



The process: 1) Smoke particles are electrostatically charged. 2) Charged particles are quickly and evenly drawn from the product. 3) Product quickly absorbs all smoke particles. 4) Control unit regulates high voltage on the electrode and smoke density. 5) Isolators ensure stable high voltage, also with temperature fluctuations, liquids and dirt etc.

Illustration: EBSmoke



# Smokers with ionisation follow different rules

## Electrostatic filters inside a smoking system improve emissions and cost-effectiveness

An electrostatic filter can now be retrofitted directly in a smoking system. The smoke is electrically charged as it streams in. The electromagnetic forces mean the product absorbs the smoke more quickly. This brings sustainable and financial benefits, such as lower energy consumption, shorter smoking times and significantly lower particulate matter emissions. The new Ionsmoke system is already used at 45 locations around the world.

By Philipp Berchtold

Refining meat products through smoking is also a topic in the environmental discussion due to high energy consumption and the environmental impact caused by the emitted smoke. Traditionally, smoke is produced by incomplete burning – after smoking, it requires an extensive filtering process. New legal requirements that came into force for environmental protection affect the market to develop new ideas. A small butcher's shop in a Swiss village has come up with one such idea. The butcher installed an electrostatic filter on the roof of his installation here to reduce the fine particulate impact of his open smoking system.

After understanding the principle of the electrostatic filter, he got the idea of building this filter directly into the chamber.

Tests with electrostatic smokers had already been performed over the past decades, but only recently was the time right for a fully-developed patent with market maturity. Today the modules can react via high-performance chips in milliseconds to the various external influences in a system. Isolators and cables are robustly built and withstand the extreme conditions in a chamber. And the process has matured. The process technology and the treatment processes with a smoker with ionisation follow different rules than those with traditional open or closed smoking systems. High voltage must be dynamically applied per product; the following procedure occurs fully automatically. HACCP specifications are still complied with.

### Financial benefits with Ionsmoke

The principal benefit is the faster smoking time, and most further benefits are then directly derived from this. Traditionally, the smoke chamber is filled with smoke, and then the exposure time starts. The smoke settles on the product due to the duration in the smoking

chamber. Therefore, smoking through ionisation is classified as active smoking because the smoke is actively applied to the product, unlike passive smokers.

The result: ionisation generally cuts down 50% of the smoking period. As this is usually connected with the drying time, it can also be shorter when the smoking and drying steps run in one interval, for example. Entire smoking and drying cycles can potentially be omitted here. The effect on total time can therefore be greater than the effect of the ionisation alone on the smoking time. Generally, ionisation is recommended for conventional smoking periods of over 30 minutes to be cost-efficient.

Weight loss during warm and hot smoking is wanted. However, there is a required weight loss and an excess weight loss. A product can then, for example, already have reached its desired weight before the colour is right. With each additional minute, the weight is unnecessarily further reduced – the product literally “goes up in smoke”! Because of the faster smoking times with ionisation, this weight loss can be prevented or, at the very least, better controlled.

A faster process also saves electricity for smoke generators and heating elements. Shorter

smoking times result in extended life cycles of the machinery. If there is afterburning, natural gas can be saved. Smoke density monitoring improves quality assurance to guarantee a uniform colour for every batch. The system is immediately informed if there are problems with the smoke density. The return on investment must be worked out individually. There is a savings calculator for the two main savings criteria – time and weight. The graphic shows the process of a typical smoking system with ionisation in five steps:

- 1) The particles in the smoke are electrostatically charged with high voltage on the electrode when streaming through the smoke chamber.
- 2) This charging means the particles are quickly and evenly drawn from the product in the smoke chamber.
- 3) In the air circulation, all smoke particles are then practically absorbed from the product and the system in next to no time.
- 4) The control unit with a high-voltage power supply is mounted outside the smoke chamber. The high voltage generated here is routed to the electrode inside the smoke chamber.
- 5) The two isolators mounted on the side prevent short circuits and are configured so a stable high voltage will also be applied with changing temperatures, humidity and dirt etc.

### Analysing smoke density

The smoke density can be measured with the ionisation process. Several factors play a role here: Chamber size, temperature and humidity. The two available measured values are voltage and current. Their ratio shows how much smoke is in the chamber. If there is a lot of smoke in the chamber, the electrons have to travel less. This means it uses less current to achieve the desired voltage. If there is no smoke in the chamber, the electrons travel further. It uses more current for the same voltage. The current and voltage curve is recorded. This is seen clearly with a smoulder smoke installation with a feed motor: After the pause time, when new smoulder material is added to the heat source, the current curve

shows when fresh smoke enters the chamber. The curves are automatically compared on typical indicators and with existing curves. The system detects a lower smoke density. A significant deviation can indicate faulty behaviour of the smoke generator. This message can already be communicated during the smoke step.

### Smoke generators and products

Retrofitted systems now run in daily production with wood chips, sawdust and friction smoke generators. Also steam smoke generators are regularly in use by now – also providing significant savings. Raw sausages, bacon or salmon, for example, are treated with ionisation in cold smoking systems. Ham and pork ribs are treated with warm smoke, and trout, Wiener and ham sausages are treated with hot smoke. Sausages with various calibres and casings are processed. Furthermore, some fish factories switched over to ionsmoke completely. And cheese can be smoked like this as well. The first tests with liquid smoke were promising. The financial benefits, however, have to be calculated differently as the benefits for liquid smoke are mainly in capacity and savings on liquid smoke itself.

### Operational safety

With ionisation, the voltage (volts) is very high, while the current (amperes) is very low. This is similar to an electric fence, which generates up to 30 000 volts, but the current flow is so low that it is harmless. Released smoke is toxic for humans – with or without ionisation. Systems in smokehouses therefore already have existing safety standards. The door can be opened from the inside and emergency switches are mounted everywhere. If someone opens the door during operation, the ionisation stops. Correct grounding prevents the chamber's potential from changing with the high voltage. Installed professionally, the smoke chamber and chamber door can be touched without any cause for concern – during running operation as well.



The isolators inside the smoke system are configured so that stable high voltage can be applied constantly. Photo: EBSmoke

Ozone is created with the ionisation process. The ozone can only be detected when the ionisation is operated without any smoke feed. Ozone in higher concentrations is harmful to humans. The chamber must be well-ventilated after the ionisation. The ozone does, however, have a positive side effect: The disinfecting effect of the ozone can also remove viruses, bacteria and moulds. These ideas have not been pursued to date. They could, however, be well worth following up on, as in many air-conditioned rooms, the space is already treated with UV light.

### Environmental effect

The smoke generated is released to the outside air via the flue after the product's circulation air treatment. This releases fine particulate into the environment. Over time this has been forbidden by legislators in many countries and regions. In the interests of environmental protection, the market now offers various solutions. Thermal afterburning is often used: With a thermal afterburner, in a chamber or with an open flame in the flue pipe, the smoke is burnt out at 800 °C. Typically, the energy source for this is natural gas. And natural gas is expensive and despite the absence of pollution by particulate matter, there is still a CO<sub>2</sub> impact.

The total carbon emissions are mostly used to measure pollution. An electrostatic particulate matter filter, so the ionisation, cannot reduce the total carbon, regardless of whether it is installed in the chamber or in the flue. The total carbon appears in gas form, and ionisation



A savings calculator shows the system's potential for the two criteria – time and weight. Illustration: EBSmoke



For sausages, the most diverse calibres are processed with different casings. Photo: EBSmoke

only filters particles out of the air. In countries or regions at any rate, however, where particles are measured instead of total carbon, the after-burning can be eliminated by operating the system with ionisation. The particulate matter

in a closed system can be reduced up to 98% with ionisation.

Ionisation can, however, also bring much for regions and countries where the total carbon is pivotal – shorter smoking times mean less

smoke. This results in fewer operating hours of, for example, a gas-run afterburner and the smoke generator itself.

### Food safety

Food companies regularly send their products to the lab to test them for food safety, as do customers who use Ionsmoke. The amount of polycyclic aromatic hydrocarbons (PAH) is also relevant for smoked products. To date, food safety has always been a given with ionisation. When the same product colour was achieved, the measured values were also similar. Substances such as benzo[a]pyrenes were not detected in lab tests after almost two hours of smoking. In direct blind tests, it could not be shown whether the product was smoked with traditional methods or with ionisation.



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## Molex

### Safety in harsh environments

Molex, a global electronics leader and connectivity innovator, introduced the Super-Safeway Ground Fault Circuit Interrupter (GFCI) industrial-duty product. The new GFCI offering is the first portable 20A device to earn the IP69K rating, which is the highest level of industrial protection against the penetration of high-pressure, high-temperature water and dust. This latest addition to Molex's Woodhead line of permanent-mount and portable GFCI solutions is ideally suited for the food-processing industry as well as other applications where sanitizing equipment continually creates excessive moisture and humidity conditions.

A multitude of industrial and electrical challenges exist in food processing, petrochemical processing and mining plants where excessive water, moisture and humidity can create hazardous conditions. Similar risks occur in temporary outdoor environments where exposure to the elements can damage electrical equipment. For that reason, among others, the U.S. Occupational Safety and Health Administration (OSHA) provides stringent guidelines on the use of GFCI solutions to protect employees from electrical shock.

Molex's new double-insulated GFCI meets industry standards while offering extra measures of protection to keep workers safe. The product's open-neutral sensing relay stops power flow under threatening conditions in accordance with OSHA requirements. Additionally, the product meets both UL-listed and CSA-certified regulations. The IP69K-rated Super-Safeway GFCI Industrial-Duty product also features superior sealing properties, impact-resistant housing, chemical/UV-resistant enclosure and vulcanized rubber for long-lasting, reliable operation. Nuisance tripping is minimized by the inclusion of an electronically enhanced filter while various product options, including automatic and manual resets as well as different outlet-box configurations, are designed to accommodate a variety of worksites.

## Südpack

### Thinner and yet recyclable

A range of films to manufacture food packaging, whose top and bottom webs are

aligned and are designed to be processed on standard machines?

Introducing Pure-Line from Südpack Verpackung GmbH & Co. KG (Ochsenhausen, Germany). Its innovative material structures also set

standards in terms of functionality, processing capability and, above all, sustainability.

Thanks to PurePP, customers now have access to a strong product family to replace conventional, non-recyclable packaging concepts. The recyclability of such a single-material solution can be substantiated by a certificate from independent external institutes if required.



The lower weight has a positive impact on the overall carbon footprint. Photo: Südpack

Pure-Line films also boast maximum performance and sufficient stability for optimum presentation at POS – with minimal material input. Above all, these high-performance top webs are extremely thin and already available in film widths starting from 60 µm. However, depending on

the products to be pack-aged, these modern material structures can be flexibly equipped with different mechanical and functional properties in order to provide optimum product protection and extended shelf life. These range from puncture resistance and peelability, through high transparency to a high oxygen barrier.