Introduction

Once the spray gun has been connected to its air and fluid supplies the correct air to fluid balance must be achieved before starting to spray. Failure to do so could result in uneven material application with visible bands when using metallic content or some solid colour materials. In addition, poor finish can be caused due to poor or over atomisation. There are several ways that the gun could be set up:

   a) To use a limited air supply
   b) To a pre-set measured fluid flow
   c) By ‘feel’

In all cases it is recommended that a piece of card or paper be made available for the sprayer to check atomisation and pattern shape during this initial gun adjustment. Despite common beliefs, it is impossible to fully judge the quality of a spray fan and pattern by pulling the trigger and looking at the spray fan as it jets into the air.

There are three spray checks that are usually used to assess the quality of a spray pattern and its atomisation:

Test 1. Pattern Shape

To check fan shape hold the gun stationary at 6-8 inches from the surface and trigger the gun for approximately 1 second. The trigger should be held until a well-defined vertical pattern shape is produced, that can be examined easily. Look for obvious lumps or bends that would produce uneven material application during production spraying. Examine the top and bottom ends of the pattern for evidence of ‘bursting’ due to too much material being fed to the gun.

Remember, it is far more common for a bad fan shape and material deposition to occur due to bad air to paint balancing than for them to be caused by dirty of damaged air caps and fluid tips. Lower viscosity and lower solids content materials will tend to ‘split’ far more easily than their higher counterparts. This is normally due to too much horn air trying to ‘squeeze’ the fluid stream. While screwing in the fan control knob will normally reduce the problem it is better to reduce the overall amount of air exiting the air cap by reducing regulator pressure or by using the air flow control valve (if fitted) on the gun.
**Beware** - while on conventional air atomising guns excess material flow will show up as a centre heavy or even elliptical shape pattern, on DeVilbiss High Volume Low Pressure and Compliant guns the excess material will tend to concentrate at the pattern ends - totally the opposite to what you would normally expect!

Pattern defects can also be produced by damaged surfaces or dry paint build-up. Critical areas include the exterior profile of the fluid tip and inside bore of the air cap centre hole. Contamination or damage here will deflect the air flow, producing ‘pear’ shape or ‘banana’ patterns. Ensure that all holes and surfaces of the aircap and fluid tip are clean and undamaged before spraying. Clean them without causing (further) damage or replace if necessary.

### Test 2. Atomisation

To check atomisation, quickly traverse the triggered gun over the surface (at the correct, constant, target distance) and then examine the droplet sizes produced. It is incorrect to look for very fine droplets or droplets of only one size. The size will depend upon pigment grind as well as atomisation power, so an even distribution of droplet sizes throughout the pattern is correct. It is normal for the pattern ends to have slightly more fines than the centre. Use the minimum air pressure necessary achieve the desired atomisation.

Too much pressure will waste paint and create excessive contamination levels. When production spraying, normally watch 6-8 inches behind the spray pattern as the gun passes across the component surface. The paint should already be flowing out into a smooth continuous film. If the resulting finish is orange-peel or very heavily loaded then the air:paint ratio of the gun is not yet correct and needs further adjustment (or a faster/slower pass speed).

### Test 3. Material Distribution

Finally, to check material distribution, rotate the air cap or gun so that the sprayed pattern will be horizontal. Holding it at the correct gun-to-target distance, trigger the gun until sprayed material starts to run downwards from the pattern due to gravity. By examining the relative flow speeds and distances of the runs the material distribution can be seen. An even or very slightly centre heavy pattern is normally desirable.
Putting it all together ….

Going back to the earlier list in the Introduction; in situation (a), where only a certain amount of air is available to the sprayer due to bad compressed air supply or insufficient compressor capacity, after setting the air at the desired or maximum level the fluid flow should be gradually increased and the spray pattern and atomisation continually checked until even atomisation and a well shaped pattern is produced.

In situation (b), the fluid flow should be set to the desired flow using a measuring flask or graduated beaker (without the use of atomisation air) and then the air regulator gradually increased until the desired atomisation and pattern is produced. Beware of air cap/fluid tip combinations that produce back pressure, and that will reduce the effective fluid flow as the atomisation air pressure is increased. Remember also that, when decreasing the fluid flow for smaller jobs, the atomising air should also be reduced to keep the desired ratio.

In situation (c) it is normal for a basic fluid flow rate to be set and then atomising air increased to correctly balance it. If found to be insufficient for area coverage or process speed, increase the fluid flow slightly, and again balance with the air. Repeat this procedure until the required setting is achieved.

Pattern Size

Pattern size is primarily dependent upon how much fluid is emitted from the fluid tip. However, once this basic fan size is established it can be reduced, if desired, by using the fan air control knob. When using medium to high fluid flows, many guns have the capability to generate a very wide fan angle (and therefore long) spray fan). The fan size should be adjusted to suit the object being coated and minimise the waste due to overspray. This wasted material never has the opportunity to land on the object and should be kept as small as possible. For certain applications, reducing the fan size will also be desirable in order to ‘concentrate’ the fluid to promote a better flow and ‘throw’ the round spray further to hit difficult to reach areas.

Naturally, gun-to-target distance will also alter the fan shape. Increasing or decreasing it too much will create other problems which will then need to be solved. However by a combination of adjusting all three controls and target distance, an 1/8" wide sharp edged spray fan can be achieved, sufficient to be able to write your name quite clearly.