

DRY SEPARATION SYSTEM FOR PAINT BOOTHS

CLASS A PAINTING PROCESSES IN AN AUTOMATIC PRODUCTION SERIES INCLUDING DRY SEPARATION SYSTEMS WITH AIR RECIRCULATION

THE TASK

Painting processes in a series production must always have high quality standards. For this purpose, paint booths today are equipped with Venturi paint mist separation systems. A typical application is the Class A coating process of auto bodies and accessories.

A NEW SOLUTION

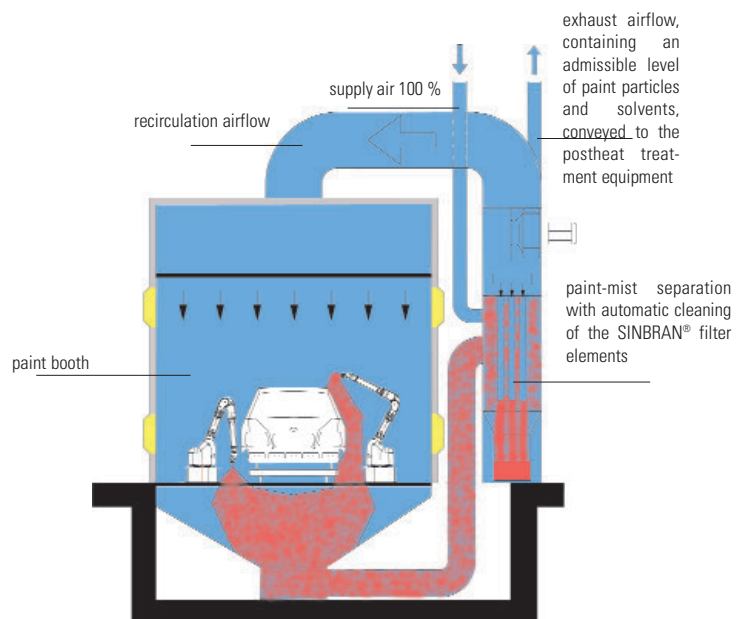
DRY SEPARATION PRINCIPLE

A dry separation system with air recirculation in an automatic series production process presents tangible and environmentally responsible advantages. The paint mist is conveyed into the filter housing via a V-shaped bottom plate and a channel system. The paint mist is separated within this housing, which is equipped with high quality SINBRAN® filter elements. Even paint particles that have not completely dried can be separated with this technology. The system is available in different configurations which allow customization geared toward individual applications.

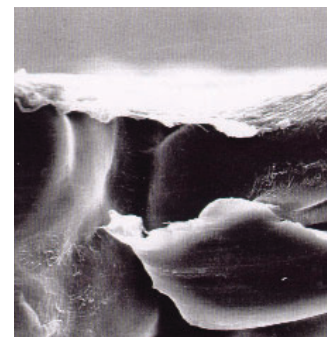
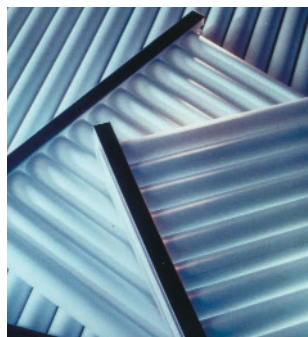
THE SYSTEM SOLUTION

The filter elements are cleaned continuously and automatically. As a result, the airflow remains constant during the entire operation. The separated paint dust is collected in waste bins. As an option, the dust can be discharged automatically. As the high quality of the cleaned air exceeds local standards, the greater portion of the filtered air can be re-circulated into the paint booth. To ensure that the paint particles and solvents do not exceed allowable maximum levels, some of the exhaust air is ducted outdoors, and some fresh air is added. The small increase in temperature of the circulating air caused by the energy input within the system is offset by a small air conditioning module. Humidification, if necessary, is achieved cost effectively by a small steam generator. The make-up air is also fed through the SINBRAN® filtration system, thereby avoiding an additional air inlet filter. With this concept the supply air ceiling of the paint booth, with integrated fiber fleece or similar media filters, merely helps to distribute the air evenly, achieving an exceptionally long filter life. As solvent concentrations from the paint may increase over time, secondary thermal treatment is a cost effective measure. The aim is to achieve an autothermal process.

DRY SEPARATION SYSTEM



FILTER ELEMENTS



SINBRAN® filter elements show distinctly less pressure drop in comparison to conventional filter elements during the entire operating period at the same air-to-cloth ratio.



THE CLASSIC PRINCIPLE OF CURRENT WET SEPARATION SYSTEMS

The operating costs for systems utilizing water as a separation medium are very high. For example, recirculation of the air into the painting area is very costly and is practically never used. The reasons are the very strict operating parameters (humidity, temperature) within the booth which are critical to paint application, and the potential danger of contaminating the circulation airflow. Heat recovery systems (heat exchanger units) are utilized in specialized cases. However, the investment costs and the operating costs are extremely high, so that the break-even point is rarely achieved.

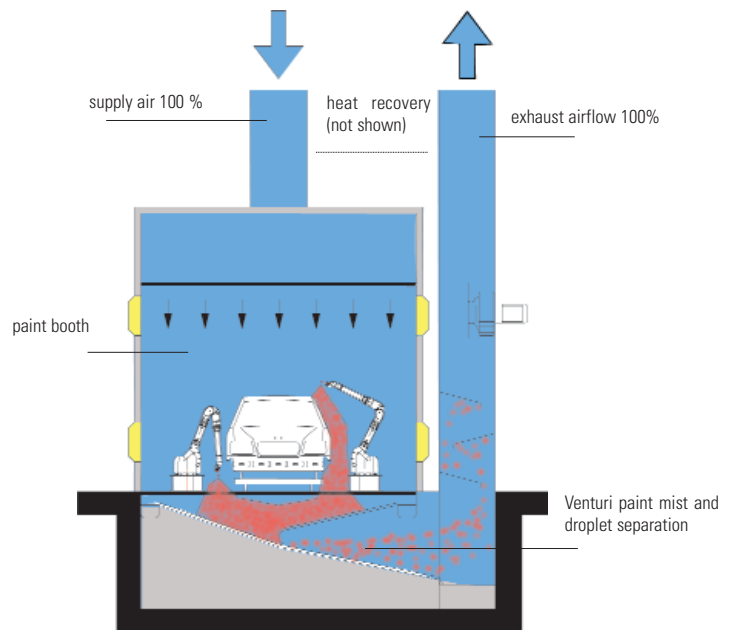
Disadvantages regarding air pollution control:

- High energy use for make-up air heating and humidification
- Technically valid solutions to effectively heat increasing concentrations of solvents can be achieved only by expensive secondary systems, e.g., adsorption wheels

Further disadvantages of using the wet separation system:

- Use of coagulation and antifoaming agents, as well as pesticides
- Costly cleanup of varnish sludge
- Waste disposal problems
- Costly maintenance and cleaning
- Cost of adhering to the local environmental regulations
- Formation of bacteria and odors
- Possible foam formation

WET SEPARATION SYSTEM



OPERATING ADVANTAGES - COMPARED TO THE WET SEPARATION SYSTEM

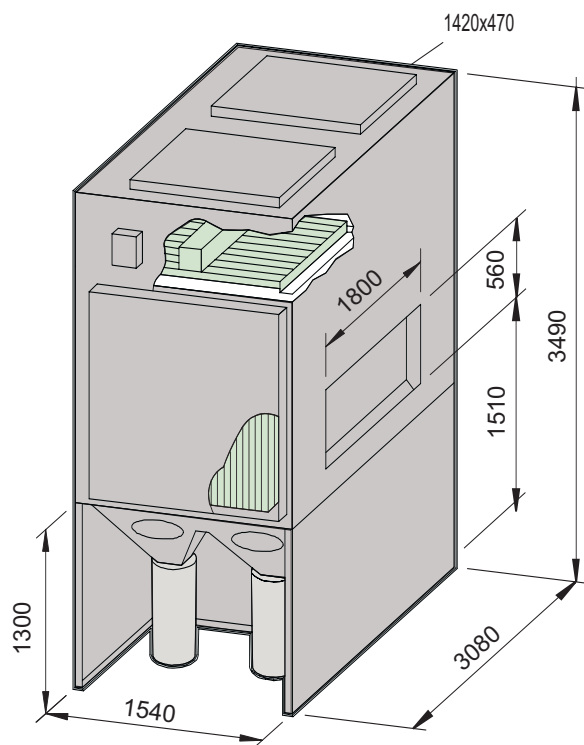
- High quality of circulated air, in compliance with local air quality regulations
- Long filter life
- Continuous air balance (automatic filter de-dusting)
- Simple and reliable air circulation
- Long cleaning cycles
- Simple air conditioning (hygienic and reliable)
- No problems with odor-causing bacteria
- No foam formation
- Manageable explosion and fire protection
- As a rule, existing wet separation systems can be retrofitted

COST ADVANTAGES - COMPARED TO THE WET SEPARATION SYSTEM

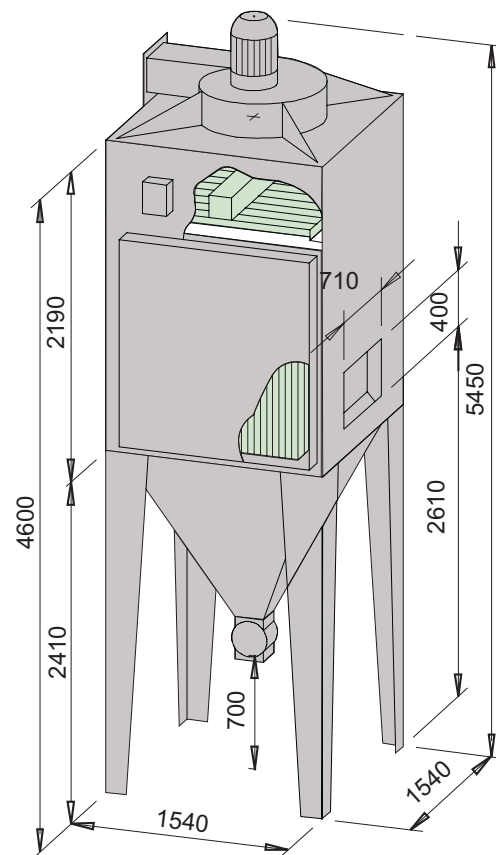
- High energy conservation
- Cost savings with regard to waste disposal
- No utilization of coagulation agents or other chemicals
- Varnish sludge discharge is not necessary
- Air conditioning of the circulating airflow
- Time-consuming maintenance of the make-up air humidifier (air scrubber or similar) is not necessary
- Cost-effective exhaust of cleaning solvents
- Low maintenance cost
- Low cleaning costs
- Compliance with local water quality regulations

APPLICATION EXAMPLES - DRY SEPARATION SYSTEMS

A modular filter design makes it possible to handle larger airflow rates of 50,000 m³/hr and up.



VARIO 6 standard model H



VARIO 4, Z model, with top mounted fan



AIR FILTRATION SYSTEM SOLUTIONS



PROPOSAL OF THE COOPERATING PARTNERS

Economic factors, tangible and environmentally relevant advantages, as well as required functional safety will prompt plant operators to convert or modify their existing systems to this new technology.

In order to ascertain the actual efficiency of the existing equipment, the cooperating partners who developed this new system, AB Anlagenplanung and Keller Lufttechnik, will gladly assist in evaluating the present situation on site.

REFERENCES

Wet painting:

- Continuous painting plants
- Coating of vessels
- Painting of aircraft wings
- Painting of razor housings

Powder coating plants:

- Final stage filters
- Cleaning stations
- Filter elements



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