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# Don't Starve Your Spray Gun For Air

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By John Treuschel  
Product Line Manager, Industrial Spray Technology

The flawless finish you set out to achieve is now an orange peel disaster. What went wrong? Pressure (psi) drop and volume (cfm) drop are two of the leading causes of imperfections in the finishing process. The air pressure that starts out as a shout at the air source is barely a whisper by the time it enters the spray gun, usually resulting in a poor finish. Too often, only atomization pressure requirements are considered when both pressure and volume are critical to the proper orientation of a spray gun.

**Select a Quality, High flow Air Regulator**

Air regulator design can also restrict air flow and can create excessive pressure drop. Check the gauge on the regulator with both static (no flow) and active (spray gun in use) conditions. If there is a pressure drop greater than 5 psi (34 kPa), the regulator may be too restrictive. Select an air regulator capable of flowing enough air for your

spray gun. Regulator specifications should exceed spray gun demand.

**Select Quality, High Performance Air Compressors**

Modern spray guns, particularly HVLP, require larger volumes of air to atomize today's high solids coatings. An air cap that requires a

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**What Causes Pressure Drop?**

The following factors contribute to pressure drop in conventional air spray and HVLP (High Volume Low Pressure) systems. Just one weak point may cause a minor loss of pressure.

- Air hose that is too small in diameter
- Air hose that is too long
- Too many quick disconnect fittings in the system
- Restrictive quick disconnect designs
- Low performance air regulators
- Low performance air compressors

**Using the Right Air Hose**

Selecting the proper hose diameter is an important step in maintaining air pressure. With a smaller and more restrictive passage, less air gets through the line. Using a 1/4 inch (6.3 millimeter) hose means less pressure at the gun than when using a 5/16 inch (7.9 millimeter) hose. A 5/16 inch hose delivers less pressure than a 3/8 inch (9.5 millimeter) hose. The smaller the inside diameter of the air hose, the less air pressure delivered to the gun. For instance, there is a loss of almost 2 psi/ft (45 kPa/m) with a 1/4 inch (6.3 millimeter) hose at 25 cfm (0.71 cmm), compared to a loss of less than 0.5 psi/ft (11 kPa/m) with the larger 3/8 inch (9.5 millimeter) hose at 25 cfm (0.71 cmm).

The "right diameter" does not mean that you have to use the biggest hose, because hose length is always a factor. As air is forced through the line, pressure drops the farther the air has to travel. The smaller 5/16 inch (7.9 millimeter) diameter can be used when hose length is relatively short. If the distance that the air has to travel increases, the hose diameter must increase as well.

**Quick Air Connectors (Quick Disconnects or QD's)**

These devices are convenient, but depending on design, can be a major source of pressure drop. Ask yourself, does this application require them? If the air hose is not removed from the gun more than once or twice per day, these devices should probably be avoided. Consider the following:

A beginning pressure of 75 psi (517 kPa) from the air filter and regulator unit is reduced to 68 psi (468 kPa) after going through a typical quick disconnect. Traveling through 20 feet (6 m) of 1/4 inch hose at 15 cfm(0.42), air pressure drops to 48 psi (330 kPa) before going through another quick disconnect.

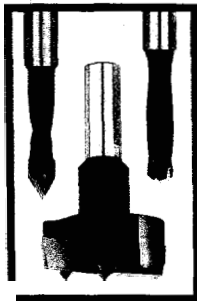
That 41 psi (282 kPa) is not sufficient to produce 10 psi (68 kPa) at the air cap, which may be necessary depending on the desired finish and the material being sprayed. Look for recommended air pressures in the manufacturer's application instructions.

It may be convenient to have a number of quick disconnects throughout a system for quick, easy detachment of hoses. But, even the best quick disconnect on the market will result in some pressure loss. Quick disconnects should only be used where necessary. With three or four quick disconnects, it's possible to choke off the air supply entirely. Examine the current quick disconnects to see if they are being used. A quick disconnect at the wall may be used once a week, a steep price to pay for the loss of pressure.

In addition, all quick disconnects aren't the same. Depending on the pressure and volume requirements, it is possible to have as small as one pound or as large as 16 pounds of pressure for one quick disconnect. Use "high-flow" quick disconnects.

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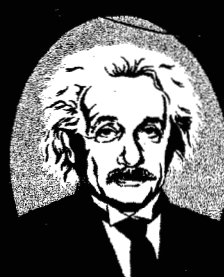


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volume of air at 28 cfm (0.80 cmm) needs at least a 7 horsepower compressor to generate that much volume. This is before considering the restrictions of quick disconnects, small diameter hose, etc.

### **Special Considerations for HVLP Systems**

Unlike conventional air spray guns, modern HVLP spray guns atomize coatings by using a high volume of air at low air cap pressure, generally in the 1 - 10 psi range. For example, the 50 psi (345 kPa) of air supplied to an HVLP spray gun by a compressor will be reduced to a pressure of no more than 10 psi (68 kPa) as measured at the air cap. In a conventional air spray gun, air cap pressure is restricted only by compressor capacity, regulated pressure and normal pressure drop conditions. Air cap pressure can be 40 to 50 psi (276 to 344 kPa).

HVLP spray depends on sufficient air pressure at the air cap for optimum performance. All of the above sources of pressure loss can prevent enough air from just getting to the spray gun to generate the necessary air cap pressure.

In general, avoid using 1/4 inch hose for all spray guns. With the volume requirements of HVLP spray guns, avoid using 5/16 inch hose to insure maximum air available to the spray gun. Use quick disconnects only when air hose must be removed from a gun several times per day. Choose QD design carefully to insure that the least restrictive units are used. Use one QD per gun located in the gun inlet.

Wall mounted regulators have larger air passages than their counterparts to minimize pressure drop and will regulate air delivered to the spray gun better than gunmounted type regulators as these must, by nature, be kept small and light weight. The regulators provide a constant adjustment of the pressure at the air cap. Air pressure adjusted with a cheater valve type restrictor will first exit the air cap with an initial burst, then level off to the adjusted velocity and pressure.

### **Air Cap Test Kits Pay Off**

A final suggestion is to use an air cap test kit. Using the test kit takes the guesswork out of analyzing the amount of air available. Knowing the amount of air pressure at the air cap allows you to determine whether there is enough air to atomize the material being sprayed. □

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