



Future-Proof Overspray Removal

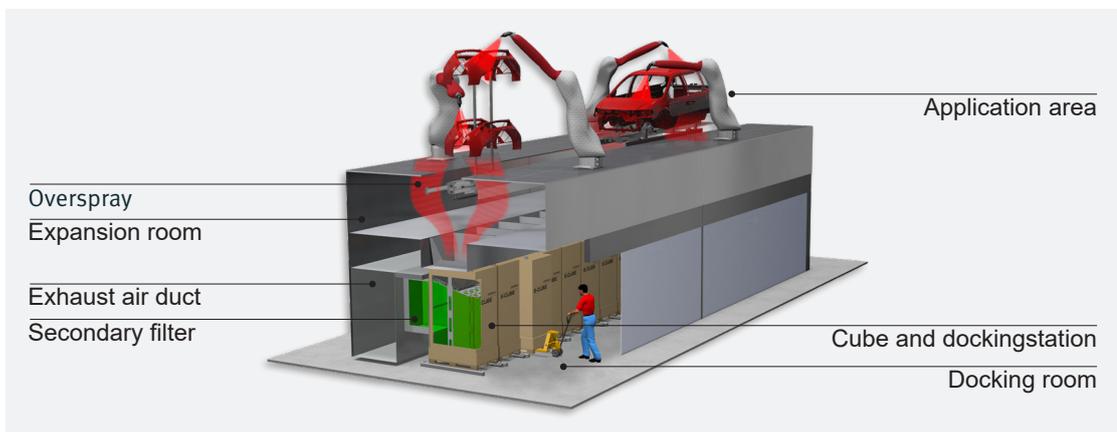
Reliable, clean and cost-efficient: the modular E-Cube system for removing paint overspray is remarkably smart yet remarkably simple.

Overspray is unavoidable – even state-of-the-art application methods cannot eliminate it entirely. Efficient technology is therefore required to reliably capture and remove airborne paint particles. Eisenmann’s dry overspray removal system, E-Cube, has become an established alternative to wet, or venturi, scrubbers, the current standard approach. Carmakers, automotive component suppliers and other users benefit from E-Cube’s significant strengths with respect to resource efficiency, operating costs and cleanliness.

Eisenmann is the world’s only paint-shop specialist with a complete product and solution portfolio for the surface treatment of vehicle bodies, plastic components, and other parts. The company has gained an outstanding reputation for low emissions, energy-efficient processes with zero waste water. The launch of E-Cube a few years ago marked a significant milestone. It represents a completely new, mechanical method of removing overspray that overcomes the serious drawbacks of wet scrubbers. The advantages have proved highly attractive: E-Cube is increasingly being deployed in painting lines worldwide.

Wet scrubbers: a standard but flawed technology

Paint shops and application technologies have continued to evolve in terms of process speed, flexibility, efficiency, and ease of use. The components beneath the spray-booth floor grate, by contrast, have remained essentially the same. Wet scrubbers employ atomized water to collect paint particles from the spray-booth air. The airstream is drawn downwards by suction and accelerated in the tapered venturi channel. As a result, the particles reach the collection tank at high speed, where the material subsequently settles to form paint sludge that requires disposal or treatment. Spray-booth exhaust air is usually vented to the exterior environment. This has become the standard method in recent decades. However, it makes significant demands on the user organization, employees, and the environment.



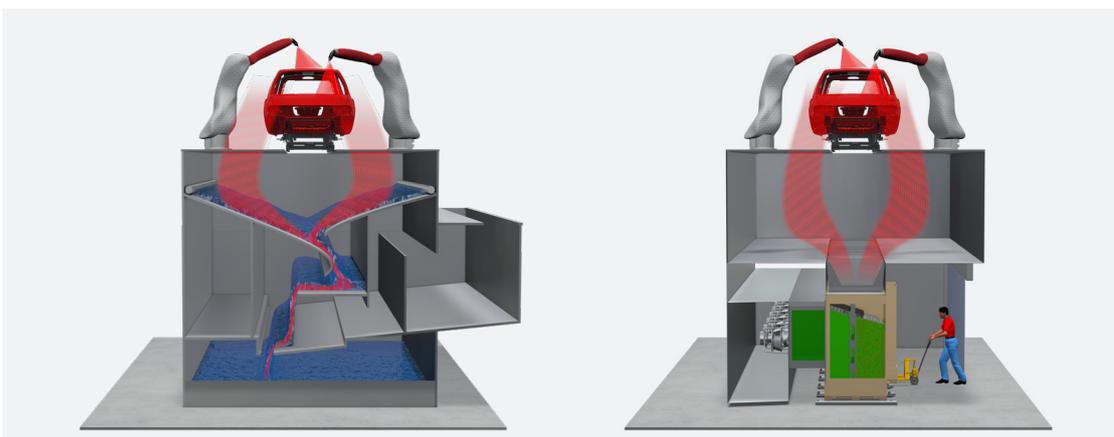
Wet scrubbing requires a complex combination of equipment: tanks, dosing units, pumps, piping, and other items all need to be installed beneath the painting line. This all occupies a considerable amount of space, and necessitates time-consuming and costly maintenance. Furthermore, resource consumption – particularly of water – is very high. Environmentally harmful biocides are regularly introduced into the tank to prevent the build-up of bacteria, above all in summer. High noise levels and unpleasant odors negatively affect working conditions. In addition, some paints and coatings require defoamers. Extensive expertise is necessary to optimize coagulation and correctly dose the corresponding agents. These multiple issues mean significant disadvantages – not just in terms of cost.

Smart filtration without water or chemicals

Eisenmann's E-Cube is also installed below the spray-booth floor grate. As a mechanical system, however, it is far simpler in structure than a venturi-type solution, and operates without water, chemicals or other additives, such as coagulants. As in wet scrubbers, air contaminated with paint particles is drawn downwards by suction, but it is then immediately routed to the overspray removal system. As it passes through the modules (the cubes), the air is stripped of particulates. A second filter stage behind each cube guarantees a high removal rate. Motorized shutters ensure that the cubes can be removed and replaced during ongoing operation. System monitoring safeguards stable, consistent operation, without cross-flow. It is possible to recirculate the air or implement a supply-and-exhaust air system.

The cube-shaped paint-removal modules, made from cardboard, contain a highly effective hybrid filtration system comprising surface and depth-type filters. Individual filter elements are arranged in such a way as to create a labyrinthine flow path. This configuration provides an ideal sequence of coarse and fine filtration, ensuring even distribution of particles within the modules. The cubes are approximately 2.1m high, 80cm wide, and 1.2m deep, and have very high particulate capacity. Their service life ranges from a few days to several weeks, depending on the mode of operation and the type of paint being applied.

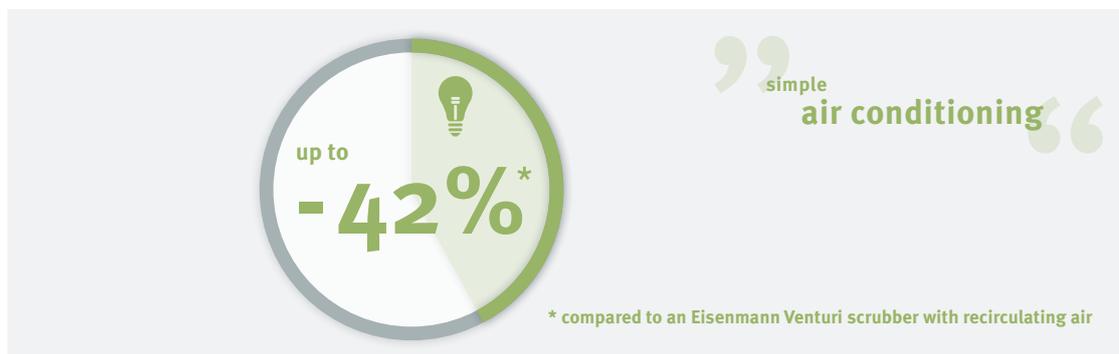
This filtration method is of unquestionably high quality. E-Cube's removal rate ensures less than 1mg residual particles per cubic meter of air, compared to around 3mg for wet scrubbers. Against this background, E-Cube can fulfill both current and future international requirements.



Comparison: Venturi (left) und E-Cube (right).

Energy savings of up to 42 percent

All industrial painting processes are highly energy- and resource-intensive. They account for up to 70 percent of total energy required to manufacture a passenger car. For this reason, paint-shop operators are focusing on improving energy and resource efficiency. E-Cube can make a major contribution in this regard. As it operates without water, the recirculated air is easier to condition: the air needed to carry away overspray particles from the paint process requires less cooling and less heating. As a result, energy savings of up to 42 percent are achievable in comparison to a wet scrubber with air recirculation.



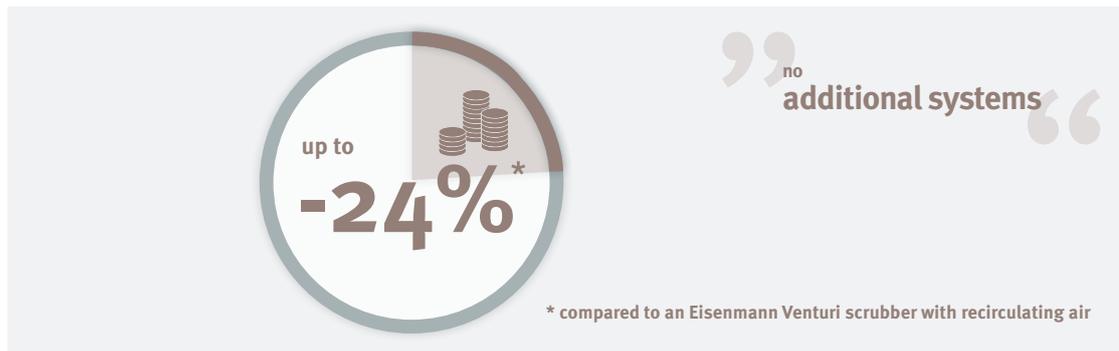
Simple to operate

Convenient disposal of the particulate matter removed by the filters is a further advantage of E-Cube. The system is extremely user-friendly, and can be operated by unskilled workers without special training. The cubes can be supplied folded up and only need minimal storage space. They are easy to assemble and replace. Intelligently designed intralogistics streamline the replacement of used with fresh cubes while the spray booth remains in operation: new cubes are brought from storage to the painting line on euro pallets. Docking and undocking are automatic, and full cubes are collected for disposal by truck. Cube replacement is completed in less than five minutes, and controlled via a touch panel that also displays cube saturation levels. The process is clean and efficient from start to finish.



Low costs, maximum flexibility

E-Cube not only drives down operating costs by up to 42 percent. Capital expenditure is up to 24 percent lower, too. The reason is simple: E-Cube has no need for much of the equipment required by wet scrubbers, such as dump tanks, flotation tanks, dosing units and pumps. That is good news for the operator's budget.



These benefits are not only relevant to greenfield paint-shop projects. The solution's modular design, flexible in both length and width, means that it can be installed in existing production environments where there is limited space. For this reason, many businesses have chosen to retrofit E-Cube to existing painting lines in brownfield plants, therefore significantly reducing their future operating costs. Eisenmann has implemented systems with overall heights of between four and nine meters. E-Cube is simply moved in below the level of the grate, adapted to the existing spray booth, and fitted with an enclosure. Since it is assembled from small segments, it can be installed in locations where the access openings are extremely restricted.

“The modules undergo functional testing at Eisenmann prior to shipping, which means the system can commence operation very quickly.”

E-Cube – ready for tomorrow's challenges today

Eisenmann's smart yet simple overspray removal system successfully fulfils customer demands for a clean, efficient, flexible and future-proof solution. Since its market launch, it has been widely deployed throughout the world – for wet-paint applications in diverse industries, including paint shops for electric vehicles, and for trucks. Thanks to its versatility, E-Cube is suitable for spray booths of all sizes. It is readily extensible, and can replace legacy systems in existing facilities. More than 90 types of paint have been successfully tested under realistic conditions at customer paint shops and in Eisenmann's test facility. The cubes, which fit on a euro pallet when fully assembled, require little storage space when folded up. They are simple to assemble and to dispose of when saturated. As a result, this pioneering overspray removal system works well in paint shops of any size.

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