



ScandMist  
Industrial  
air cleaners

MANN+  
HUMMEL

ScandMist

# ScandMist

## For clean and safe workshop environments

### THE PROBLEM

Industrial processes that combine lubricant with high-speed machine tools generate air pollution. The exact make-up of this pollution will vary significantly depending on the process, but is likely to consist of a complex mix of toxic contaminants – including oil, water, additives, metal slivers, bacteria and more.

Unsurprisingly, exposure to this cocktail of pollutants is detrimental to both human health and the wider environment. Contact between metalworking fluids and the skin can result in dermatitis. And more severely, inhaling lubricant mist or smoke can lead to a range of respiratory illnesses, including industrial asthma and extrinsic allergic alveolitis. So, it's vital to capture industrial pollution at source, the moment it is generated, to mitigate the risk to workers and other stakeholders.

The difficulty is that as machine tools spin faster to improve productivity, coolant delivery rates and pressures also increase. And as this happens, the risk of problems from oil mist and smoke grows too, which makes the job of removing such contaminant all the more important.

### THE ANSWER

ScandMist is a range of industrial air cleaners that use a modular filter system to eliminate oil smoke, oil mist and emulsion mists for a clean and safe workshop environment.

ScandMist removes fumes, emissions and other harmful by-products of metalworking processes at source with a three-stage filtration process.

The clean air is returned directly to the workshop and exceeds international health and safety standards for exposure limits to metalworking fluids.

In fact, ScandMist exhaust air is a similar quality to that used in clinical applications, such as operating theaters. And with pre-filter efficiencies of greater than 95%, final filter life is measured in years rather than months. And that's why ScandMist is best-in-class for filtration performance



ScandMist is available as standard, off-the-shelf products with extraction capacity up to 6000 m<sup>3</sup>/h for oil mist applications and 4000 m<sup>3</sup>/h for oil smoke, or as customized high-capacity systems for air flows from 8,000 m<sup>3</sup>/h to over 100,000 m<sup>3</sup>/h.





## Inhaling oil mist has been linked to a host of respiratory problems and new health implications are still emerging.

### STAY COMPLIANT - BOTH NOW AND IN THE FUTURE

There is currently no international or EU standards for acceptable oil mist emission levels. But a marked increase in awareness of the impact to human health of ingesting sub-micron particles has led many countries to set their own limits.

In the UK, for example, guidance levels have been removed following two cases of industrial disease that impacted over a hundred workers. The UK government is now seeking new methods of monitoring oil mist levels using particle counters to monitor particle distribution rather than particle concentration. Until that time, the UK government has stipulated that there is no safe level of oil mist, and companies must ensure that workers are adequately protected through good industrial ventilation systems.

This is indicative of the changing picture across the rest of the world. As new evidence on the health impact of exposure to metalworking fluids emerges, responsible employers are taking steps to protect workers from industrial air pollution.

ScandMist can help you stay compliant, both now and in the future. ScandMist exceeds all prescribed limits for exposure to metalworking fluids. And to make compliance easy, MANN+HUMMEL or our ScandMist Expert partners can survey your facility and provide a documented report of air quality at your site — recommending an optimized filter solution for even the most challenging environments.



Oil mist exposure limits are based on the maximum permissible particle concentration levels in  $\text{mg}/\text{m}^3$ . Levels set in Europe range between  $0.2 \text{ mg}/\text{m}^3$  in Switzerland,  $1 \text{ mg}/\text{m}^3$  in France and from  $0.5$  to  $10 \text{ mg}/\text{m}^3$  in Germany depending on the coolant.

# Industrial air pollution

## The threat is microscopic

### **PARTICULATE MATTER – HARMFUL TO EVERY BODY**

Particulate matter (PM) is microscopic solid or liquid airborne matter. It can be man-made or natural, but PM concentrations are typically greatest in areas of high industrial activity. And that's why it's important to understand the effect that PM can have on your workers' health.

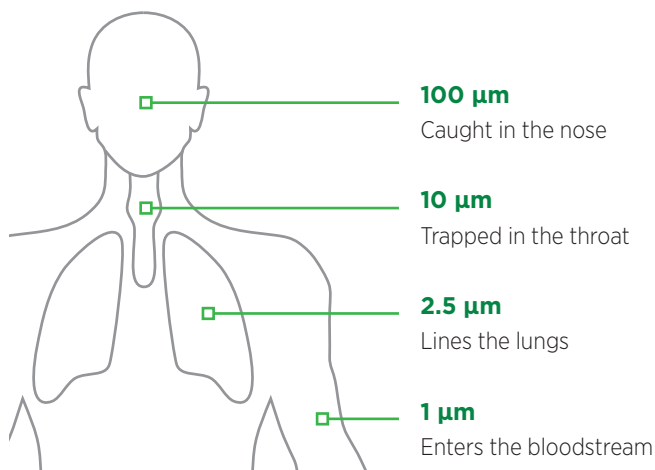
One in nine deaths globally are now associated with air pollution<sup>1</sup> and PM is a major contributor to that number.

In fact, when public bodies, such as the World Health Organization, discuss air pollution they typically talk in terms of PM10, PM2.5 and PM1 – that is, particulate matter smaller than 10  $\mu\text{m}$ , 2.5  $\mu\text{m}$  and 1  $\mu\text{m}$  respectively. And there's good reason for this. Humans are adept at stopping particles larger than 10  $\mu\text{m}$  from entering our bodies, but particulate smaller than this gets past our defences – and how far it travels depends on its size.

PM1, for example, passes through the walls of the lungs and enters the bloodstream; causing damage to our vital organs – including heart disease and various cancers.

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### **PENETRATION OF DIFFERENT PARTICLE SIZES**



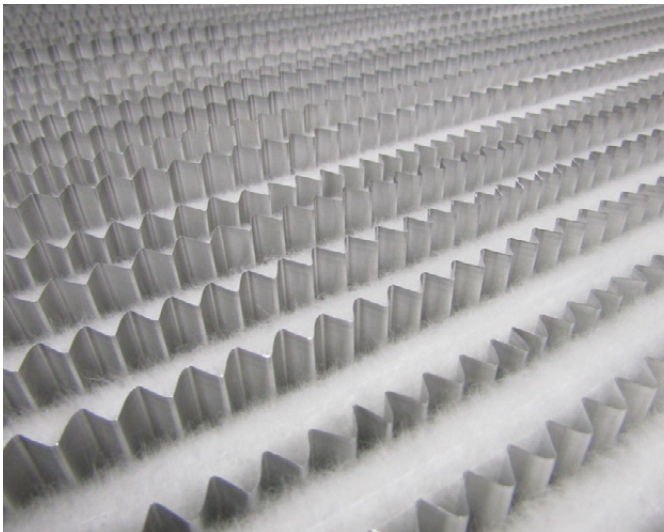
<sup>1</sup> World Health Organization, WHO releases country estimates on air pollution exposure and health impact, September 2016.



The size of particulate generated by different processes and coolants may vary, but PM1 is by far the most common contaminant.

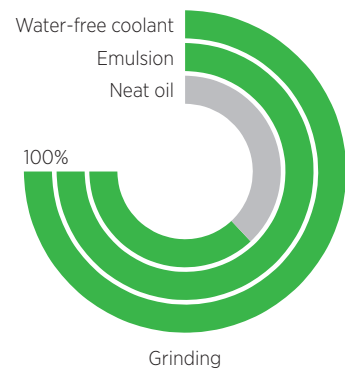
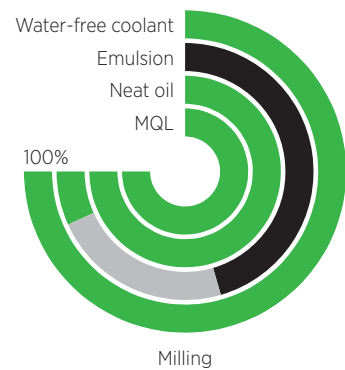
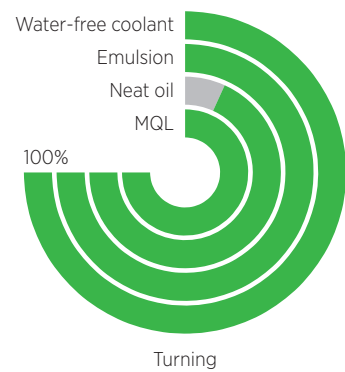
### PM1 – THE GREATEST THREAT IN MACHINING

High rotational speeds, increased process heat and high-pressure coolants mean machining processes are creating finer and finer aerosols. In 2006, a study by the German Social Accident Insurance Institute examined the pollution generated by a wide variety of machining processes using different coolants. It found that the most dominant particulate created across all processes was PM1 (right).



Most oil mist eliminators are only effective against larger particulate, around 10 µm in diameter. But ScandMist is effective where it really counts – with particulate under one micron in diameter (PM1).

ScandMist combines oil scrubbing filters with a final HEPA filter stage (class H13 to EN 1822) that provides 99.95% efficiency against particulate 0.3 µm in diameter. With this level of filtration, the output air from ScandMist is clinically clean and likely to be of a much higher standard than that found outside your facility. That means safe air quality for your workers, and health and safety resolution for you.



■ PM10   ■ PM2.5   ■ PM1

# Multi-stage filtration

## Best-in-class efficiency

### THE SCANDMIST PROCESS

ScandMist uses a three-stage filtration process to progressively clean the air flow. The first two stages remove the oil or emulsion, and the final filter cleans the air so that it can be returned directly to the local environment.

This approach prolongs filter life, reduces overall energy consumption and enables the captured coolant to be drained for recycling.

A high performance fan driven by an EC or IE3 motor draws the contaminated air through the series of filters.



Stages one and two remove 95% of emulsion and 98.5% of neat oil @ 0.4  $\mu\text{m}$ .

## 1 SCRUBBING FILTER

In the first ScandMist stage, multiple layers of pleated media collect the oil or coolant, allowing it to drain to the base of the unit. The filter media does not absorb the oil, but rather coalesces the ever-increasing droplets until they are heavy enough to drain.

Contaminated air passes through the filter media where oil particles are attracted to the oleophobic fibres. The oil droplets continue to collide with the fibre and grow in mass. As the oil drop becomes bigger, it becomes heavy enough to fall against the air flow to the base of the ScandMist unit. Here, it can be collected or drained straight back to the machine tool sump.

## 2 COALESCING FILTER

The scrubbed air is then passed through a second coalescer at stage two, where the process is repeated. This second coalescer has a higher filtration efficiency than the initial stage, and captures the smaller oil particles that were not caught in stage one.

After this second filtration stage, the air is on average between 95 – 98% free from oil mist.

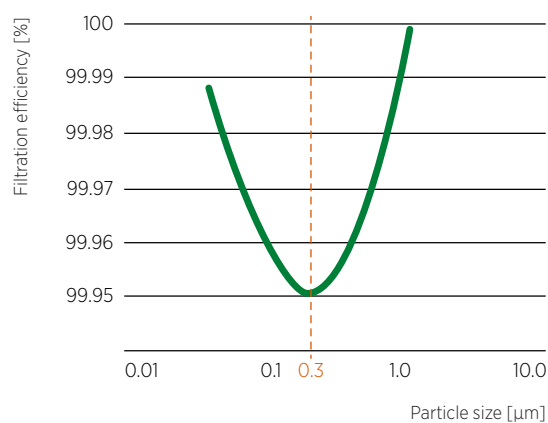
## 3 HEPA FILTER

The third filtration stage is designed to completely clean the remaining air to a standard far higher than the surrounding ambient air.

Using a HEPA filter, this final stage ensures that fine, sub-micron particles – trace oil, smoke, bacteria, pollen and spores – are trapped and not allowed to return to the workshop.

ScandMist employs an H13 (to EN 1822) HEPA filter that provides 99.95% efficiency at 0.3  $\mu\text{m}$ . This means that in a workshop environment, effectively all hazardous particles are trapped and only clinically clean air is returned to the workshop.

### STAGE 3 HEPA FILTRATION EFFICIENCY



# Why choose ScandMist?

## Consistent, efficient performance

### SCANDMIST VS. THE COMPETITION

There are a range of different technologies for combating oil mist and smoke available on the market across a range of different price points. But it is important to remember that in CNC machining applications, the most common and harmful contaminant is PM1. While electrostatic precipitators and centrifugal techniques can work well for relatively large PM10 – and even occasionally PM2.5 – particles, their performance against smaller particulate is poor. Sub-micron PM1 particles are simply too small for these techniques to capture and pass through unfiltered.

A HEPA filtration stage is sometimes employed after an electrostatic or centrifugal process. But because the initial stage is unable to remove significant quantities of PM1, this particulate quickly clogs the fine media of the HEPA filters – resulting in frequent and costly changes.

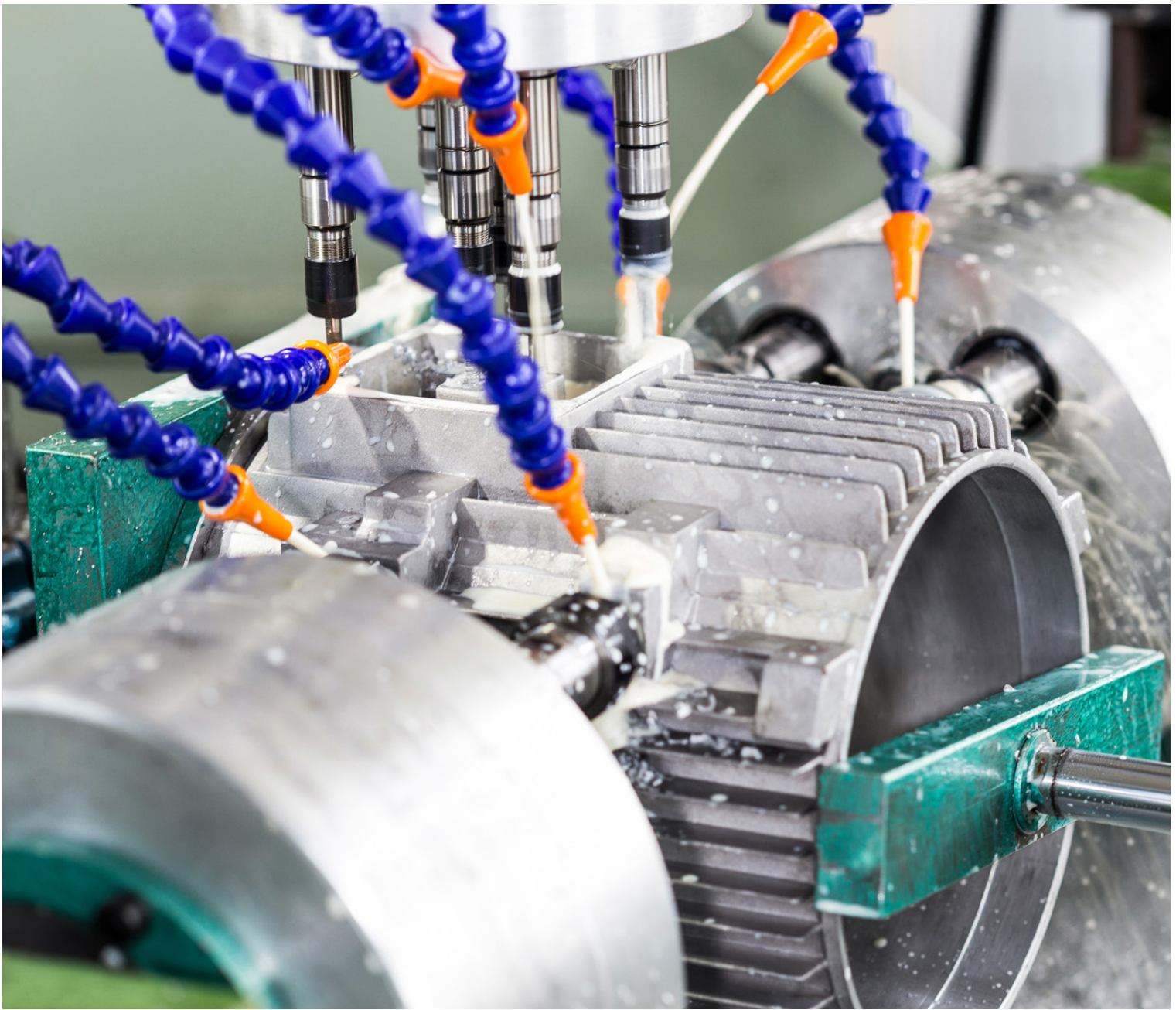
ScandMist is different. It employs coalescers in the first two filtration stages. These gather and coalesce sub-micron particles into larger droplets, which then drain to the bottom of the machine or a separate oil sump for reuse.

This delivers high efficiency, protects the final HEPA filters, and prevents all stages from becoming clogged with particulate – increasing filter life and prolonging performance.

### Filtration efficiency of different filter systems Inlet of 30 mg/m<sup>3</sup> of oil mist

	Efficiency	Outlet
	%	mg/m <sup>3</sup>
Centrifugal	10 – 90	3 – 27
Electrostatic	20 – 90	3 – 24
ScandMist	99.95	< 0.002





## REDUCE YOUR ENERGY CONSUMPTION

Some industrial filtration systems are essentially just extractors that take oil mist from the vicinity of the machine and vent it directly outside the facility. Not only is this bad for the environment, it is also bad for your wallet.

Venting scrubbed air from your workshop to the outside is the equivalent of driving with the heaters on full blast and the windows down. Your heating system is working hard to warm air that your filtration system then vents outside.

Because ScandMist's exhaust air is so clean, it can be returned directly to the workshop. That means you can break the cycle of continually heating and expelling air outside. And that can have a dramatic impact on your heating costs.

And ScandMist is energy efficient in its operation too, employing IE3 or IE4 compliant EC motors that deliver maximum performance from a low energy demand – with closed-loop motor and fan speed control fitted as standard.



The output air from ScandMist is so clean it can be exhausted directly into the workshop environment.

# ScandMist standard units

## Off-the-shelf solutions

40R / 60D



100R2 / 100D



100R / 200D



### ScandMist R series

#### Oil smoke filtration systems

	40R	100R2	100R	100R OEM	200R	300R
Nominal flow	400 m <sup>3</sup> /h	1000 m <sup>3</sup> /h	1000 m <sup>3</sup> /h	1000 m <sup>3</sup> /h	2000 m <sup>3</sup> /h	3000 m <sup>3</sup> /h
Number of coalescing stages	1	1	2	2	2	2
Quantity filters/stage	1	1	1	1	2	3
Fan/EC motor power (IE4)	0.4 kW	2.8 kW	2.8 kW	2.8 kW	2.8 kW x 2	2.8 kW x 3
Fan/AC motor power (IE3)	N/A	N/A	1.1 kW	1.1 kW	1.1 kW x 2	1.1 kW x 3
Built-in pump option	✓	✓	✓	✓	✓	✓

100R OEM / 200D OEM

200R / 400D

300R / 600D



## ScandMist D series Oil mist filtration systems

	<b>60D</b>	<b>100D</b>	<b>200D</b>	<b>200D OEM</b>	<b>400D</b>	<b>600D</b>
Nominal flow	600 m <sup>3</sup> /h	1000 m <sup>3</sup> /h	2000 m <sup>3</sup> /h	2000 m <sup>3</sup> /h	4000 m <sup>3</sup> /h	6000 m <sup>3</sup> /h
Number of coalescing stages	1	1	2	2	2	2
Quantity filters/stage	1	1	1	1	2	3
Fan/EC motor power (IE4)	0.4 kW	2.8 kW	2.8 kW	2.8 kW	2.8 kW x 2	2.8 kW x 3
Fan/AC motor power (IE3)	N/A	N/A	2.2 kW	2.2 kW	2.2 kW x 2	2.2 kW x 3
Built-in pump option	✓	✓	✓	✓	✓	✓

# Built to perform

# Built to last



## SCANDMIST SYSTEM ARCHITECTURE

1. Air inlet module — right, left or rear.
2. Integrated for pump for oil recycling.
3. Stage one — scrubbing filter.
4. Stage two — coalescing filter.
5. One piece service door with integrated seal.
6. Stage three — HEPA filter.
7. Power distribution panel.
8. Closed-loop feedback motor and fan controller.
9. Electrically-commutating motor — IE3 motor and fanset optional.
10. Pressure manometers— one for each filter stage.
11. Outlet grille — exhaust transition available as an option.



# ScandMist high capacity Fully-customized systems

## SCANDMIST HIGH CAPACITY PLATFORMS

ScandMist high capacity platforms manage the oil mist emissions from a number of CNC machines, and are particularly popular in high-volume manufacturing environments that require filtration systems for entire production lines. These high capacity systems are designed to operate as part of a local ventilation system and can handle air flows from 6,000 m<sup>3</sup>/h to over 100,000 m<sup>3</sup>/h.

The real beauty of a ScandMist high capacity system lies in its simplicity; each is a completely custom design but consists of a selection of standard ScandMist units integrated together – with one common inlet and one common outlet. This modular approach allows us to quickly design a system that is a one off and tailored for your exact requirements, while using technology that's well proven in the field.

Each ScandMist high capacity system is an integrated unit, with all the necessary components to plug in to your new or existing ventilation system. This can be configured to your requirements, but the typical ScandMist high capacity system will include:

- > ScandMist multi-stage filtration stacks.
- > System control cabinet.
- > Frequency inverter
- > High capacity fan & motor.
- > Silencing system.





# MANN+HUMMEL

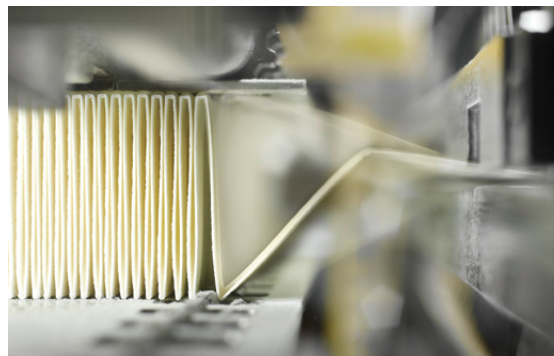
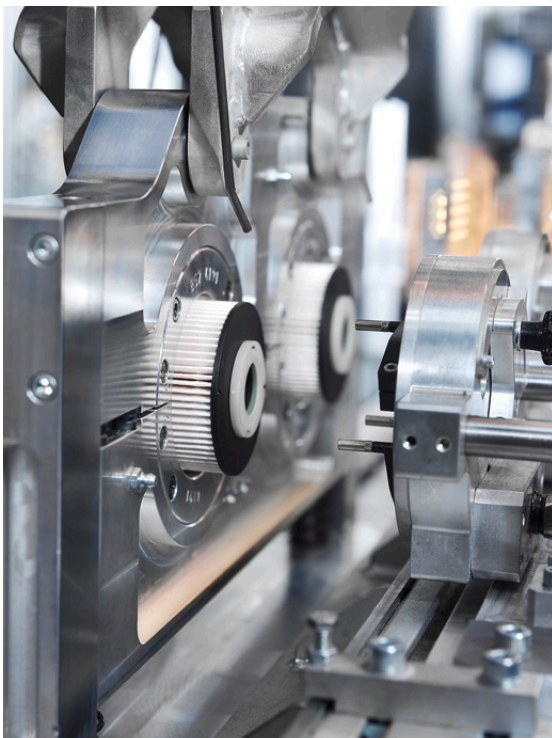
## The filtration experts

### **TWENTY FOUR.**

It is the number of hours in a day. But it is also the number of filters that MANN+HUMMEL produces every, single second. And that is part of what makes us a world leader in filtration.

But it is our commitment to quality and innovation too. Of the 20,000 people we employ worldwide, over 1,000 work in our R&D department. That means we are at the front when it comes to finding new ways to improve air quality or deliver it more efficiently – which can be seen in the more than 3,000 patents that we have registered.

The technology developed as a result of this knowledge has been recognized by many of the world's leading automotive and automotive component companies that have deployed ScandMist in large-scale industrial ventilation projects. Many have adopted ScandMist as the benchmark oil mist and oil smoke filtration platform.





MANN+HUMMEL has been a filtration specialist for more than 75 years. ScandMist is a product of this experience and expertise.

#### INDUSTRY KNOW-HOW

Not only is ScandMist well-proven in the field, so are we. Our experts have helped hundreds of customers address the problems caused by oil mist, oil smoke and VOCs in the workplace.

Much of our expertise comes from our experience across all fields of filtration. And as a major manufacturer with more than 80 locations around the world, we understand your aims and challenges.

> Detailed knowledge of machining processes

> In-depth understanding of associated contaminants

> Air filtration research and development

> Oil mist and oil smoke filtration

> HEPA filtration

> Hydrophobic coalescing filters

> Activated carbon filtration

> Thermodynamics, fluid mechanics & AHU design





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