

## SUCTION AND SEPARATION DURING WET SPRAY PAINTING UTILIZING WATER OR SOLVENT-BASED PAINTS

### THE TASK



During spray painting processes, not all the paint ends up on the work piece. Accumulating overspray may build up on the painted parts, impairing the overall quality of painted surfaces. In addition, the paint booth itself is significantly contaminated,

resulting in an ultimately unreliable production process. When using solvent-based paints, a danger of explosion is created if the lower explosion limits are exceeded. The long downtime needed for manually cleaning conventional filter media adversely affects their profitability.

A variety of filter systems are used for spray painting processes:

**Wet Separation Systems** Venturi mist separator  
Venturi mist separator with ring nozzle spray

**Dry separation systems** One-way filters (cartridge filters, fiber fleece, mesh or combinations thereof)  
Reusable filter media

The filtration systems listed above present a number of disadvantages.

### Wet separation systems

The operating costs for systems utilizing water as a separation medium are very high. They are, therefore, hardly ever implemented because of economic considerations. Some reasons are the ambient conditions required for the application of paint, the potential risk of contaminating the re-circulating air flow, and the high energy usage when heating and humidifying the supply air.

Further disadvantages of wet separation systems:

- heat recovery systems (heat exchangers) are associated with high investment and operating costs
- profitability levels for heat recovery systems can rarely be achieved
- expensive secondary treatment systems (e. g. adsorber wheels) are required to concentrate solvents in order to economically clean the exhaust air
- use of coagulants, de-foaming agents and pesticides
- costly removal of paint sludge
- waste disposal problems
- costly maintenance and cleaning
- cost of adhering to the Clean Water Act (local environmental regulations)
- formation of bacteria and odors
- possible foam formation

### Dry separation system (one-way filters)

- expense of cleaning filter cartridges / air channels
- high cost of the exchange and disposal of filter elements
- a continuous air flow volume is not possible, because the filtration units do not contain an integrated continuous cleaning system

In order to effectively resolve the difficulties listed above, the paint mist must be captured and reliably suctioned off. High make-up air requirements, a long filter service life and a continuous air flow over a long period of time must also be achieved at the same time. These necessitate an optimum cleaning system for the filter elements.

## THE SOLUTION

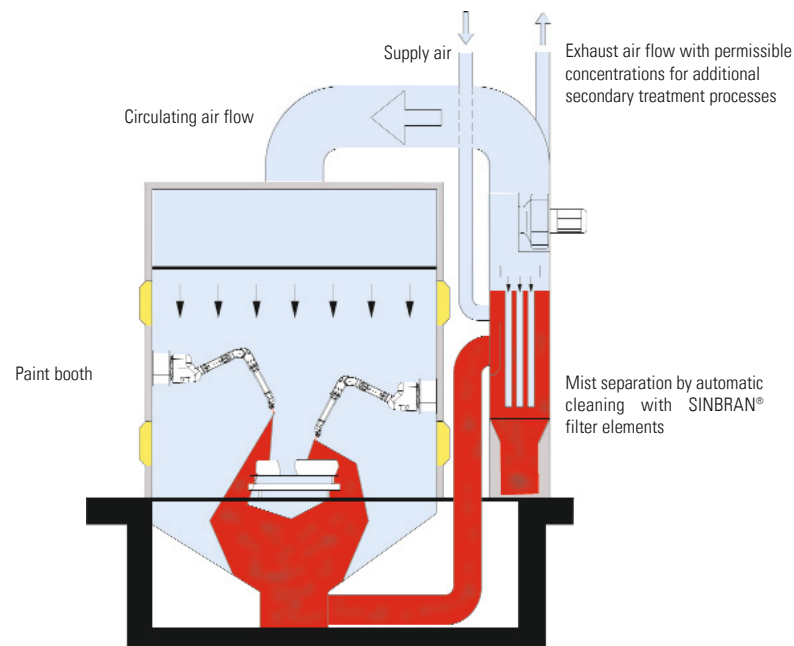
Keller meets these diverse challenges by means of an effective suction and separation process for spray painting. Our long-term experience and comprehensive expertise in filtration processes, especially with regard to very fine dust, ensure high levels of reliability, a long service life and the profitability of our filtration systems.

The dry separation and re-circulation of air to the painting area can result in concrete environmental advantages. The overspray is either collected in paint booths or in collection elements adapted to the production process. Keller uses flow simulation programs in designing all components. A channel system conveys the spray mist to the filter housing where it is separated by means of high efficiency SINBRAN® filter elements. Even paint particles that are not completely dry can be reliably separated using this technology or with minor system modifications.

The filter elements are continuously cleaned, ensuring a constant air supply. The cleaned paint mist is collected in appropriate receptacles. It can also be automatically removed, as an option.



The cleaned air has a quality rating of approximately H12, which is superior to the allowable quality of supply air. The result is that most of the filtered air can be re-circulated to the paint booth. This air conditioning system collects any solvents contained in the paint, adding a secondary treatment of the exhaust air in order to further reduce hydrocarbons, thereby achieving a cost-effective auto-thermal process.

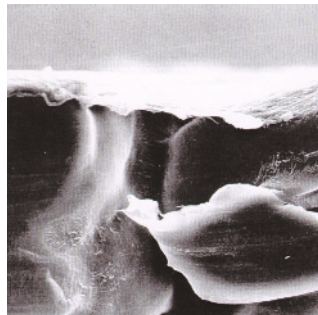
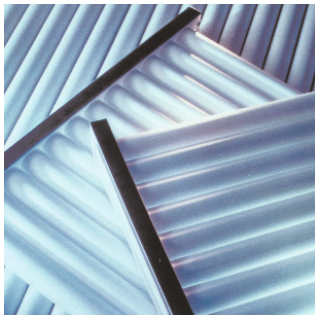


## FILTER ELEMENTS

The separation is achieved by means of high-efficiency SINBRAN® filter elements.

SINBRAN® is a combination of sintered, porous polyethylene with a GORE® membrane laminated onto it, combining the advantages of membrane filtration with those of rigid body filters. The solid rigid body accommodates a large filter surface in a very small area. The filter material's high mechanical stability ensures a long service life.

Thanks to its smooth uniformity, the GORE® PTFE membrane results in surface filtration with an extremely high degree of separation. The dust particles are almost completely retained on the surface of the filter and cannot clog the sintered body. This results in low pressure loss, compared to conventional rigid body filters. Short jet pulses of compressed air effectively clean the filters during the filtration process.



SINBRAN® = sintered rigid body filter with a Teflon membrane laminated onto it, for pure surface filtration, absolutely silicone-free.

### OPERATING ADVANTAGES AS COMPARED TO WET SEPARATION:

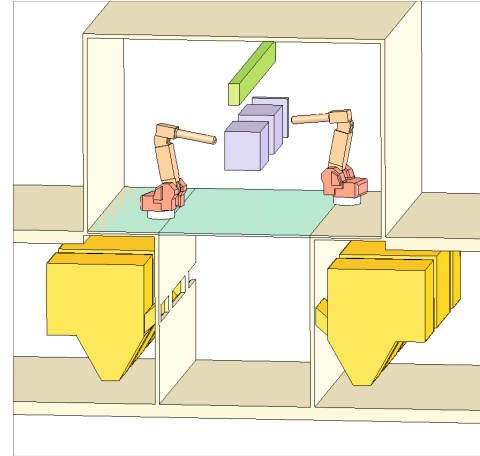
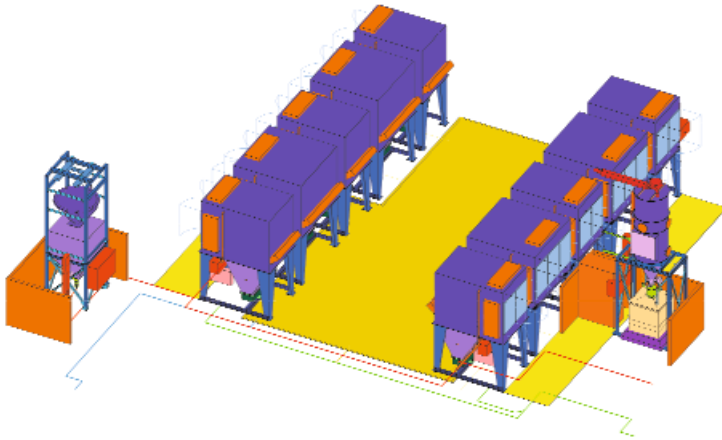
- high-quality re-circulated air (rated at approx. H12)
- very long life cycle
- constant operational airflow
- less frequent cleaning cycles required
- high filtration efficiency (safe and dependable)
- no odor causing bacteria
- no risk of foaming
- safely controllable explosion and fire protection
- existing liquid separation systems can normally be retrofitted

### COST ADVANTAGES REALIZED IN COMPARISON TO WET SEPARATION:

- energy efficient
- low cost disposal
- coagulants or other additives not required
- paint sludge removal not necessary
- cost-effective air re-circulation
- no air humidifiers required (air washing systems, etc.)
- cost-effective removal of solvents from waste air
- low maintenance
- low-cost cleaning
- cost-effective adherence to Clean Water Act (complies with EPA regulations)

# AIR FILTRATION

## SYSTEM SOLUTIONS



| Branch of industry            | Painted components                                    | Air volumes         |
|-------------------------------|---|---------------------|
| Automotive industry           | Gears   | 52,350 cfm          |
| Automotive industry           | Axles   | 40,000 cfm          |
| Automotive suppliers          | Dashboards  | 1,470 - 2,940 cfm   |
| Automotive suppliers          | Bumpers   | 17,650 - 25,885 cfm |
| Construction industry         | Claddings   | 26,470 cfm          |
| Electrical industry           | Razor housings  | 4,120 - 14,120 cfm  |
| Electrical industry           | Flat screen housings                                  | 4,530 cfm           |
| Aircraft industry             | Tail wings and Tail assemblies                        | 29,415 cfm          |
| Aircraft industry             | Interior Struts and Reinforcements, Window Assemblies | 10,000 cfm          |
| Leisure and camping           | Window frames   | 5,880 cfm           |
| Container industry            | 5 liter barrels                                       | 2,940 cfm           |
| Furniture and music industry  | Grand Pianos  | 29,415 cfm          |
| Steel manufacturing and trade | Sub-assemblies and structures                         | 2,350 - 23,800 cfm  |
| Textile and cloth industry    | Cloth impregnation and textile coatings               | 4,120 cfm           |
| Alternative energies          | Wind turbines   | 29,410 cfm          |

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