



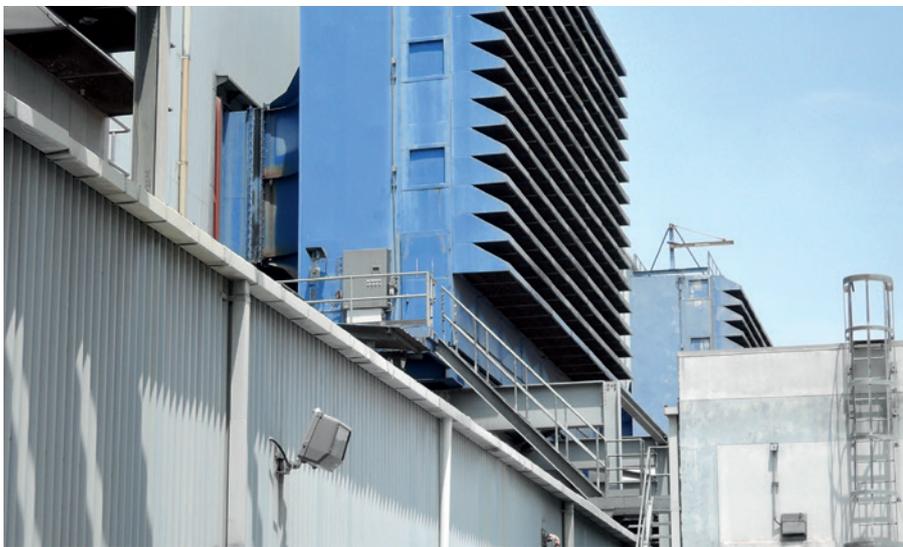
DECEMBER 2017

VILEDON NEWS

IN FOCUS: GAS TURBINES AND COMPRESSORS

DESPITE THE ELEMENTS

TWO THAI GAS AND STEAM TURBINE POWER PLANTS PROFIT FROM RELIABLE FILTRATION SOLUTIONS FOR TROPICAL CONDITIONS



Turbines in power plants depend on reliable filtration of the supply air. Inadequate filters, which allow dirt and moisture to pass through, endanger process reliability. If turbines fail, this quickly leads to bottlenecks in the power supply. Filter solutions from Freudenberg Filtration Technologies are making two power plants in Ratchaburi, Thailand, both more reliable and more powerful.

Between May and October, conditions are particularly oppressive. Rarely does the temperature fall below 30°C and it rains almost daily. The humidity is noticeably high, usually over 80 percent. Filters without permanent moisture protection quickly lose their separation efficiency under these conditions and wear out faster. As a result, the penetrating moisture can pollute the machines and damage them

to such an extent that the operational safety and process stability of the systems are endangered.

High loss of power causes problems

The two power plants in Ratchaburi generate electricity for the region. The turbines they use to do this need to be able to cope with the effects of climatic conditions. Previous filtration systems did little to help and had to be replaced after less than a year of running time. The turbine blades fouled quickly and became increasingly inefficient due to low and decreasing filtration performance over time. Unplanned maintenance and downtime as well as frequent filter changes were the result.

The solution: systematic moisture protection

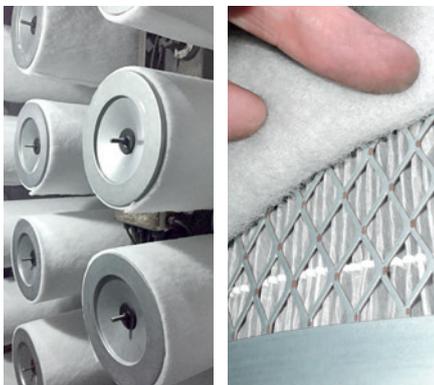
With the aim of reliably protecting the turbines at the two power plants against the demanding climatic conditions over

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the long term, our experts worked with the power plant operator to devise the optimal solution. 800 and 672 sets respectively of Viledon® GTS Pulse-Jet filter cartridges of filter class F9/ISO ePM1 80% replaced the previously installed filters. Each cartridge is wrapped with a synthetic-organic filter material. This serves as a coalescer and protects the filters and turbines against excessive moisture and penetrating water. Coarse dirt particles are also trapped by the protection.



Supply air filter houses of the power plant in Ratchaburi



Viledon® GTS filter cartridges with nonwoven wrapping

More power, less downtime

The operator is highly satisfied with the result. While the previously used filters had to be replaced in the rainy season after only three months, the filter cartridges from Freudenberg Filtration Technologies are still providing reliable protection after two years. The water-repellent material of the Viledon® GTS filter cartridges is particularly suitable for local conditions with high humidity. The pollution rate of the turbines has been significantly reduced, which positively influences the efficiency of the compressor as well as fuel consumption. All in all, Freudenberg Filtration Technologies has thus realized a filtration solution that is optimally geared to the local climatic conditions, offers impressively long lifecycles and protects the plant safely and reliably. ■



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You can find detailed information about this case study on

www.freudenberg-filter.com
> Download Center > References
> Turbomachinery



SAVING EFFICIENCY LOSSES

THAT IS WHAT ISO 16890 MEANS FOR GAS PHASE FILTRATION



Many gases in the supply and circulating air of industrial plants cause corrosion damage to sensitive electronics. The result is a loss of performance and defects that can lead to production downtime. The targeted filtration of harmful gases and fine dust therefore protects the efficiency and reliability of your devices. With the new ISO 16890, gas phase filtration can also be optimized.

Whether papermaking, laboratories, data centers, water treatment plants or petrochemicals: in many industrial processes, acid gases are generated that can corrode metals or harm human health. Sensitive electronic components react to even low concentrations of corrosive gases. The consequence is high repair costs and unplanned downtime. Prefiltration and fine filtration also help to protect the electronics. The new ISO 16890 test standard

classifies filters in terms of particle sizes PM1, PM2,5 and PM10. In the process, the standard takes into account the real particle spectrum. When selecting filters, local conditions and system requirements can be easily included.

The safe separation of particulate matter fraction PM10, which includes pollen, fibers, pigments and salt particles,

is important for gas phase filtration to ensure that the effect of the filters is not adversely affected. Thanks to the new test standard, the choice of the right filter combination is also very easy, even with individually higher requirements. With our new e.FFECT tool, we can calculate the best filtration solution for your system – and reliably protect people and machines. ■



Relevant particle sizes for gas phase filtration

You can find out more about the benefits of the new ISO 16890 in individual applications on

www.freudenberg-filter.com
 > ISO 16890 > Gas Phase Filtration

FINDING THE RIGHT FILTER SOLUTION

EASILY FIND THE BEST SOLUTION

GAIN SAFETY AND INCREASE EFFICIENCY WITH E.FFECT

The single perfect filter solution for all requirements unfortunately does not exist. The selection of the optimal filter system always depends on the respective process and ambient conditions. The more targeted the alignment, the more reliably, safely and efficiently the system works. If that sounds complicated, it is actually easy. With e.FFECT, the electronic Freudenberg Filter Efficiency Calculation Tool, we can determine the ideal filter combination for you in a very short space of time.

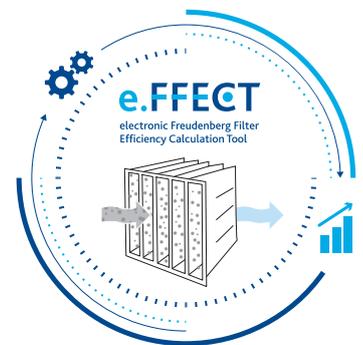
Salty air in offshore areas causes corrosion damage to equipment. In desert regions, sandstorms play a major role, while in urban areas, soot and particulate matter clog up the machines. Standardized

filtration solutions are not much use in these situations because they do not take into account the specific composition of the supply air. However, if the environmental conditions and plant requirements are taken into consideration during selection of the filters, the solutions are much more reliable.

To simplify the path to finding the optimal filter sequence, we developed e.FFECT. Using this tool, relevant influences such

Further information on e.FFECT can be found on

www.freudenberg-filter.com
 > ISO 16890



as ambient air, process requirements and other aspects can be quickly and easily integrated into the analysis. The calculations are based on the filter test standard ISO 16890 and, as a result, show the decrease in fine dust concentrations along the filter stages. In this way, different systems can be transparently evaluated and compared, which simplifies selection of the ideal filter combination. ■

Find your individual filter solution. We will be happy to help.

e.FFECT@freudenberg-filter.com

FRESH IDEAS FOR THE FUTURE

INVESTMENT IN YOUNG TALENTS SHOWS RESULTS



Our new blood on the innovation front, from l. to r.: Philipp Kuch, Dr. Christian Ewald, Dr. Georg Hirsch, Patrick Weber, Dr. Stefan Kluck and Dr. Edith Kühl

Research and development has a high priority at Freudenberg – and the company is always open to new ideas, to the delight of Dr. Edith Kühl. During her first years at Freudenberg Filtration Technologies, she has been able to advance several developments in gas phase filtration. For example, with pellets that reliably adsorb harmful gases such as hydrogen sulfide from the air, or the ChemWatch monitoring system, which monitors the corrosiveness of the air. The chemical engineer was decisively involved in both developments. But her case is no exception at Freudenberg Filtration Technologies. Promoting young talents, enabling them to get involved and to assume responsibility is one of the company's fundamental principles.

How to tie-in talents

Now they are sitting together to talk to us about their experiences as young engineers at Freudenberg. They look relaxed and confident. Whether industrial engineer, mechanical engineer or paper engineer – whoever wants to work here on innovative filtration solutions needs above all to possess curiosity and the desire to develop. "Following my dual studies at Freudenberg, I started the trainee program here. After a few months in the

lab, I was offered a permanent position", explained Patrick Weber. Existing support measures such as the trainee program are very popular. Nevertheless, the goal is to integrate talents into established teams as quickly as possible. To support personal development, numerous training courses are also offered on specialist topics and on soft skills such as time management or leadership.

INNOVATING TOGETHER

Everyone nods as Patrick Weber and Philipp Kuch praise the pleasant atmosphere and collaborative working culture. Dr. Stefan Kluck explains further:

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"BECAUSE OF OUR DIFFERENT PROFESSIONALS BACKGROUNDS, IT IS EXTREMELY HELPFUL TO BE ABLE TO FREELY EXCHANGE IDEAS WITH COLLEAGUES."
.....

This is how the company motto "INNOVATING TOGETHER" is lived at Freudenberg Filtration Technologies. The focus of the work is the development of solutions together with the customer. To achieve this, our engineers work very closely with the sales professionals. Proximity to the market is a crucial suc-

cess factor, right from the start. At the customer's site, innovative products and solutions are just as much discussed as acute problems. "We need to conduct a root cause analysis and find solutions very quickly. That particularly appeals to us", commented Dr. Georg Hirsch. "Even if new guidelines are pending", added Dr. Christian Ewald. "For example, in surface treatment, where the deposited paint sludge must now be more intensively hygienically examined. This drives many companies to implement alternatives. And that's where we feel the need for specialist information and advice."

From filters to systems

This customer and practice proximity is essential for the individual's own innovation potential. Researchers who venture outside the ivory tower will find better solutions that address the acute problems of the industry. Today, classic filter development goes hand in hand with the design of intelligent systems and individual service offerings. Developing for and with customers is therefore more important than ever. One look at this group of young scientists shows that it is clear to them that innovation and market proximity are inseparable. ■

THE FILTER BUSINESS IN 2017

60 years of Freudenberg filters. The thought fills us with great pleasure and gratitude for the many successful projects we have shared. It spurs us on to keep pushing ahead with forward-looking product and service innovations. In 2017 too, we continued on this path undeterred.

4 languages and **1** web app

Whether in the product catalog, on our website or in the new web app: you will find comprehensive information about our filter solutions wherever and however you want – for maximum freedom and easy access to information about all aspects of filtration and our products.

Fit with ISO 16890 in **4** segments

With “fit for ISO”, the new test standard was introduced through numerous seminars and webinars for our customers. In this way, we were able to provide specific tips and information for the food and beverage industry as well as for the gas turbines and compressors, surface treatment and gas phase filtration sectors.

Variety to the power of **7**

This was the idea behind the image motif for our 60th anniversary: The exploding colors symbolize the variety of technologies, applications, business fields, ideas, the community, customer proximity and cultural influences of our internationally active company.

60

YEARS

1957 – 2017

7 new Viledon® filterCair packages!

We are pleased to be able to offer new service packages. These are even better adapted to customer needs and can be flexibly combined with each other. We will happily advise you on creating your own optimally tailored Viledon® filterCair service.

8 times closer to our customers

Our team was there for you this year at the Water Berlin, FILTRES and Schüttgut trade fairs, at the VGB symposium, the Surface Treatment Days and Energy Rating seminars as well as our “ISO 16890 for your application” webinars. We are grateful for the insights into the industry and the lively exchange with our customers. Because new perspectives and impulses always drive innovation.

Over **2,300** colleagues

Even after 60 years, the Freudenberg Filtration Technologies team continues to grow. Today, with more than 2,300 colleagues, we are more broadly based than ever before. For research, production and customer service, this means even more power to create the best solutions.

2017 – A GRATEFUL LOOK BACK

2017 is heading for the home stretch at a rapid pace. High time to pause for a moment's reflection to review the most important events and topics.

2017 was all about Freudenberg Filtration Technologies' 60th anniversary. We can look back on many exciting, eventful years in which we, together with you, our customers, business partners and employees, have driven advances in air and liquid filtration. Thank you very much for your confidence and for the successful collaboration we have shared. At the same time, we look forward full of confidence to the many challenges that lie ahead. And we are quite convinced that, together with you, we will master them.

2017 is already looking like being a very successful year, during which we have grown strongly in our three core areas – Filter Business, Services and Equipment Construction. This success is based among other things on the further development of process-oriented services such as the new Viledon® filterCair service packages. In this way, we are able to offer our customers flexibly combinable solutions that help them to increase productivity and reduce operating costs. These and other innovative developments meet the spirit of the times and confirm our commitment to continuing to invest in research and development with young, highly qualified talents.

Another highlight this year was ISO 16890. The introduction of the new international test standard resembled a revolution, which we supported with numerous information days, webinars and direct customer discussions. We will continue our information activities in 2018 as well and hope these will be beneficial for you. If you have any questions or would like more information, simply send a short message to: iso16890@freudenberg-filter.com

There can be no success without the people who work with their knowledge and enthusiasm for the needs of our customers and for progress: our employees. Our special thanks go to them for their great dedication. And for the passion with which they fill our company slogan "INNOVATING TOGETHER" with life every day.

We wish you all, our customers, partners and employees, a peaceful holiday with plenty of space and time to relax and recharge your batteries. A very happy and healthy New Year to you all! ■

Your Freudenberg Filtration Technologies Team



TRADE FAIRS AND EVENTS

We look forward to seeing you!

April 17–20, 2018

PaintExpo: World's leading trade fair for industrial painting technology, Karlsruhe, Germany

May 14–18, 2018

IFAT: World's leading trade fair for water, sewage, waste and raw materials industry, Munich, Germany

November 7–8, 2018

SOLIDS: Trade fair for granulate, powder & bulk solids technologies, Dortmund, Germany

EVENTS 2017

EXPERTS AMONG THEIR PEERS

THE FOCUS WAS ON THE EXCHANGE OF KNOWLEDGE AND EXPERIENCES

Whether surface treatment days or energy rating seminars – the new ISO 16890 test standard concerns the entire industry and was therefore the subject of much discussion at our events. Participants were impressed as well with the comprehensive and diverse range of topics we covered in the second half of the year. Animated discussions about the new filter energy rating system or the latest developments in dry separation paint booths made it clear that such events continue to be very significant for the industry. ■



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