaces, converters, alloying plants)
- Secondary metallurgical processes
- Further processing (e.g. roller mills, tension levellers, galvanising plants, sanding and blasting etc.)
- Transportation, handover and loading equipment



## Automotive engineering

- Ventilation systems
- Process-air technology
- Weld smoke exhaust systems
- Oil mist filters
- Painting/varnishing systems
- Power and utility supply systems
- Refrigeration supply systems
- Coolant and lubricant systems



## Wood

- Raw wood treatment and cutting
- Chip processing and sifting
- Production plants for chipboards, OSB, MDF, and HDF products
- Press exhaust systems with gas treatment
- Floor production
- Refining
- Furniture production
- Window and door manufacturing



## Energy

- Biomass-fuelled systems
- Waste incinerators
- Substitute fuel systems
- Sludge disposal
- Heat and power stations
- Recycling systems



## Chipping

- Chip transportation
- Cooling-lubricant and MQL filtration
- Oil mist exhaust systems
- Mechanical conveyor technology
- Heat recovery
- Individual and central systems



## Coal, coke ovens

- Coal processing, treatment and transportation
- Coke processing, treatment, classification and transportation
- Explosion-proof systems and equipment
- Co-operation as part of the CokeTec joint venture



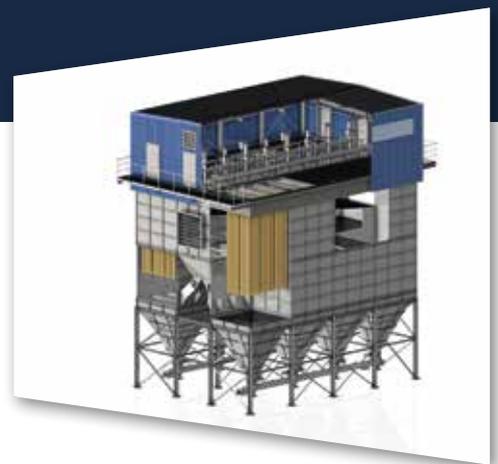
## Cement, lime and plaster

- Raw material extraction, treatment, mixing systems, crushers
- Clinker coolers, rotary furnaces, roasters
- Coal milling plants, coal milling and drying plants, raw mills
- Bypass systems, evaporation coolers
- Electric filter retrofitting, secondary fuel supply
- Material handling, silos
- Further processing, loading, packaging



## Chemistry, food

- Unique individualisation, e.g. for toxic materials or flammable dust
- Mixers
- Packaging stations
- Sifters
- Exhaust systems at production plants
- Conveyor belts
- Handover stations



### System advantages

- Longer service life of filter bags
- Minimum consumption of compressed air
- Low maintenance expenses
- Energy-efficient controls
- Ideal for vast dust volumes
- Air volumes of up to 2,500,000 Bm<sup>3</sup>/h
- Easy handling

### Design features

- Customised design
- Good accessibility to clean gas chamber through the maintenance doors/penthouse
- Easy installation and dismantling of filter bags, support cages, and blow pipes
- Temperature range up to 270 °C / 518 °F
- Flow-optimised air distribution at the raw gas inlet

## Process filters

### TurboJetPulse

The design is geared toward the perfect compromise between filter efficiency, life time, and investment cost. Since filter design is determined by numerous parameters, our long-time experience is key here.

Compressed air is blown outwards through blow pipes into the filter bag for cleaning. The filter cake blasted away by this process falls into the dust collector and is removed. Cleaning can be online, offline or semi-offline, depending on the design.

**Online cleaning:** Cleaning is performed against the flow of raw gas; the chamber is not shut down. This type of cleaning is sufficient in

most cases, and minimises system expense, as well as possible pressure fluctuations/losses.

**Offline cleaning:** Individual chambers are completely sealed off from the gas flow through raw gas and clean gas flaps. This enables optimum cleaning even at lower pressures.

**Semi-offline cleaning:** Is performed when individual chambers are partially blocked off. In these cases, the shut-off valves are only partially (if more than one clean gas flap is used) or fully closed to incoming gas.



## Dry sorbent injection systems

### TurboDry/GARANTsorp

Our dry scrubbing systems meet the highest standards in flue gas treatment, and can be connected downstream of all kinds of combustion systems, e.g. biomass or residual waste combustion, waste or combined heat and power plants, and sintering plants in the steel industry. We also use our sorption systems for the secondary production of non-ferrous metals, such as aluminium or copper.

Our sorption systems meet the relevant international standards as well as national standards and regulations, e.g. the VGB power plant standards and TRD standards.

The optimised supply of additives, e.g. calcium hydroxide or sodium bicarbonate, enables hydrogen chloride or sulphur oxides (SO<sub>2</sub>/SO<sub>3</sub>) to be removed from the exhaust gas.

It is a similar story when injecting activated carbon or activated coke to separate dioxins, furans or heavy metals.

Selecting these suitable absorbent and adsorbent materials means the legal limit values can be competently upheld, and peaks in toxic substances avoided. Accordingly, our product range is completed by evaporation coolers, static and dynamic mixing reactors, and the relevant silos with the additive supply stations.

### System advantages

- Customised use of sorption materials
- Minimum consumption due to optimised stoichiometry
- Process selected based on “Best Available Technology” (BAT)
- Incorporation of on-site decision-making criteria such as availability, operational safety, maintenance requirements, usability of residual materials, and usable residual heat
- Optimised investment, operating and disposal costs
- Technological diversity (single or multi-level systems, cooling stages, heat extraction, sodium bicarbonate or calcium hydroxide etc.)



## Bag house filter

### System advantages

- Smooth filter interior
- Panel structure for optimum transportation
- User-friendly layout of diaphragm valves
- Split clean gas lid for easy handling
- Diaphragm valves integrated into the compressed air tank
- Air volumes of between 1,500Bm<sup>3</sup>/h and 500,000Bm<sup>3</sup>/h

### Filter bag lengths

- 1,125 mm
- 2,250 mm
- 3,375 mm
- 4,500 mm
- 5,000 mm
- 6,000 mm

### LHS JDR

High-quality, modular bag house filter which also meets ATEX requirements!

This tried-and-tested filter model is regenerated/cleaned by pulse with compressed air using a sophisticated cleaning system, which is why it is also known as the jet compressed air in-line filter (Jet-Druckluft-Reihenfilter, JDR). The effective, economic compressed air cleaning process is performed by special air-jet pipes and a venturi nozzle at the opening of the filter bag.

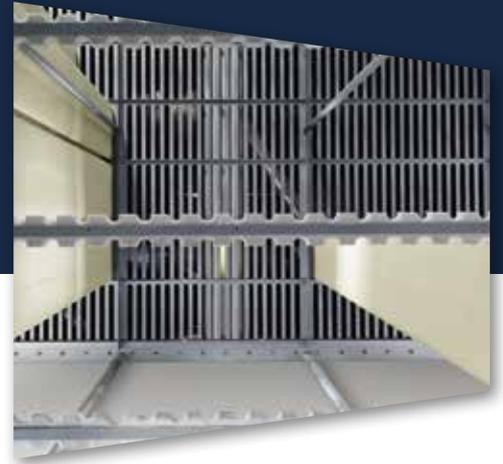
The filter housing and tray are designed using panels with smooth inner surface. The basic material and wall thickness of the filter construction are adapted to the respective requirements. Several wear features,

particularly at the raw gas inlet and material outlet, are incorporated as standard.



Both ATEX-compliant and standard models can be used in explosive environments (e.g. internal zone 20, external zone 22).

Sophisticated, standardised micro-processor-controlled filter cleaning controls provide various options for optimum continuous operation, e.g. online/offline, mandatory cleaning, pre-coating, and subsequent cleaning.



## Flat bag filter

### S-type GARANT filters

The flat bag filter uses flat, horizontally arranged filter elements. A fully welded raw gas chamber with flange-mounted clean gas chamber creates a completely gas-tight compact filter, which is also ideal for hot-gas applications. Filter media for all purposes ensure clean gas values well below the legal requirements.

The assembly times are minimised thanks to pre-assembly at our factory. Our modular design with variable bag lengths allows for individual planning with flow rates of up to 500,000 Bm<sup>3</sup>/h per filter system, and temperatures of up to 240 °C / 464 °F.

### Series

- S-type with air-flush cleaning
- P-type with mobile compressed-air cleaning
- D-type with stationary compressed-air cleaning

### GARANT TS cleaning system

The TS system, patent pending, breaks the gas flow into three filter series, taking these "offline". Filter cakes and fine-dust particles drop down and are removed. Low power consumption means the residual dust content is reduced well below the legal regulations. Readings confirm an extremely low loss of pressure, resulting in significant savings in the main fan's power input.

### System advantages

- Very low filter differential pressure
- Energy-efficient filter
- Optimised active surface on filter bag
- Inspection in the semi-penthouse
- Service-optimised accessibility
- Affordable assembly
- Corrosion-resistant due to innovative insulation concept
- Reduced operating costs (TCO)
- Air volume of up to 500,000 Bm<sup>3</sup>/h
- Temperature range up to 240 °C / 464 °F





## Pulsing round filters

### System advantages

- Robust rounded design
- Diaphragm valves integrated in the compressed-air tank
- Anti-wear measures at the material inlet and outlet
- Design featuring filter bags or filter cartridges
- ATEX-compliant design (internal zone 20, external zone 22)
- Air volumes of between 1,500 Bm<sup>3</sup>/h and 25,000 Bm<sup>3</sup>/h

### Filter bag lengths

- 1,125 mm
- 2,250 mm
- 3,375 mm
- 4,500 mm

### LHS JRU / TurboJet

This robust design is used for special powders, high pressures and high material loads of the gas due to be filtered. The round filter combines the properties of a fabric filter with those of a cyclone, thanks to its circular structure. The tangential raw gas inlet in the lower part of the housing creates a separation effect comparable to that of a cyclone. This allows most of the material to be separated by centrifugal forces before the gas even flows through the filter media.

The ENTECCO round filters are regenerated/cleaned by pulse with compressed air using a sophisticated system. The robust, circular structure enables high process-based negative and excess pressure. Relevant anti-wear measures are taken at the material inlets and outlets.

The material is once again discharged from the round filter using a rotary valve and downstream conveyors. Finally it may be removed pneumatically or mechanically.



## Compact filters

### LHS JDE

Compact filters are used for smaller air volumes of between 200 and approx. 20,000 Bm<sup>3</sup>/h, and decentralised exhaust systems. The streamlined assembly is an advantage here, as the devices can be delivered in turnkey condition.

The highly variable design of this filter opens up a wide range of possible applications. Depending on use, these compact filters can come in a square or circular design, and in varying sizes. Air volume, type of material to be separated, system pressure, and installation location are all crucial for individual designs.

While compact filters can be designed as simple mounted silo filters with filter tubes or cartridges, they can also be developed, built and

installed as complete systems containing features such as fans, silencers, air-volume regulating dampers, raw gas inlets, chutes, material discharge mechanisms, supports, ladders, and railing.

### Compact filters are used in the following areas:

- Sand conditioning
- Construction materials and dry plaster
- Sandblasting
- Weld smoke
- Mixers
- Additive, paint pigment and storage containers
- Scales (with particularly lightweight design)
- All kinds of conveyors

### System advantages

- Compact structure
- Variable accessory layout possible
- Design featuring filter cartridges or filter bags
- Filter bags may be positioned horizontally or vertically
- Option of stainless steel design
- Delivered pre-assembled
- Air volumes of between 200 Bm<sup>3</sup>/h and 20,000 Bm<sup>3</sup>/h

### Filter bag lengths

- 1,125 mm
- 1,600 mm



## Wet scrubbers

### System advantages

- Optimised systems for chipboards, MDF and OSB
- Air volumes of between 60,000Bm<sup>3</sup>/h and 160,000Bm<sup>3</sup>/h
- Highly effective collection features
- Optional system extension to reduce formaldehyde emissions
- Option of a simple design without standpipes
- Microfilter to increase efficiency if necessary
- Includes system visualisation

### LHS venturi scrubbers

A collection system optimally adapted to the relevant conditions effectively sucks off foreign matter at the point of origin. Water is injected just beyond the raw gas collection points, and the solids are flushed into the collection tank through special standpipes. From the tank, water and solids are conveyed through a venturi pipe to a special settling basin.

The raw gas containing harmful substances is once again mixed with water in the venturi scrubber, creating a homogenous mist of water droplets which dampens the toxic particles. The water droplets are then separated from the air flow in the adjacent cyclone based on the principle of centrifugal forces.

With the help of a radial fan, the purified air flows through the blasting pipe, which features an additional droplet separator, and into another purification phase.

The liquids are separated from the solids in the settling basin, from which floating sludge and deposited solids are removed using special equipment. Flocculant feeding stations and pH value controllers increase filtration efficiency and operational safety, if required. ENTECCO provides complete systems, including steel constructions, buildings, pipe work, and state-of-the-art visualisations.



## Compact bag filters with compressed-air cleaning

### AERSTAR AAS

The AERSTAR AAS is a bag filter featuring fully automated compressed-air cleaning, which reliably filters dust rather than dispersing it.

During system operation, compressed air and suctioned secondary air are blasted into the filter bags based on the top-down principle. The mass inertia forces disperse the dust stuck to the outside of the filter bag, while the injected air pushes out large volumes of the dust sitting in the fine needle felt. This process is repeated at specific intervals from filter bag to filter bag. The 6-bar compressed air required is low compared to the volume of raw gas. Depending on dust quantity and type, 0.02-0.3 m<sup>3</sup>/h of suctioned com-

pressed air is required per m<sup>2</sup> of filter area. It is important to choose the right air cleaning interval in relation to the dust concentration. Our Puls-tronic microprocessor control will do this automatically for you.

### Easy access

The filter bags are fastened securely onto a front panel with easily removable clamps. The large maintenance doors of the clean gas chamber make them quick and convenient to fit and dismantle. The diaphragm valves and compressed-air tank are similarly easy to access. As an option, we also offer the patented quick-change system for filter bags, which achieves an 80 % time saving.

### System advantages

- Maximum filter efficiency
- High efficiency
- Modular structure
- Customer-specific design
- Low-maintenance
- Easy access
- Pre-assembled delivery
- Compact design
- Expandable capacity



## Chip conveyors and oil mist filters

### Conveying coolants and lubricants efficiently

When designing and developing state-of-the-art systems for coolants and lubricants, the INFRA>PROCESS engineers and technicians put all their efforts and skills into creating smooth manufacturing, logistics and material cycles. We build the perfect systems for transporting chip/lubricant compounds from the production plant to further processing, separation and recycling.

### Oil mist separators with demister and storage technology

Our LTG AEROB product range features filters for mechanical metal processing, such as drilling, milling, rotating, honing, sanding etc. These processes involve different quantities

of various lubricants and coolants, which in turn generate different droplet spectrums when used. Furthermore, these fluids mix with the metals to varying degrees, resulting in all kinds of combinations. To cope with this, our demister technology includes so-called storage filters, which can be designed with or without backwash.

### LTG AEROB AOM, AOS oil mist separators

#### How they work

The oil mist passes through the filter cassettes vertically from the bottom up. The separated droplets trickle through drains into the collection tank. The tank's level is monitored, and the liquids can be fed back through a siphon. The large maintenance door

makes it easy to replace all filter cassettes. The cleaned gas is discharged at the top. If required, a filter for suspended matter may be installed before the outlet.

#### System advantages

- High filtering efficiency
- Suitable for all droplet spectrums
- Long lifetime
- Low-maintenance
- Energy-efficient



## Processing systems/Power and utility supply

### Experience and expertise

The ENTECCOgroup brings in an extensive industry knowledge, and is your competent partner for consultancy, design and construction of all systems relating to refrigeration technology and coolant supply, as well as vapour technology, exhaust and supply air, heating, cooling lubricants, and oil emulsions.

### Complete vapour systems

We devise and design generators and supply systems down to the last detail, and take full charge of construction and installation. The services range from boiler design, to pipe construction including condensate return, to heat recovery.

### Lubricant and oil emulsion systems

We devise appropriate, closed process circuits to collect mechanical waste products mixed with cooling lubricants and oil emulsions. These systems transport and separate the substances, treat them, and feed them back into the production process.

### Refrigeration systems

We design and build complete refrigeration and supply systems for your production plant and air conditioners. To do this, we use both traditional chillers and absorption coolers operated by waste heat. Intelligent controllers with displays complete our product line in this area.

### Sample project

- Steam boiler system with 3 x 2,000 kg/h/6.5 bar steam boilers
- 5 x 10,000l hot-water tanks
- Tank heated via the steam boiler's waste-gas heat recovery system
- 1x pressure increase
- 25-bar hot water network
- 3 screw compressors
- 8.5-bar compressed air supply
- 1 demineralised water system (reverse osmosis) 2.2 m<sup>3</sup>/h



## Ventilation systems

### System advantages

- Optimum concept thanks to calculation programs and CFD analyses
- Energy-efficient system engineering
- Complete, turnkey concept
- Customised controls
- Improved air quality, which also increases workplace productivity

### Intelligent ducting of supply and exhaust air

Our machinery performs a controlled air exchange to ensure constant, optimum air conditions for humans and technology. Low investment costs and outstanding control modes are among the systems' advantages.

- Energy-efficient ventilation systems with integrated heat recovery
- Tried-and-tested, scalable solutions for pure supply-air operation
- Warming-up using an energy source of choice

The constant rise in energy costs, coupled with the strictest requirements for production plants require constantly optimised energy consumption to reduce energy costs and improve air quality at the workplace. The ENTECCOgroup's scheme is a system solution meeting all these requirements. It revolves around complete assessment of the requirements, and analysis as per our 4-phase model. The ENTECCOgroup offers customer-specific systems based on this. From emission collection and filtration to economical use of highly efficient energy recovery, the ENTECCOgroup provides an entire ventilation concept for any production plant.



## Surface technology

### ENTECCO systems for surface coating

- Washing enclosures
- Adhesive water dryers
- Painting enclosures
- Drying enclosures
- Combined painting and drying enclosures

Painting and drying enclosures form the centre of any paint finishing system, regardless of whether they are used in vehicle repair painting, part painting, or series painting. All enclosures – painting, drying or washing enclosures – have a modular structure.

This allows us to cater individually and flexibly to our customers' needs. Emissions, fire risk and explosion risk require intense contact with authorities and industrial safety agents when it comes to designing and building paint finishing systems. To take the strain off you, we will also gladly take care of this share for you.

LHS Clean Air Systems GmbH has developed a patented system with regenerable PDC paint dry cleaning filter technology, whose benefits become fully apparent in industrial 3-shift operation.

### Our expertise

- Heat recovery
- Host computers for air conditioning
- Sectional deactivation of painting enclosures: only the required system sections are in operation
- Fully automated paint finishing systems
- Engineering services for public authorities, planning and construction based on the 4-phase model
- Servicing and after-sales service



## High-performance and standard cyclones

### For even greater filter efficiency

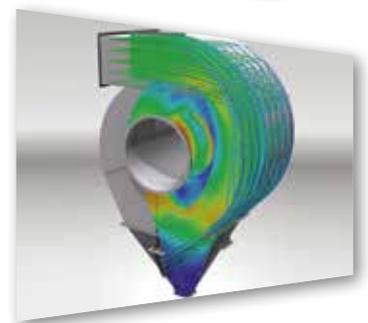
The ENTECCOgroup cyclones/ cyclonic separators are distinguished by minimal pressure loss. Applied as pre-separators and spark separators, they reduce the air's material load, which in turn significantly increases the performance and life of the subsequent filter unit. Each cyclone is designed individually depending on use, and can also feature pressure relief areas, where necessary.

Flying sparks in various applications, e.g. metallurgical high-temperature processes (coke, iron or steel production), as well as work processes such as sanding and flame cutting, cause a high fire risk for the exhaust system's filter unit.

### ENTECCOgroup cyclones

- High-performance cyclones as pre-separators before the filter systems. (TurboCyclone, including multi-cyclone groups) (1,400 to 1,000,000 Bm<sup>3</sup>/h)
- Multi-cyclones with a separation rate of over 99%
- High-pressure cyclones fitted directly into pneumatic conveyance systems with high material flows in the conveying air
- TurboSpark horizontal cyclone spark separator for glowing particles (10,000 to 1,000,000 Bm<sup>3</sup>/h)
- Skimmers fitted directly into the piping (up to 250,000 Bm<sup>3</sup>/h)
- Cyclone dust collector fitted directly into the piping (up to 220,000 Bm<sup>3</sup>/h)

- TurboGlow spark eliminator fitted directly into the piping. Sparks are extinguished by being knocked against the pipe wall, but not separated.





## Coolers and heat recovery systems

### Material coolers

Temperatures of up to 500 °C / 932 °F can arise during metallurgical processes. If such temperature peaks occur only for a short period of time, upstream mass coolers (which also serve as spark separators) can absorb them, thus cost-efficient filter materials may be applied.

### Evaporation coolers

Ideal in processes such as flue gas treatment. Injecting ultra-fine water mist into the hot process gas allows gas flows and dust particles to be cooled to outlet temperatures of around 130-140 °C / 266-284 °F before reaching the downstream filter system.

### Surface cooler

Our surface coolers have an online cleaning function, and are ideal for energy recovery. Surface coolers are equipped with horizontal cooling elements. The to be cooled dust-laden raw gas flows around the cooling elements, the clean cooling air is fed into the cross flow.

### Rotation heat exchanger

Rotation heat exchangers, also known as thermal wheels, involve a rotor as a fixed store transferring the energy between two air flows. The rotating movement causes the warm exhaust air to flow in a rotary manner from one direction, and cold external air to flow through the rotor from the other.

### System advantages

#### Material cooler

- Minimal operating costs for short temperature peaks
- Gas temperature equalisation

#### Evaporation cooler

- Reduced gas volume flow
- Precise setting of desired process temperatures

#### Surface coolers

- Online cleaning of heat exchange surfaces
- Exhaust gas outlet temperatures of up to 600 °C / 1112 °F
- Cooling elements or modules made from stainless steel or mild steel
- Extremely low input of excess air at modular design

# Further services and products of the ENTECCOgroup



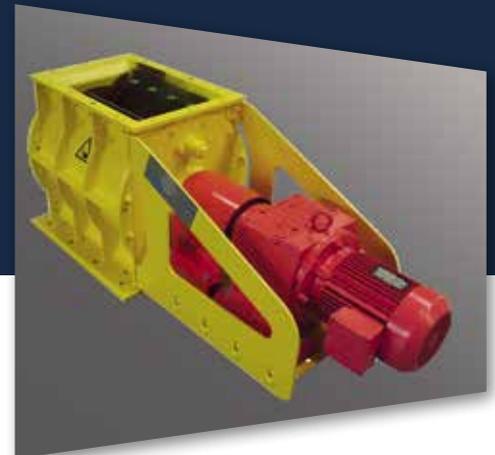
## Pipe construction

We design, plan and manufacture all kinds of pipes, as well as tubes for ventilation and dust removal technology. They range from simple piping for hall ventilation, to high-strength welded steel pipes for extremely abrasive exhaust air. Alternatively, we provide detailed manufacturing and assembly documents for a supplier of your choice to produce pipes locally.



## Sifters

Air sifters are primarily used to separate mineral or metallic components and bulk from a material flow. The ENTECCOgroup has air-sifting systems which use adjustable air volumes, cross flows and cascades to separate and remove wrong material from the material flow. Depending on their purpose, the ENTECCO sifters are designed and manufactured in different versions, primarily for the wood/timber industry.



## Rotary feeders

Rotary feeders are used to separate system areas with different pressure. Here, too, the requirements depend on purpose. Our feeders are available in standardised nominal widths of between NW 315 and NW 2000. The material quality, pressure, and of course safety issues such as fire/explosion risk, must be considered.



## Explosion protection and prevention

We supply and integrate anti-explosion equipment to protect your staff and machinery, as well as pipe flap traps, bursting discs, and dry pipe systems. All protection systems are type-examination tested.



## Mechanical conveyor technology

We also offer pipe and trough screw conveyors, as well as bucket conveyors, elevators and loading equipment, to transport material.



### Pneumatic conveyor technology

We build both low-pressure and high-pressure pneumatic conveyor systems with a capacity of up to 40 tons per hour over a hundred metres. Conveyor units, feeding stations, piping, elbows with cast-in wear-back, separation and material discharge are all perfectly adapted to the respective system parameters for wear and efficiency.



### Additive supply

Additives are supplied to dry and semi-dry flue gas treatment systems to separate acidic or toxic contaminants. The ENTECCOgroup develops stations for feeding via silo, and for storing additives in flow bins and big bags. The feeding equipment incorporates a separate loosener to ensure products, which tend to form bridges, to be precisely fed.



### Fans

Our expertise in the technically correct usage of all fan types allows us to reduce your operating costs. Optimum configuration and size, plus perfect planning, create the ideal system concept.



### Silos

Silos are a tried-and-tested solution when it comes to storing bulk goods safely and economically. Our silos/ system components are made with zoning complying with the ATEX.



## Servicing and spare parts

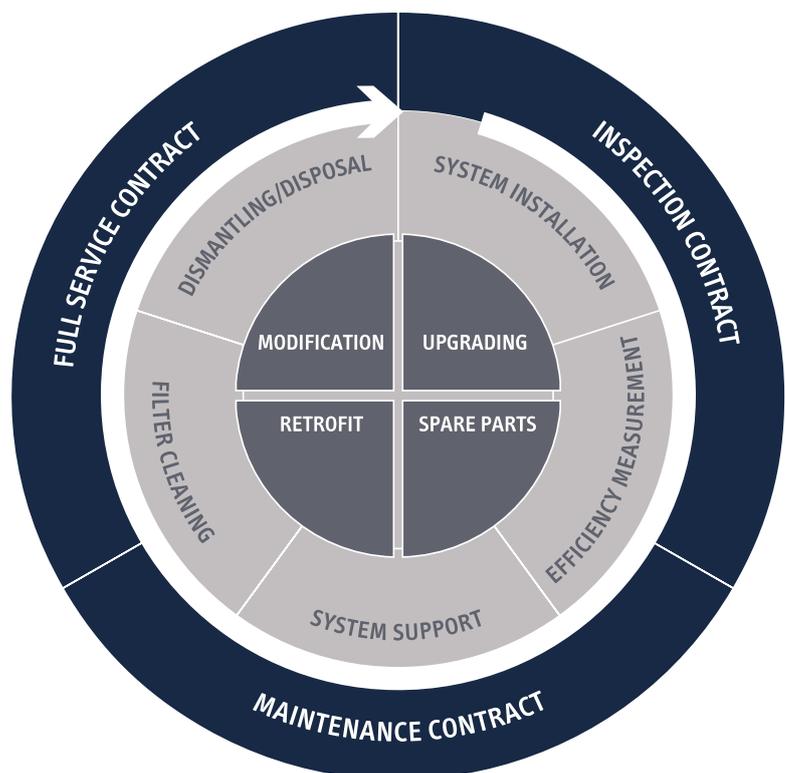
The servicing pros of the ENTECCOgroup live for air treatment just as much as their colleagues in sales, engineering and manufacturing. We dedicate ourselves fully to your system throughout its entire life cycle, and modify it to meet changing requirements, if necessary.

### ENTECCO services

- Inspection, maintenance and full-service contracts
- Spare part, wear part, and standby part service
- Installation and start-up of new components and system elements

### Non-risk advantages

- Spare parts available as quickly as possible
- Minimised downtimes
- Smart resource management regarding logistics and staff
- Guaranteed functioning of new components and system elements





## Extending, retrofitting, upgrading, testing

Sustainability is already built into the ENTECCOgroup's systems – this is made possible by modular production designs. Experienced experts plan and co-ordinate all measures. Existing systems are made even more efficient thanks to our customised upgrade solutions.

### Extension and modification

- Increased filter efficiency
- Less energy consumption
- Adaptation to changing processes
- Reduced environmental impact
- Compliance with new codes and regulations regarding emission values

### Retrofit for existing systems

- Thorough on-site analysis of current state
- State-of-the-art technology for existing systems
- Environmental compliance

“With our service contracts, we focus “on the big picture”, as our specialists assist and consistently optimise your system throughout its entire life cycle.”

### Measurements

Regular measurements allow for the recording of the current and the pre-estimation of the future system status. We use state-of-the-art diagnostic devices to conduct performance tests, gas analyses, dust tests and dust analyses. Furthermore, we examine the filter bag materials.



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