

HVLP SPRAY

High Volume Low Pressure (HVLP) spray equipment is commonly used in painting and finishing applications where control, efficiency, and reduced overspray are important. Originally developed for fine finishing and woodworking industries, HVLP technology has also become widely used in certain architectural coating applications.

Understanding how HVLP systems operate, where they perform best, and their limitations can help painting professionals select the appropriate equipment for specific coating materials and jobsite conditions.

What Is HVLP Spray?

HVLP stands for High Volume Low Pressure. These systems atomize coatings using a large volume of air delivered at relatively low pressure, typically 10 psi or less at the air cap. Unlike conventional air spray equipment, which uses higher pressure to break coatings into fine particles, HVLP relies on higher airflow at lower pressure to produce atomization while reducing the velocity of the sprayed material.

This lower-pressure approach creates a softer spray pattern with less bounce-back and less overspray. As a result, more of the coating reaches the intended surface instead of being lost into the air. For that reason, HVLP equipment is often associated with improved transfer efficiency and better material control, especially on detailed or smaller surfaces.

How HVLP Systems Work

HVLP systems generally consist of an air source, a spray gun, and a material supply system. The air source may be a turbine unit or, in some cases, a compressor designed to provide the high air volume needed for atomization. The spray gun is specifically engineered to regulate airflow and fluid delivery in a way that produces a controlled spray pattern at low pressure (Figure 1). Coatings may be supplied through a gravity cup, siphon cup, or pressure pot depending on the equipment configuration and the type of work being performed.

Many professional HVLP systems use multi-stage turbine units that generate warm, dry air. This can help support atomization and may assist with drying under some conditions, although performance still depends heavily on the coating type, viscosity, and application setup.



Figure 1

Intended Uses of HVLP Equipment

HVLP equipment is designed primarily for precision finishing and controlled application rather than high production output. It is most commonly used where finish quality and overspray control are critical. Typical uses include cabinet and millwork finishing, furniture finishing, painting doors and trim, and other small-scale painting projects.

HVLP equipment is especially useful when working in interior environments where overspray must be minimized, such as occupied buildings, residential interiors, or shops.

Because of the controlled spray pattern and high transfer efficiency, HVLP systems are frequently used in refinishing and shop environments where finishing quality is a primary objective.

Coatings Commonly Applied with HVLP

HVLP equipment performs best with lower- to medium-viscosity coatings that can be atomized effectively at lower pressures. It is commonly used to apply wood stains, clear sealers, lacquers, conversion varnishes, polyurethanes, shellac finishes, and many waterborne wood finishes. It may also be used for certain enamels and urethanes when the material is properly matched to the gun setup and fluid tip size.

In architectural painting, HVLP is most often chosen for fine finish applications where appearance is critical and where the goal is to achieve a smooth, furniture-like finish. Some thinner waterborne architectural coatings may also be applied successfully with HVLP, provided they are within the equipment's viscosity range and can be atomized without excessive thinning.

By comparison, HVLP is generally not intended for heavy-bodied or high-build materials such as block fillers, elastomeric coatings, textured coatings, masonry coatings, or many high-build primers. These types of products usually require greater fluid pressure and higher production capability than HVLP systems are designed to provide. For those materials, airless or air-assisted airless spray equipment is typically more appropriate.

Advantages and Limitations of HVLP Systems

HVLP systems offer several important advantages, particularly in applications where finish quality and overspray control are priorities. One of the main benefits of HVLP technology is its high transfer efficiency. Because the coating is delivered at lower pressure, a greater percentage of the sprayed material reaches the target surface, which can reduce waste and improve material utilization. Reduced overspray is another significant advantage, especially for interior work or projects involving adjacent finished surfaces.

HVLP equipment can also provide excellent finish quality. Its controlled spray characteristics make it well suited for fine finishing applications where appearance matters. In addition, operators often value the level of control they have over spray pattern, material flow, and application precision. In some cases, HVLP systems may also help support compliance with air quality requirements that favor or require higher transfer efficiency spray methods.

At the same time, HVLP equipment has practical limitations. It generally operates at lower production speeds than airless systems, making it less suitable for large walls, ceilings, exterior surfaces, or other high-production applications. Spray patterns are typically narrower, and heavier-bodied coatings may not atomize well without thinning. When unsuitable materials are forced through HVLP equipment, the result can be poor atomization, uneven film build, or finish defects.

Thinning also requires caution. Excessive thinning may affect coverage, hide, sag resistance, dry time, or overall coating performance. For that reason, coating manufacturers' recommendations should always be reviewed before adjusting material viscosity for spray application.

Comparison to Other Spray Methods

Compared with other spray methods, HVLP occupies a more specialized role. Conventional air spray also produces fine finishes, but it generally operates at higher pressure and can create more overspray. Airless spray equipment uses high fluid pressure without atomizing air and is better suited for high-production work such as walls, ceilings, and other large surfaces. Air-assisted airless systems combine fluid pressure with a limited amount of atomizing air, making them useful where both production efficiency and finish quality are needed.

For most large-scale architectural painting projects, airless spray remains the more common choice because it can handle heavier coatings and cover large areas more efficiently. HVLP is best viewed as a precision application tool rather than a general-purpose production sprayer.

Key Takeaways

HVLP spray equipment is a practical and effective choice for fine-finish applications where overspray control, transfer efficiency, and appearance are important. It is especially well suited for cabinets, doors, trim, millwork, and other detailed surfaces that benefit from a smooth, controlled finish. However, HVLP has clear limitations and is generally not intended for large-scale production work or for heavy-bodied, high-build coatings that are better suited for airless or air-assisted airless application.

Achieving good results with HVLP depends not only on selecting the right type of spray equipment, but also on proper setup and application technique. Fluid tip and needle size, turbine or compressor capacity, coating viscosity, spray technique, and jobsite conditions all influence performance. Temperature and humidity can also affect atomization and how the coating lays down on the surface. Matching the equipment to both the coating and the project requirements is essential for consistent application, efficient material use, and high finish quality.

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