

SUPPLEMENTAL AIR MOVEMENT SYSTEMS

Turbulent air movement is a key to efficient drying when applying waterborne finish material. What is turbulent air? With regard to drying waterborne refinish materials, turbulent air allows moisture to rapidly escape from the surface of the panel.

In a typical spraybooth environment, "laminar air" is what is commonly created along the length of the panel. This type of airflow, however, traps moisture beneath what is called a boundary layer. This is an area between the fast moving air and the painted surface of the vehicle (see Figure 1). Air movement systems add turbulence to the airflow, breaking up the boundary layer, allowing moisture to escape.

To generate the turbulent air, supplemental air movement systems are needed. These systems are available as wall-mounted

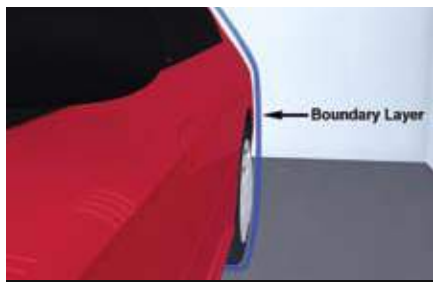


Figure 1 - The boundary layer can trap moisture against the panel surface, extending the refinish dry time.



Figure 2 - The Junair tower contains eight nozzles that can be adjusted manually for optimum airflow.

blower towers, hand-held venturi blowers (air multipliers), or ceiling fans. Each system is uniquely designed to create turbulent air. The system chosen depends on personal preference and budget.

WALL-MOUNTED SYSTEMS

The wall-mounted systems typically have a total of four towers, positioned in each corner of the spraybooth. The tower is equipped with multiple venturi-style nozzles that direct forced air onto the vehicle surface. The nozzles are adjustable so the air can be directed toward various locations along the vehicle's surface to achieve the most efficient drying (see Figure 2).

For this article, we will use the QAD system from Junair as an example of a wall-mounted air movement system. I-CAR has recently installed a QAD system with the help of Junair providing a more detailed look into the installation and operation of this system. The Junair QAD system now joins the AcceleCure ceiling fan system by Garmat, and the SATA hand-held venturi blowers as supplemental air movement systems in the I-CAR Tech Centre spraybooth.

QAD SYSTEM

This particular system uses filtered, ambient air to create forced air in the spraybooth. The filters are located in the intake plenum where they provide the system with clean air (see Figure 3).

The air-supplying units distribute the forced air using a blower motor located on top of the spraybooth. The forced air is transferred to the towers via four air ducts, one for each of the towers.

On this system, the blower nozzles on the towers are located behind an automatic door that opens for operation and closes when the system is turned off. This allows the nozzles to be protected from overspray during painting operations as well as reduce the dirt buildup that can contaminate finishes. There is also slight positive pressure when the doors are closed to prevent contaminants from getting behind the closed door. The doors are pneumatically operated through the control panel and the speed at which the doors open can be adjusted on the bottom of the air cylinders.

The system can also be used during the



Figure 3 - The intake filter for the Junair QAD system is located in the spraybooth plenum.

spraybooth bake cycle to ensure heat is evenly distributed throughout the spraybooth, similar to a convection-type oven.

INSTALLATION

The installation procedure for this type of air movement system is fairly straightforward. As mentioned earlier, the towers are mounted at or near the corners of the spraybooth. Through-holes must be drilled into the side of the spraybooth to accommodate the ductwork that transports the filtered air to the air supplying towers (see Figure 4). The motor assembly is mounted on top of the spraybooth and draws air from inside the spraybooth between the ceiling filter and the roof of the spraybooth. The filter is designed to remove particulates up to 10 microns.

Almost all spraybooth designs can be retrofitted with this type of air movement system. One common issue is where to locate the towers. Personnel doors, lights, and equipment can hinder the location. The most common solution is to simply move the location of the tower away from the hindrance, but still keeping it near the corner of the spraybooth. The nozzles can be adjusted to compensate for the tower position.

Common installation time is about 10-20 hours. To help accommodate the collision repair facility's working schedule, some installation crews work when the facility is closed for the day for minimal workflow disruption.

STATIC NEUTRALIZATION

A vehicle carries a relatively high static charge, particularly plastic parts such as bumpers. Static electricity in the form of electrostatic attraction or repulsion generates dust contamination and other paint defects.



Figure 4 - The ductwork is run outside of the spraybooth to the blower motor located on top of the spraybooth.

To compensate for this, this system is equipped with an option that ionizes the airflow directed at the vehicle. This system uses a Static Neutralization bar that is fitted to the tower between the two columns of nozzles, to reduce the static charge.

PROPER USE OF WALL-MOUNTED SYSTEMS

To use the wall-mounted system, the spraybooth must be turned on. When the power switch on the control panel is engaged, the system will open the doors to the units and engage the blower (see Figure 5). The air velocity may not be adjustable.

Depending on the options, the system may include a feature that can be used to control the spraybooth temperature while in flash-off mode. This feature turns on with the power switch. For this feature to be operational, the bake switch for the spraybooth must be wired into the control panel.

MAINTENANCE

Like every forced-air drying system, maintenance is key to optimum performance of the wall-mounted system. Some key maintenance items include replacing the air intake filters periodically to ensure proper airflow. Junair recommends that the filter tubes be changed at the same time as the intake filter.

Other periodic maintenance items include but are not limited to:

- wiping down the nozzles and tower.
- functionally testing the system.
- cleaning pneumatic systems related to the door opening system.
- calibrating the temperature controller.
- verifying nozzle velocity.

Check with the manufacturer for specific service schedules.

In addition to the wall-mounted air movement systems, other types of systems include hand-held air multipliers and high-speed and adjustable ceiling fans.

HAND-HELD AIR MULTIPLIERS

Hand-held air multipliers may be available with adjustable stands (see Figure 6). They employ the venturi effect to multiply volume/velocity, which can be up to 12 times the airflow from the compressed air system. This particular system is generally a less expensive option compared to ceiling fans and the wall-mounted towers.

Hand-held air multipliers make use of compressed air, therefore, may require a compressor upgrade to handle increased cfm depending on how many multipliers are used. If the compressor is able to handle the increased cfm, the compressor may run longer to keep up with the increased demand.

CEILING FANS

Spraybooth ceiling fans use clean ambient air to break up the laminar airflow around the vehicle (see Figure 7). This system consists of bladed fans with safety cages, which are mounted through the ceiling in the center of the spraybooth.

The fan motors are mounted outside of the spraybooth and may have to be routed around the fire-suppression system in the spraybooth. During installation, the fans are evenly spaced in the spraybooth, which may require modification of the air plenum in the ceiling.

During operation, the fan speed can be adjusted using the control panel located outside of the spraybooth (see Figure 8). Proper fan speed depends on the technician's preference.

CONCLUSION

For the refinishing department to run efficiently, quick dry time of a waterborne finish is key. There are a number of options available for including hand-held air multipliers, ceiling fans, and wall-mounted air movement systems. Each of these systems can be installed with little to no change in the design of a spraybooth, and little disruption to workflow. Which system will work best for a collision repair facility depends on the needs of each repair facility. For more information on each of these types of systems, contact your local vendor.



Figure 5 - The control unit is mounted on the outside of the spraybooth and is used to turn on the system.



Figure 6 - The ceiling fans are installed down the middle of the spraybooth.



Figure 7 - This is an example of a hand-held air multiplier mounted on an adjustable stand.



Figure 8 - The control panel contains a rheostat that controls fan speed and air velocity.

This article first appeared in the I-CAR Advantage Online, which is published and distributed free of charge. I-CAR, the Inter-Industry Conference on Auto Collision Repair, is a not-for-profit international training organization that researches and develops quality technical education programs related to automotive repair. To learn more about I-CAR, and to subscribe to the free publication, visit: www.i-car.co.nz, then click on 'Links', then 'I-CAR Advantage Online' For information on I-CAR training courses conducted throughout New Zealand, contact I-CAR NEW ZEALAND PHONE 07 - 847 0218