



The traditional company Schwarzwaldhof takes its responsibility for the environment seriously.

Schwarzwaldhof

## Efficient, sustainable smoking

The modern exhaust air technology used in the manufacture of meats and sausages has a great potential for saving energy and avoiding CO<sub>2</sub> production. At Schwarzwaldhof Fleisch und Wurstwaren GmbH (Blumberg, Germany), a technical solution from KMA that combines economic and ecological advantages was implemented for flue gas cleaning.

Schwarzwaldhof attaches major importance to preserving the beauty of the region for future generations, in particular the cultural landscape of the Black Forest. It is firmly anchored in the company's corporate culture to pay attention to sustainability in daily activities, conserve natural resources, and respect nature and the environment.

### Info

The multi-stage KMA process works with two filter modules to separate solids (tar) and odors simultaneously.

Triggered by the steadily growing demand for their ham and sausage specialties, the management of the Schwarzwaldhof decided to expand production in Blumberg in Baden-Württemberg. There was no question that the plant's exhaust air treatment should also be environmentally friendly, above all with the aim of significantly reducing CO<sub>2</sub> emissions. At

the same time, existing plants were checked for sustainability and economic efficiency.

### TNV: Ecological and economical No-Go

The company was looking for solutions to intensively clean the odor-intensive exhaust air of the smoking chambers while simultaneously conserving resources. Tight rules had to be observed: To meet the German TA Luft requirements, the smokehouse had to comply with the specified clean gas value of a maximum mass concentration for total carbon of 50 mg/Nm<sup>3</sup>, the odor units had to be kept below 3,000 GE/m<sup>3</sup> and the formaldehyde limit value had to be below 10 mg/Nm<sup>3</sup>. In addition, new smoking plants are already subject to an approval procedure under the Federal Emission Control Act (BImSchG) during the planning phase.

In smoking plants, the thermal post-combustion plant (TNV) or so-

called hybrid filters consisting of several filter modules are generally used to treat exhaust air. Post-combustion plants must be operated at high temperatures greater than 750 °C to sufficiently separate emissions and odors from the smokehouse exhaust gases. This satisfies the goal of purified exhaust air, but at the expense of the environment, as the fossil fuel supply required for these high temperatures consumes immense natural resources and costs and releases secondary emissions such as NO<sub>x</sub> and CO<sub>2</sub>. It was obvious that this energy-intensive process contradicted the sustainability goals of the Schwarzwaldhof, so an alternative was needed.

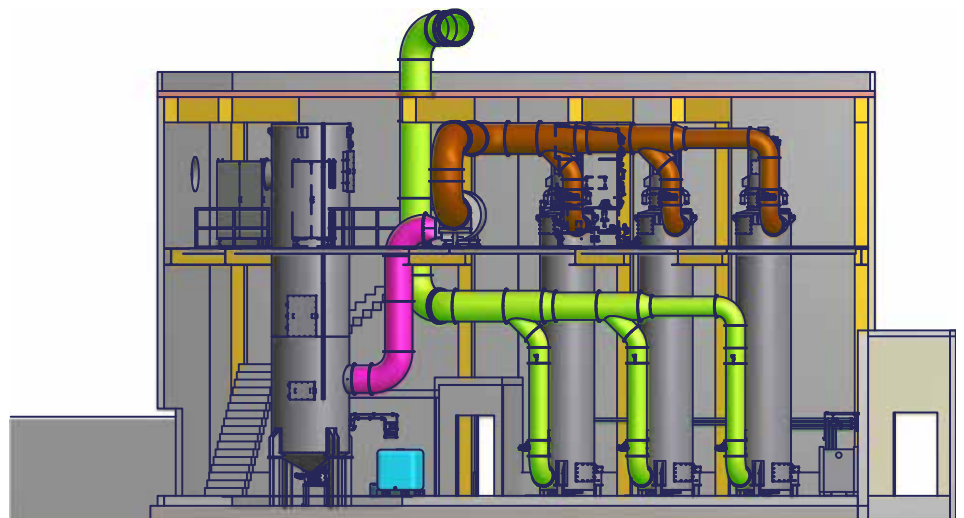
### Economy and ecology in one

The Schwarzwaldhof commissioned the filter specialist KMA Umwelttechnik GmbH (Königswinter, Germany) to design, install and commission an electric scrubber hybrid filter system.

A calculation example shows the economic and ecological advantages of this process.

The smoking systems of the Schwarzwaldhof are operated with a maximum exhaust air volume of 16,000 m<sup>3</sup>/h on seven working days per week with a daily operating time of 24 hours. The alternating cleaning intervals of the three electrostatic precipitators ensure optimum cleaning results at all times. If a conventional TNV were used, the annual operating costs would be around 713,000 euros due to the high consumption of natural gas and electricity. This was based on 5,760 operating hours and a burner temperature of 750 °C. In contrast, the operating costs of the KMA hybrid system are currently around 60,000 euros. They consist of electrical energy consumption, consumption of washing liquid and disposal of the discharged wood tar. In comparison, the KMA filter system saves 92 percent of the annual operating costs of a post-combustion plant.

The ecological effect of the plant technology used at the Schwarzwaldhof is even more obvious: while the operation of a TNV under the above conditions would lead to an annual CO<sub>2</sub> load of about 2,838 t, the carbon footprint using a KMA filter system is only 133 t – 95 percent less CO<sub>2</sub> emis-



The exhaust air technology was installed in a newly constructed technical building next to the production building.

KMA

sions. And the planned introduction of a CO<sub>2</sub> tax will open this gap even wider. Currently in discussion is a tax starting at around 35 euros per ton in 2020, which is expected to reach 185 euros by 2030. The innovative KMA technology has received several awards, most recently the Ludwig Award for Medium-Sized Businesses in the Innovation 2018 category.

### Custom exhaust air solutions

As different as the customer's requirements are, so different are the specialist's exhaust air solutions. At

the beginning of project planning, the number and procedures of the smoking plants are used as a basis. The exhaust air flows to be removed are determined, the exhaust air properties (such as temperature and pollutant concentration) are verified and limit values for the clean air quality are defined. A process diagram defines the design of the multi-stage filter system for friction-free connection to production.

Based on this information, KMA determines the appropriate filter modules with the required smoke filter capacity needed by the customer's application. The hybrid filter system is offered in various sizes under the brand name AAIRMAXX: from 50 m<sup>3</sup>/h (for small climate smoke systems) to 10,000 m<sup>3</sup>/h (for connecting entire system groups) even up to 30,000 m<sup>3</sup>/h or as a central filter depending on the exhaust air volume. For the Schwarzwaldhof project, a central exhaust air filter system consisting of three electrostatic precipitators and a gas scrubber was selected for the maximum exhaust air volume of 16,000 m<sup>3</sup>/h.

Once the required filter capacity and module size of the hybrid filter system have been defined, the installation location of the exhaust air filter system is checked and the connecting pipes drawn in the construction plans. Due to the compact design of the filters, the flue gas cleaning



The three KMA electrostatic precipitators (right) and the gas scrubber (front left) ensure clean air quality compliant with TA Luft.

Schwarzwaldhof



Division Manager Andreas Göhring (left) and Head of Industrial Engineering Bernd Goder are satisfied with the new smoke cleaning system.

Schwarzwaldhof

system can usually be installed right next to the smoking chambers. Existing production plants can be reused without modification. But installation on the roof or as a container solution for outdoor installation next to the factory hall is also possible.

### Energy-efficient flue gas filter system

From the smoking chambers, the exhaust air passes through collecting pipes to the central exhaust air filter

stainless-steel tube from below and flows centrally along the arranged high-voltage electrode. This ionization electrode generates a strong electric field with very low energy consumption. The electrostatic charge inside the tube causes the passing pollutants to migrate to the earthed stainless-steel walls of the separator tube and settle. This process is copied from nature and resembles the cleaning effect of a thunderstorm: dust and other particles are charged by ionization and then precipitated. The ener-

## “We smoke not only economically, but also environmentally consciously.”

Andreas Göhring, Division Manager, Schwarzwaldhof

gy input with this method of smoke separation is extremely low – only a few hundred watts of smoke are required per 1,000 m<sup>3</sup> of smoke. Bernd Goder, Head of Industrial Engineering at Schwarzwaldhof, is also pleased about this and emphasizes in this context the good cooperation with

system. In the KMA process, the smoke is treated in two steps. In the first step, the exhaust air for particle separation reaches the “heart” of the cleaning system, the AAIRMAXX tube electrostatic precipitator. The flue gas loaded with fine wood tar particles enters the vertical

stainless-steel tube from below and flows centrally along the arranged high-voltage electrode. This ionization electrode generates a strong electric field with very low energy consumption. The electrostatic charge inside the tube causes the passing pollutants to migrate to the earthed stainless-steel walls of the separator tube and settle. This process is copied from nature and resembles the cleaning effect of a thunderstorm: dust and other particles are charged by ionization and then precipitated. The ener-

KMA in the project planning and implementation phase.

With the system, a wide variety of pollutants can be removed from the exhaust air in a highly effective manner without sticking to the filter medium, because the separated tar droplets and residues flow off on the inner walls of the tubular electrostatic precipitator. The filter tube has a liquid collector at the bottom with an outlet to the depot container. An integrated hot-air cleaning program automatically cleans the interior walls of the smoke filter system. The constant efficiency of the exhaust air cleaning system eliminates the need to replace the filter cell.

In the second step, the pre-cleaned smokehouse exhaust gases flow through an exhaust air scrubber, which filters odors, gases and vapors from the exhaust air according to the absorption principle. The gas scrubber is designed as a pH-controlled tower packing scrubber with a highly effective countercurrent column. This means that inside the stainless-steel tube, a washing liquor flows against the stream of the incoming smoking plant exhaust gases, removing gaseous air pollutants and aromas from the exhaust air stream. Automatic regulation of the exhaust air scrubber adapts the washing liquor and freshwater demand to the respective operating situation.

The Schwarzwaldhof took the opportunity of the production expansion to also equip the existing flue gas plants with the latest generation of exhaust air filter systems: “We take our responsibility for our environment seriously. That is why we constantly optimize our operations for greater sustainability. We saw great savings potential in our smokehouses and were convinced by the figures. We not only smoke economically, but also environmentally consciously. But there’s a catch: Since we put the new exhaust air purification plant into operation, Blumberg no longer smells as much like Black Forest ham,” says Andreas Göhring, head of the business unit, with a smile on his face.

[www.kma-filter.de](http://www.kma-filter.de)