

Water wash vs. Dry Booths

Understanding how a water wash booth works: excerpt taken from Appendix 2, Filtration Systems; Warringah Council, NSW AU <http://warringah.nsw.gov.au/environment/documents/appendix%202.pdf>

Water wash booths are designed to minimize dust or residues entering the atmosphere (generally through the exhausting of emissions through a stack). The water, which is chemically treated and formulated to sink or float the entrapped particulates and dust particles, pumps through the system. If the particulates and dust particles sink, they form sludge. The sunken sludge is decanted and shoveled into containers for waste disposal. If the particulates and dust particles are encouraged to float, they can be skimmed from the surface of the water for disposal. In some applications, particulates and dust particles are collected, washed, homogenized, dewatered and blended with virgin coating material to be reused, thereby increasing efficiency. Water filter systems have a continual circulation of water through the system, which is powered usually by an electric pump. The circulation of water helps balance the airflow in the booth and is discharged into a container or pit where the water is treated with detackifiers, flocculants and defoamers to remove the stickiness of the particulates and dust emissions and to coagulate them into larger particles to form a sludge. The water is then continuously recirculated and returned to the spray booth. The paint sludge is eventually collected from the pit for further treatment and reclamation or disposal. An important component of a water filter system is the make-up water float tank. This feeds additional water into the circulating system which may have been lost during the process through evaporation or as a component of the sludge. With water wash booths it is vitally important that if sprays are used they are functioning correctly and are not clogged with particulates and dust particles due to inefficient filtration. This causes particulates and dust particles to be recirculated. It is also important that the make-up water float tank is at the level recommended by the manufacturer. If water is not continually added the amount of water passing through the system will be reduced, decreasing the amount available for filtration and leading to fewer particulates and dust particles being removed and the system becomes clogged and inefficient. The manufacturer's recommendations for the addition of alkali and oil should also be followed. This will keep the water at the correct pH and chemical composition to ensure effective removal of particulates and dust emissions. In most cases, water conditions and levels are the best indicator of a water filters performance. For this reason it is important to have a sight glass so regular checks can be undertaken.

Cost analysis: a look at a case study provided by Crenlo LLC of Rochester, New York, a sheet metal fabricator with 16 booths <http://www.mntap.umn.edu/intern/projects/crenlo.htm>

Crenlo had converted 2 water curtain booths to dry filter booths in order to improve overspray capture efficiency. Initially dry filters were used as pre-filters to catch the solids in front of the water curtains. When the company discovered that the water was not providing extra filtering value it converted the booths exclusively to dry filters. Water use was reduced by 354,000 gallons per year and \$4000 in water, sewer, chemical costs and labor were saved.

Another case study: <http://www.p2pays.org/ref/07/06146.pdf>

Exide Electronics converted their water wash booths to dry booths and made other smart changes to net them a savings of \$177,000.

Comparison of dry filter booths vs. water wash booths from a US Navy Report:
<http://www.p2pays.org/ref/01/00598.htm>

In short, the primary disadvantage of the water curtain is the generation of large quantities of wastewater and paint sludge. The wastewater requires treatment and the sludge is disposed of as hazardous waste. In addition, the cost of chemicals and water, as well as extended maintenance, is also a disadvantage. Benefits of dry filters are decreased operating costs: eliminates chemical costs, reduces electrical costs, eliminates water costs and potential sewer disposal costs, reduces waste generation by eliminating wastewater and paint sludge wastes, eliminates need for daily skimming and removal of sludge from the booth, increased particulate removal efficiency. Disadvantages of dry filters include incompatibility with powder paint applications and downtime during filter replacement.

Converting a water wash booth to a dry filter booth:
http://www.ronjoseph.com/Q&A/L1204_retrofitting_spraybooth.htm

General Instructions on how to convert a water wash booth to a dry filter booth

- 1) Remove everything out of the exhaust chamber that directs water or may otherwise impede airflow.
- 2) Seal all openings for water drainage and patch any panels that may allow air leaks.
- 3) Install frame at front of opening (see installation instructions).

