
What is the correct moment for replacing the air filter in paint-spray booths?

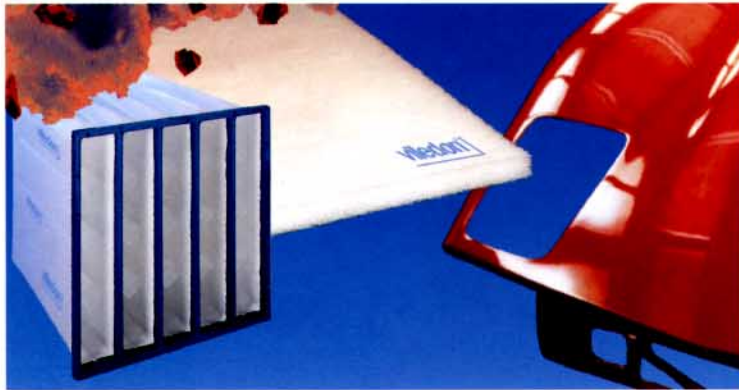
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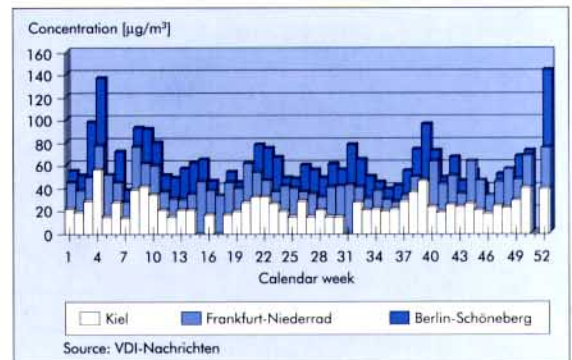
■ Air pollution

The dust concentration is one of the major factors crucially determining the filter's useful lifetime. Depending on the location concerned, the concentration may be low (e.g. coastal areas) or high (e.g. industrial regions), as the illustration shows. In addition, the type of dust involved, the proportion of coarse and fine particles, decides how high the filter's dust holding capacity

This is a question which every paint booth operator will have pondered more than once. And a question which becomes particularly acute when you start having problems with dirt trapped in the paintwork. Usually the ceiling filter is singled out as the culprit, for not being able to collect any more dust and therefore letting more dust particles through. To get on top of the dust problem, precipitate rescue actions are then initiated, like immediate replacement of the ceiling filters, irrespective of whether the ceiling filter actually has anything to do with the dust problem or not.

But since every filter change inevitably involves costs (filter material, personnel, downtime, disposal, etc.), the operating time should be optimized, thus enabling the timing of a filter replacement to be decided against maximally objective criteria.

The crucial factor in determining how high the operating costs are going to be is the choice of filter material. Plenty of people who bought their filters on the principle of "The cheapest is more than good enough for me" later had to shell out many times the purchase price for much too frequent filter replacements, not to mention the resultant system downtime. So it's advisable to go for high-quality filter products. Like the Viledon ceiling filter mats PA/500-10 or PA/560 G-10, which not only ensure the requisite dust arrestance over the entire service period, but also offer a maximized useful lifetime in terms of the dust loading involved. However, for various reasons it is almost impossible to predict the anticipated filter lifetime, although paint booth operators understandably often request a figure.

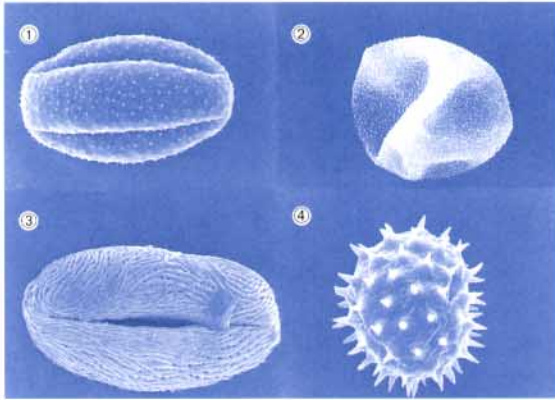


Airborne particle concentrations in Germany, 1992

city actually is. If there is a high proportion of fine dust (including soot), as is the case in areas with a lot of traffic, then the anticipated useful lifetime for the filter will be significantly reduced. In more countrified areas, the majority of the dust encountered will generally be coarse particles, so that the loading on the ceiling filter is effectively decreased by the prefilter, enabling above-average useful lifetimes to be achieved.

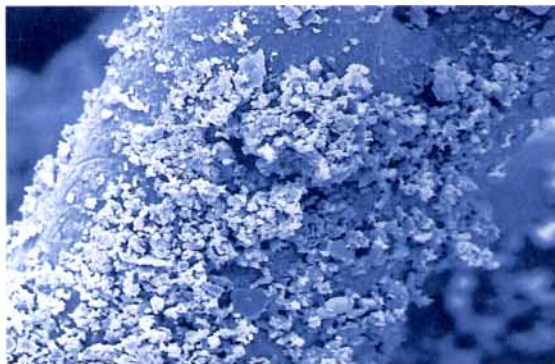
■ Airborne pollen

Every year, there is a lot of trouble due to pollen, which occurs in large quantities at particular seasons, and can cause problems in any painting operation. In the case of airborne pollen, it is particularly important to make sure that the right prefilters and ceiling filters have been installed, and that there are still sufficient reserves in dust holding capacity, i.e. that the current pressure drops at the filters are still signifi-



SEM photos of floral pollen
(1 ribwort, 2 stinging nettle, 3 thistle, 4 sunflower)

cantly below the final pressure drop specified by the booth manufacturer. If this should not be the case, we recommend replacing the filters (especially the ceiling filter) as soon as possible, or at least having replacement filters standing by. A marked increase in pressure drop within a few days is often a clear indication that a filter's dust holding capacity will soon be exhausted, and that the final pressure drop will soon have been reached. For this reason, when there is lot of airborne pollen about, special attention should be paid to the pressure drop gauge, the prefilter and the ceiling filter. As a further precautionary measure, we



SEM photo: Particle deposits on a fiber from a P15/500 S prefilter.

recommend checking the seal set of the ceiling filter, and in the case of pocket filters checking the seals in the prefiltration section, and replacing them where necessary.

■ Prefilter's arrestance characteristics

The prefilter is a crucial factor in determining a ceiling filter's useful lifetime. The important thing here is to make sure that the prefilter and ceiling filter are properly matched, since this is the only way to achieve optimum results. In the case of high dust concentrations, we recommend installing a pocket filter with a high dust holding capacity (e.g. Viledon Compact pocket filter G 35 SL or F 40), while for low dust concentrations a filter mat will be sufficient, such as the Viledon PSB/290 S or P 15/500 S (washable and re-usable). This will depend on the environmental conditions involved.

■ System characteristic

The fan rating is an important criterion for determining the right time to replace the prefilter and ceiling filter. Since the filter resistance increases with rising dust collection, and has to be overcome by the fan, the replacement time will also depend on the fan characteristic. For this reason we recommend proceeding in accordance with the final pressure drop specified by the system manufacturer for the type of booth involved, i.e. replacing the filters when this final pressure drop is reached. This is an objective criterion, and will save the booth operator any unnecessary filter replacement procedures, provided of course that the ceiling filter assures sufficient operational reliability until this final pressure drop figure is reached. Care must also be taken to ensure that the pressure drop gauge is regularly serviced and checked, so that this final pressure drop is not exceeded. Otherwise problems must be anticipated in regard to air flow and overpressure in the booth.

■ Empirical values

If a paint booth is not fitted with a measuring device for determining the filters' pressure drop, then empirical values must be added. In view of the problems outlined above with regard to different dust concentrations at different locations, the empirical values given below must be taken only as rough guidelines.

For booths with a low level of painting operation (e.g. fewer than 5 vehicles a day), the filters are replaced approximately 1 x a year, whereas for booths with a high vehicle throughput (e.g. 15 vehicles a day), the filters will need changing 2 x a year. If a booth is being run alternately in spray mode (fresh air) and in dry mode (recirculated air), this will result in a lower dust loading for the filters than in fresh air mode only, which will mean longer useful lifetimes both for the prefilter and for the ceiling filter.

As can be seen from the considerations outlined above, it is almost impossible to provide a generally valid prediction for useful filter lifetimes, since there are simply too many factors involved, which is why even filter experts can only give approximate guideline figures.

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