White Paper

Airflow for Waterborne Coatings and Paints

Matching Low-VOC Coatings Technologies with Innovative Airflow Systems

Low VOC Confusion:

Paint and coatings manufacturers have been responding well to legislative, competitive and lean production pressures to develop new paint and coatings technologies. This change has been particularly focused on reducing environmental damage and health concerns related to solvent borne paints and VOC emissions. Development of Low-VOC coatings technologies, specifically waterborne coatings, has pushed this cause forward significantly in recent years. The industry however is still trying to discover what "gearing up for lean and green" and "readiness for waterborne implementation" means at their facility. While color matching and coatings quality levels are ready for world-wide use and application equipment manufacturers have responded to the needs of low-VOC paints, what about paint booth and airflow systems?

The real answer is that waterborne coatings have the following specific needs that have not been address by paint booth manufacturers to date.

- ✓ Clean, dry air is critical
- ✓ Waterborne is more sensitive to contamination
- ✓ Multi-stage filtration is required
- ✓ Increase of turbulence and air volume (CFM) is necessary for efficiency
- ✓ Airflow should flow *across* the surface – *not directly* into the paint job

Adaptation and Use of Traditional Downdraft Airflow

The most widely used strategy in tackling waterborne coatings implementation has been to adapt the traditional downdraft booth. The issue facing downdraft is that it was not designed to handle the unique needs of waterborne technology noted above; specifically that airflow should flow across the surface, not directly into the paint job.

Adaptations to the downdraft booth system have somewhat increased efficiency of waterborne dry times such as hand held or stand dryers, ceiling mounted fans, wall mounted blowers/towers and infrared units. These adaptations have however experienced their problems. Firstly, introducing air moving equipment into an environment that was designed for downdraft adds unfocused turbulence, disturbing airflow and causing dust, dried overspray and dirt to move onto the finish from floors and corners of booths. Secondly, these add-ons have limits in achieving efficiency as the downdraft airflow will still be the primary determinant of dry times. Lastly, the necessary increase in air volume causes your compressor to work harder

and run longer than before the equipment was installed. Therefore, shops with downdraft adaptation equipment should consider adding an additional air compressor dedicated for use with the new mechanical drying equipment.

Adaptation of downdraft has proven to be a difficult and expensive solution and further studies are needed to understand downdraft airflow and the unique waterborne coatings needs.

Revisiting Cross-Draft Airflow Systems

Cross-Draft paint booths are well known in the industry as being an inexpensive alternative to downdraft. Cutting and forming a pit for effective downdraft technology can cost between $5,000 and $7,000 before considering the paint booth cost which can be significant. Cross-draft offers a cost efficient solution.

Cross-draft also offers the critical waterborne requirement of airflow *across* the paint job, not *directly* into it. This is the very root of cross-draft air movement and a good use of the technology.

So what is the issue with cross-draft? Traditionally it has been quality of air. Cross draft booth systems are known to be less effective than downdraft at controlling overspray and dirt transfer from shop floors. Waterborne paint implementation has however levelled the playing field. Adaptation equipment use for downdraft airflow has resulted in dirt transfer from floors and corners; the traditional criticism of cross-draft airflow. As noted above, clean, dry air is critical for waterborne quality as these coatings are more sensitive to contamination.

Additionally, cross-draft systems have been criticised for the lack of focused air and CFM needed for efficient waterborne dry times. The new paint technologies need an increase of turbulence and CFM to “wick” the moisture out of the coating and complete the dry cycle.

Taper-Draft as the Innovative Alternative

Taper-Draft is a new technology on the market that has been explored and developed by the research and development team at Duroair Corp. In a simplest explanation, Taper-Draft works by pulling a high volume of clean air through an intake filter that, once inside the paint enclosure, creates an envelope of airflow over the work piece and continues to flow directly into the two-stage tapered filter chamber.

Taper-Draft and Dry Time Efficiency:

The tapered filtration chamber provides high levels of CFM and air turbulence required for waterborne. A wicking process is created by the air envelope that pulls moisture off the work piece greatly enhancing coating dry times. This is an especially efficient and ideal technology for waterborne paints. Taper-Draft, with no drying aids necessary, achieves faster dry times than traditional paint booths. This technology is having a significant impact on shop throughput and efficiency that has not been previously experienced in the use of waterborne coatings to date.

Taper-Draft and Quality of Finish:

Air Intake Filter:
Waterborne paint technologies require a multistage filtration system to ensure air quality. The air intake filter of Taper-Draft ensures the highest level of air quality.

Overspray and Dirt Transfer:
The focused airflow created by the tapered airflow system creates focused air movement across the work piece avoiding shop floors and booth corners entirely. Proper paint booth hygiene is of course recommended for any waterborne paint booth system; however taper-draft has the ability to enhance the quality of waterborne finishes compared to traditional downdraft and cross-draft solutions.

When used correctly, overspray is pulled directly into the tapered filtration chamber and does not settle onto the work piece, shop floors, paint booth, or anywhere that will present a quality issue with the system. In this way the technology is similar to downdraft paint booths; a high quality of finish.

Taper-Draft and Lean Operations:

The systems created by Duroair require low cost of installation. A start to finish installation can be completed in one day, and is significantly less expensive than downdraft paint booth systems and in some cases, adaptations to current downdraft paint booths.

Additionally, the 13,500 CFM model has been enhanced with retractable enclosures to allow for efficient use of shop floor space.

Conclusion:

In analyzing any coatings operations and considering the readiness for waterborne coatings, operators need to understand the challenges of the technology lag in the paint booth manufacturing industry. Only now are options such as taper-draft available for sale and offering viable solutions to the unique air quality and air movement needs of waterborne coatings. Adaptations to traditional technology are now realized to be unworkable solutions.

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