Choosing the best dryer for your wash

Find out which drying features will work best with your wash format.

By DARRYL & CHERYL DOBIE

Two general types of dryers exist for the in-bay automatic. On-board dryers are attached to the wash equipment gantry and move over the stationary vehicle in the same way the gantry moved over the vehicle during the wash process.

Stand-alone dryers are separate from the wash system and may be located either inside the tunnel or on the exterior. While more compact on-board dryers tend to slow the wash process.

The drying difference

Because the vehicle remains stationary until the dryer has completed its cycle, subsequent customers are prevented from entering the tunnel and beginning their wash.

Additionally, moisture that accumulated on the equipment during the wash cycle may be pulled into the air dryers and deposited back on the vehicle.

Stand-alone dryers allow some drip space between the wash system and the dryer. However slight, the movement of the vehicle the short distance to the dryer aids in the natural removal of water from the vehicle surface.

As the washed vehicle proceeds forward, another customer is allowed to begin the wash process, thus increasing the available number of washes per day.

The speed of the vehicle passing through the dryer is at the discretion of the driver; therefore, most owners or operators install signage and countdown timers to assist the driver in determining the correct speed.

Rushing through the cycle may result in operation of the dryer after the vehicle has exited.

Power

The measurement commonly used to describe a drying system is horsepower. While this is a useful measure, without the proper combination of air velocity and volume along with efficient delivery, horsepower only gives a very general idea of dryer capability.

Increasing horsepower may not necessarily improve performance. Motor horsepower is determined by the amps required to turn the fan at a given speed on a pre-determined voltage — 1800 revolutions per minute (RPM) or 3600 RPM are standard.

The performance of a fan depends on the:

- Size;
- Shape; and
- Speed of the impeller.

Axial-flow fans

Air passes through the fan parallel to the drive shaft. An axial-flow fan is suitable for a larger flow rate with relatively small pressure gain.

The effective progress of the air is straight through the impeller at a constant distance from the axis. To accommodate the larger air volume exiting the apparatus, the outlets are larger than those of a centrifugal system.

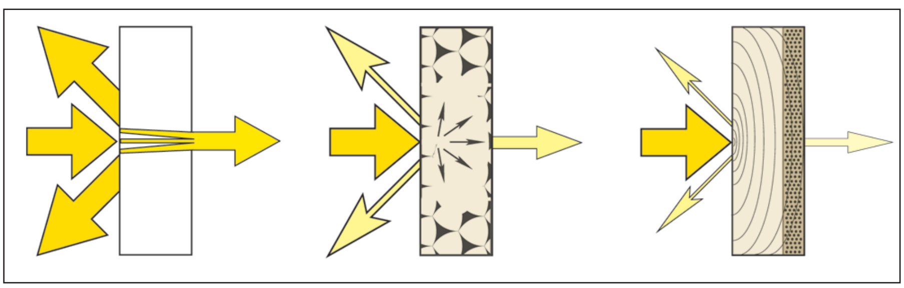
Air essentially flows directly through from inlet to outlet, increasing the size of the inlet to the extent of the fan and motor capabilities, allowing the size of the outlet to be increased.

Configuring the outlets too small may result in a fan stall where the backpressure reaches its maximum and the fan simply does not produce air with every rotation.

Centrifugal fans

Often called squirrel cage fans, centrifugals operate on the principle of throwing air away from the blade tips.

The air is led through an inlet pipe to the center of the impeller, which forces it radially (making a right angle turn) outward into the volute from which it flows into the discharge pipe.



Noise reduction graphic

Typical sound pressure levels

Sound pressure level (dB)	Source	Subjective Reaction
0	Threshold of excellent youthful hearing	Threshold of hearing
10	Threshold of good hearing	
20	Buzzing insect at 3 feet	Faint
30	Whispered conversation at 6 feet	
40	Quiet residential area	
50	Window air conditioner	Moderate
60	Conversational speech at 3 feet	
70	Freight train at 100 feet	
80	Computer printout room	Loud
90	Unmuffled large diesel engine at 130 feet	Very loud
110	Loud rock band	Threshold of discomfort
120	Passenger ramp at jet airliner (peak)	Threshold of pain
130	Artillery fire at 10 feet	Extreme danger
140	Military jet takeoff at 100 feet	Extreme danger

Sound pressure level chart

A centrifugal fan has a comparatively smaller flow rate with a larger pressure rise and, because of this pressure rise, the likelihood of stress fractures and fan failures is increased.

Improper sizing of ductwork or outlet assemblies may increase backpressure and therefore lead to fan or motor failures.

The correct combinations

Different fan types require different air delivery designs to achieve the required results. Improper delivery of produced air robs the dryer of efficiency while increasing noise and vibration.

Airflow broadens as it leaves the constrictions of ductwork and nozzles; however, it follows a straight-line path, stripping moisture first from the top portion of the vehicle, followed by the sides; conforming to natural gravitational forces.

To achieve an effective dry, airflow must also be directed at vertical surfaces in a slightly downward manner.

Neither pressure alone nor volume alone can effectively move fluid. The correct combination of both pressure and volume provides complete vehicle coverage with adequate force to remove properly treated rinse water.

Only a small amount of pressure is necessary to break the surface tension allowing the volume, along with its accompanying weight, to effectively move the debris/water.

The sound level dilemma

Sound has become a major issue for the industry. Although there is no universally accepted point at which sound is perceived as noise, potential health problems due to noise are accepted and recognized hazards.

Generally, the drying system is considered the major culprit in producing unacceptable sound levels. Other noise is created:

■ At the exit of the nozzle — where pressurized air meets still air.

■ At the intake — where air is being forcibly pulled in and compacted.

■ During cavitation — at the fan, as it compacts or pressurizes the air.

■ From turbulence — when the air is being twisted, turned, and re-directed from the blades.

All of these factors will produce noise with every dryer; however, the level of noise created with each one and the ability to reduce the noise will depend on the type of fan.

Incorrect abatement methods can result in loss of airflow, overheating of motors or fan failure by increasing back pressure on the fan itself.

Noise regulations

The Occupational Safety and Health Administration (OSHA) sets the standards for occupational noise exposure. These standards govern the maximum levels of industrial noise an employee may be exposed to, and they explain what action must be taken if these levels are excessive.

Additionally, local ordinances may impose restrictions or dictate hours of operation, depending on the noise generated by the carwash and emitted to neighboring properties.

Noise levels are measured and reported in decibels (dB). However, the decibel system can be confusing because it is based on a logarithmic scale.

For example, a 110 dB noise level is not 10 percent greater than a 100 dB noise level; it actually represents 10 times the acoustical energy.

For this reason, a small increase or decrease in the sound pressure level (measured in dB) has a very significant effect on the noise intensity. A drop of just 3 dB means the sound pressure level has been cut in half.

Source control

Noise radiates from a source. The most desirable approach to noise control is to reduce noise at its source by using absorbent materials to dissipate the sonic energy into small amounts of heat.

All equipment emits sound within a wide range of frequency levels (Hz), and abatement materials must be designed to treat those specific ranges.

Carwashes have large entrance and exit doors, therefore sound cannot be completely contained in the building.

The most effective sound absorption materials used in construction are porous and are not suitable for wet, harsh carwash environments.

Consideration should be given to sound reduction when designing the building; however, it is more effective to contain and reduce the power of sound waves emitted at the equipment source.

Noise reduction methods

■ **Blocking** — Blocking materials provide a barrier to noise. Blocking materials do not absorb or deaden noise, but rather block the direct path of the noise by reflecting it away from the receiver.

Performance is based on the mass and density of the material. The greater the mass and density of the material, the better the barrier. Blocking materials can be used as a barrier to enclose the noise source.

■ **Absorption** — Materials that absorb noise have an open fibrous structure that allows sound to enter. The internal fibers of the material vibrate, and the resulting mechanical movement dissipates the energy in the form of a minute amount of heat.

Absorbing materials are used to reduce the reverberant noise build-up from inside equipment housing.

■ **Damping** — Damping materials reduce noise radiation from metal surfaces by damping the vibration of the metal.

The minute flexing of the damping material provides the energy dissipation to reduce noise by reducing the ringing sound of vibrating sheet metal.

Combining damping with blocking and absorption materials significantly reduces sound levels. □

The addition of heat

Today, some operators have chosen to add heat to their drying process and thereby warm the tunnel.

Air drying utility costs may already account for a significant portion of the operating budget and attempting to heat a large, open-ended tunnel may not prove feasible.

An operator must first:

- ■ Research local utility costs;
- ■ Consider climate;
- ■ Assess the total system; and
- ■ Most importantly, be aware of what pleases the customer before completing this upgrade.

— C.D. & D.D.

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