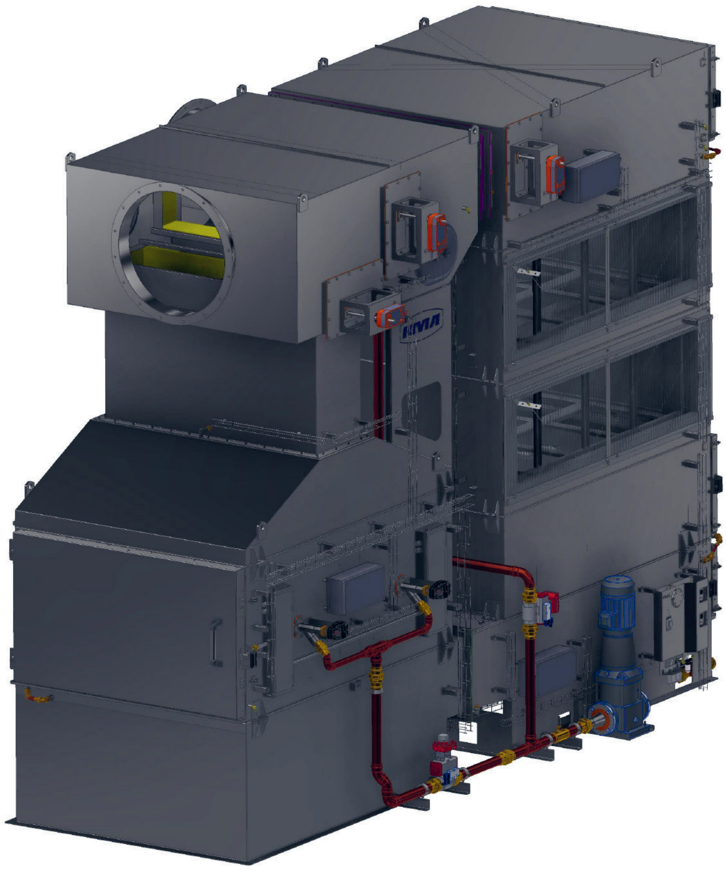
CLEAN AIR. SAVE ENERGY.



ULTRAVENT® Tandem
Exhaust air filtration and heat recovery
for demanding processes

One system. Two goals.

KMA offers tailor-made solutions for exhaust air purification and heat recovery on stenter frames.
The energy-saving KMA exhaust air filters pursue two goals: Clean air in textile finishing while at the same time reducing energy consumption.

We combine environmental protection and economic efficiency

The ULTRAVENT® Tandem is suitable for manyfold processes in textile finishing on stenter frames as

- heat treatment
- wet finishing
- coating applications

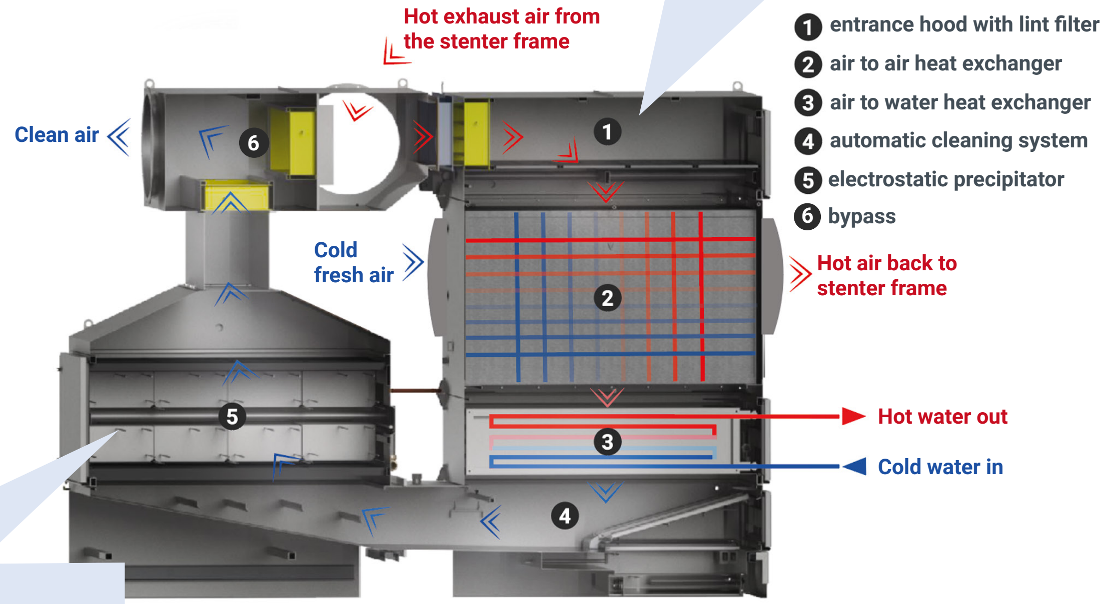
The exhaust air from stenter frames is highly loaded with dusts and oil particles, but at the same time contains valuable waste heat from the finishing process. With more than 60 years of business experience, KMA is a leading expert in exhaust air purification and heat recovery. The proven KMA ULTRAVENT® Tandem combines highly effective electrostatic precipitators with powerful heat exchangers. This innovative filter technology offers environmental protection on several levels: The KMA system has proven to separate tons of oil per year from the exhaust air at stenter frames and thus reduce environmental pollution. Furthermore the ULTRAVENT® Tandem recovers valuable heat energy and returns it to the production processes. This significantly reduces overall energy consumption. Our climate is protected thanks to lower CO_2 emissions and at the same time our customers can cut their energy costs. Binding emission regulations for the operating permit are complied with, measurable contributions to sustainability can be proven and production costs can be permanently reduced. This way KMA ULTRAVENT® Tandem offers important strategic advantages.

The KMA ULTRAVENT® Tandem

KMA ULTRAVENT® Tandem is available in three sizes with a filter exhaust air capacity of 15,000, 20,000 and 30,000 m³/h. ULTRAVENT® Tandem consists of two functional components, integrated to a comprehensive solution: The first component contains the heat exchanger technology for cooling and powerful heat recovery. The second component contains an electrostatic precipitator for highly efficient particle separation.

Component 1: Heat exchanger

KMA ULTRAVENT® Tandem can be equipped with air-to-air heat exchangers, air-to-water heat exchangers or a combination of both. The specific configuration is chosen, based on an evaluation of the available heat energy in the waste air and the preferable way of using the recovered heat energy. As a result the overall energy consumption of the stenter is reduced, since less energy from the cost intensive conventional heating methods such as gas or thermal oil heating is required. The offered combination of supply air and water heating is unrivaled on the market.
The processing of fabrics frequently creates high amounts of lint. KMA ULTRAVENT® Tandem is equipped with mechanical lint filters before the waste air enters the heat exchangers.



Component 2: Electrostatic precipitator

The second component of the system is the electrostatic precipitator, which is specialized in the high-grade separation of smoke, dust and oily, greasy and pasty particles. The ionization electrode generates a strong electrical field with very low energy consumption. The particles move by electrostatic forces and stick to the collector plates. The air flow through both components is vertical with a redirection at the center. The heat exchangers are flowed through from the top to the bottom. Air flow and gravity thus help to carry out condensate and pollution. The electrostatic precipitator is then flowed through from the bottom to the top. It is thereby effectively protected against dripping substances from the heat exchanger. The vertical arrangement of the filter cells support effective cleaning with the integrated cleaning system.

All configurations of KMA ULTRAVENT® Tandem include a cleaning system for automatic cleaning of heat exchangers and the electrostatic precipitator. The system is leading in terms of comfort and washing result thanks to the rotating nozzle system, which moves between the filter and heat exchangers during the washing process. The integrated bypass ensures that production can continue on the stenter during cleaning or maintenance of the filter system.

Both components of the system can also be installed individually, if only one function is required. In that case the Tandem structure can be provided for in a way that the other component may be retrofitted at a later time.

Space-saving installation on the stenter frame

Integrated Heat recovery

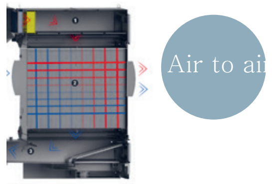
Textile finishing is by nature a very energy intensive task. Depending on the finishing process and fabric type, stenter frames are operated at temperatures of more than 200 °C. The energy costs thus represent on average more than 20 percent of the total operating costs. Heat recovery is a powerful tool to reduce these costs and at the same time improve the carbon footprint .

The heat exchangers integrated in the KMA ULTRAVENT® Tandem extract the valuable waste heat from the hot exhaust air. Returning the recovered energy into the production process results in significant energy savings. At the same time the cooling of the waste air is an important step in air filtration. Volatile substances are extracted in the condensation process and the subsequent electrostatic precipitator operates most effective at temperatures below 70 °C. This way, energy recovery is a win-win procedure.

The system can be equipped with air-to-air heat exchangers, air-to-water heat exchangers or a combination of both.

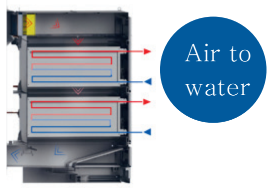
Air to air - For recirculation of heated ambient air into the stenter frame

- immediate gas saving at the stenter frame
- CO_2 reduction in the production line
- with a decisive influence on the carbon footprint of the end product



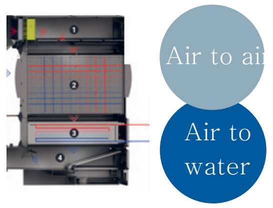
Air to water - For the production of hot water (or solar fluid) for other processes

- provision of pre-heated water for dyeing or laundry processes
- heating of buildings /warehouses
- contribution to overall energy efficiency & support of the hot water infrastructure



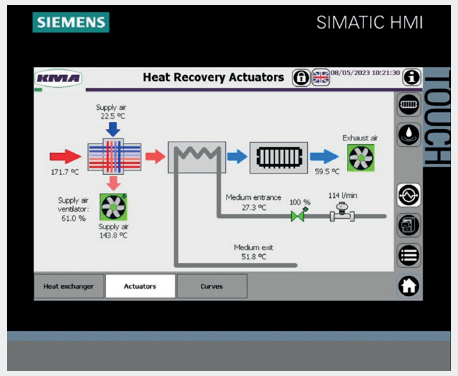
Air to air & Air to water - As combination of both configurations

- supply of the stenter frame
- supply of other processes with pre-heated water
- flexible setting of priorities and target temperature levels



A unique strength of the system is the high efficiency of the heat recovery and that this is achieved continuously, not only during performance peaks. The integrated cleaning system is of particular importance for this. The high potential of energy recovery can result in a payback period of less than two* years for the entire system. In this way, ecology is ideally combined with economic efficiency.

* with an exhaust air volume of 20,000 m³/h, 170 °C, 5,000 operating hours/year and a gas price of €0.025/m³



Programmable controller (PLC)

The Siemens S7 allows permanent monitoring of all functions of the KMA ULTRAVENT® Tandem. It intelligently controls the heat recovery system, e.g. the frequency of supply air fans or the flow rate of the heat transfer fluid in the heat exchanger depending on the exhaust air temperature, exhaust air volume and other target parameters.

The HMI display shows the current heat recovery performance as well as the operating status of the electrostatic precipitator. All relevant parameters as well as automatic cleaning and preventive maintenance advice are accessed via an intuitive graphical menu.

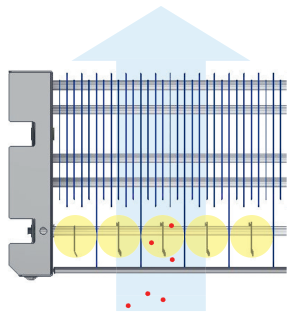
High-grade exhaust air filtration

The exhaust air from the stenter frame is heavily polluted by the chemical and thermal treatment of the textiles. Depending on the textile finishing process, different pollutant emissions arise at the stenter frame and need to be treated. In addition to fumes, oil smoke and aerosols, also wax particles, formaldehyde, synthetic resins or fluorocarbon resins have to be separated from the contaminated exhaust air. There are country-specific regulations and legal requirements with regard to the emission limits on stenter frames. In order to separate emissions, the hot exhaust air is cleaned in an electrostatic precipitator.

The double staged electrostatic precipitator is characterized by high separation efficiency, very low energy consumption and the durable and robust design of the filter cells: frame, electrodes, collector plates and carrying bars made of stainless steel, insulators in oil-resistant ceramics and an optimized design for the separation of liquid substances. The filter cells do not need to be replaced. They are wet cleaned and can be operated for years. A preceding mechanical lint filter as well as wire mesh demisters protect the electrical separator from larger objects and facilitate continuous operation. Heat recovery allows the electrostatic precipitator to operate effectively at optimum exhaust air temperatures. Depending on the specific characteristic of the exhaust air and the customer's requirements, KMA ULTRAVENT® Tandem can be combined with further exhaust air treatment methods by KMA, e.g. activated carbon, UV light, gas scrubbers or biofilters.

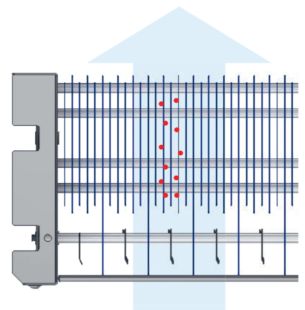
1. Ionization

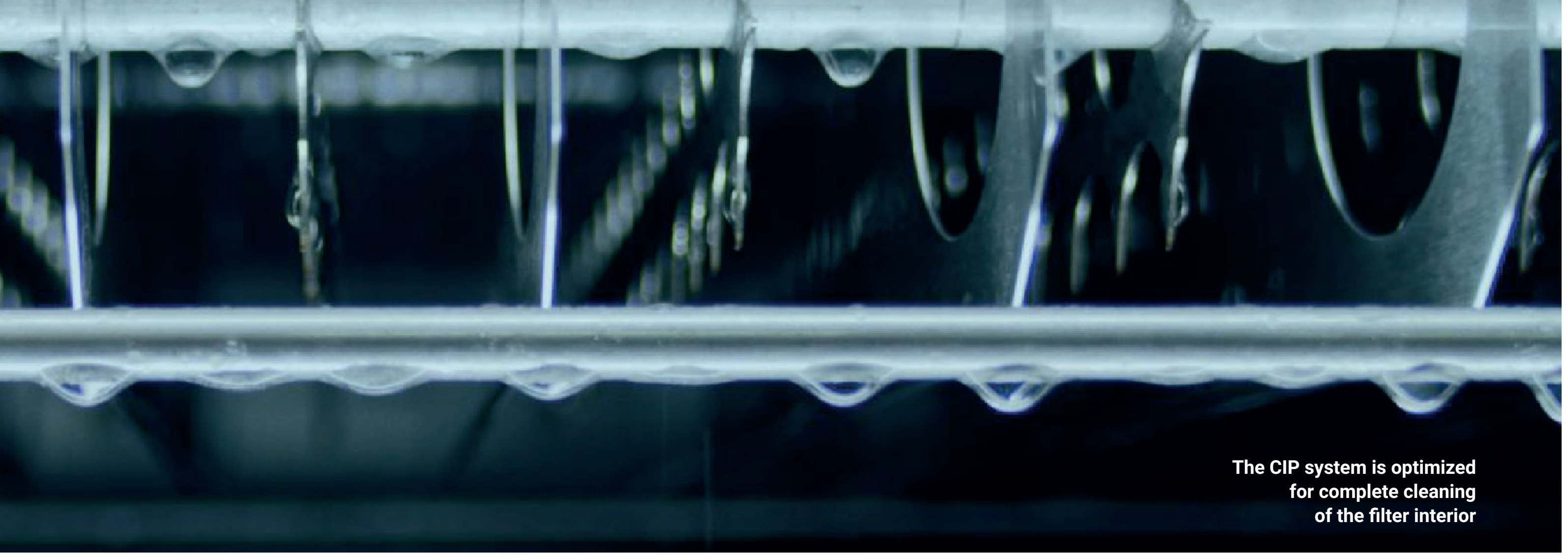
High voltage at ionizing profiles creates an electrical field, where passing particles receive a charging



2. Separation

Grounded separator fins attract passing particles and hold them back with minimum resistance to the air





The CIP system is optimized for complete cleaning of the filter interior

Automatic cleaning system

High efficiency & minimal maintenance

Many customers and prospects have already had experience with cleaning heat exchangers and electrostatic precipitator cells. This work is dirty, hard and time-consuming. With the automatic cleaning, KMA ULTRAVENT® Tandem reduces the workload of the maintenance staff and keeps the cleaning effort to a minimum while protecting the technology from wear.

Main cleaning:
During the main cleaning, the filter cells and heat exchangers are cleaned in place (CIP) with water. Thermal, chemical and mechanical forces act together.

1. Thermal cleaning force:
The cleaning water is heated to approx. 80 °C using supplied steam or optional electrical heating. Contaminants are dissolved more effectively in the hot water.

2. Chemical cleaning force:
A cleaning detergent is added in low concentration to the cleaning water. Target dosing is ensured by an automatic feeding pump. The cleaning detergent dissolves oily and greasy deposits.

3. Mechanical cleaning force:
The hot cleaning mixture is sprayed into all areas of the heat exchangers and the filter cells via rotating spray bars. The water runs back into the cleaning tank and is continuously circulated through the system via the cleaning pump for a duration of approx. 2 hours. The cleaning system, which has been developed over many years, achieves unique effectiveness while conserving resources. After the cleaning process, the floating oil phase is skimmed off and depending on the degree of contamination, the washing water can be reused for another cleaning.

In addition to the main cleaning there are further flexible cleaning options:

Online cleaning:
Only the heat exchanger is sprayed with water during filter operation in 30-minute intervals. Deposits are continuously rinsed off before they become encrusted. This ensures that the heat exchanger surfaces are clean and the heat transfer is most effective.

Short cleaning:
Service times at the stenter frame (batch change, cleaning of the lint filter, etc.) can be used to clean the heat exchanger and the filter cells in an abbreviated intermediate cleaning. This option supports to bridge or extend the period to the next main cleanings.

Case study: AUNDE

AUNDE uses waste heat recovered with KMA ULTRAVENT® Tandem

The German textile company AUNDE realizes an energy recovery of 486 kW per hour and saves 18% energy per year. The CO_2 emissions are thus reduced by more than 405 tons per year. The KMA heat recovery system saves a total of 2,300,000 kWh of valuable process heat.

The case

For two stenter frames of the textile company AUNDE with a total exhaust air volume of 24,500 m³/h, an energy-efficient heat recovery and exhaust air purification was to be implemented. The aim was to reduce the high energy consumption of the stenter and to reuse the valuable heat from the exhaust air with an average temperature of 143°C.

Our solution

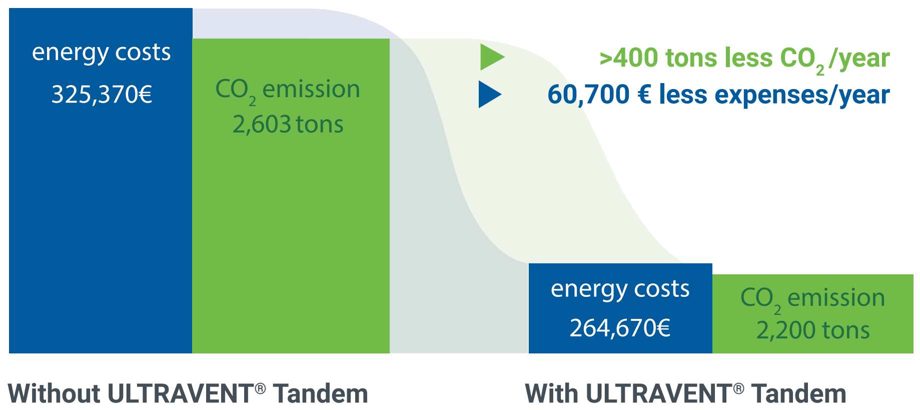
For both stenters, KMA installed a central ULTRAVENT® Tandem with an integrated heat recovery and an electrostatic precipitator. The integrated heat exchangers extract thermal energy from the hot exhaust air, which is fed into the production process in two ways:
First and foremost, the water from the two upstream washing machines is heated. The energy recovery system heats 8.5 m³ of process water for the dyeing process from 15°C to 60°C every hour without the additional consumption of electricity or gas.
Secondly or when there is less demand of hot water, the fresh air supplied to the stenters is pre-heated with the help of the remaining energy. In this way, 440 kW of heating energy can be saved.
In addition, the electrostatic precipitator removes the condensed aerosols after the heat exchangers and purifies the exhaust air from the stenter frame.
The automatic washing system (CIP) for cleaning the heat exchangers and electrostatic precipitators ensures maximum efficiency and minimizes maintenance.

The Result

The average energy recovery of the filter system is 486 kW per hour. As a result, our customer achieves annual energy savings of over €60,700*.
By reducing CO_2 emissions by more than 400 tons per year, the customer sustainably improves the carbon footprint. Profitable heat recovery leads to an amortization period of 2.94 years.

*At a gas price of 0.025@€/kW.

Annual savings:



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KMA Umwelttechnik GmbH
Eduard-Rhein-Straße 2
53639 Königswinter
Germany

Phone: +49 2244 9248-0
Fax: +49 2244 9248-30
E-mail: info@kma-filter.de

www.kma-filter.com
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