

Where LESS Is **MORE:** *Increasing Transfer Efficiency Using Dense-Phase Technology*

How did one office furniture manufacturer reduce coating time and increase line speed from 12 fpm to 20 fpm? And a retail display manufacturer increase coating line speeds from 11 fpm to 15 fpm? They both now use dense-phase technology.

BY KEN KREEGER,
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Compressed air is the main power source in powder coating systems. Traditionally, powder coating systems have relied on venturi-style gun pumps that propel powder to the spray guns by movement of high velocity air. The high velocity can mix powder and air and lead to powder blowback and over-

spray, reducing transfer efficiency.

Because of its inherent benefits and continuous improvements, the use of powder coating continues to grow as it's used for more and more applications. As powder coating enjoys expanded application opportunities, the supporting equipment industry has worked hard to improve application technology.

High-Density Powder, Low-Velocity Air

Transfer efficiency is one area that has benefited tremendously from recent innovations, including the adoption of dense-phase technology. Dense-phase is a reference to the dense powder in the transport tubes. This technology provides a way for powder finishers to increase productivity and reduce material and operating costs by improving dispensing, powder transport and powder circulation. Nordson uses the term HDLV® (High-Density powder, Low-Velocity air) to describe the technology.

HDLV technology focuses on dense-phase powder transport with closed-loop digital flow technology. Moving more powder with less air results in higher transfer efficiency compared to conventional venturi-style pumps. Using less compressed air to propel powder to the gun means less overspray, more powder on the part, and greater powder material savings. Using



With HDLV technology, powder coating systems can achieve more than 70 percent first-pass transfer efficiency. This provides excellent powder coverage for even difficult parts, while dramatically cutting down on the amount of powder used—and wasted in non-reclaim systems. Colors can also be changed on the fly with nearly instantaneous agility.

Dense-Phase Technology

HDLV technology requires a well-flu-idized powder supply for the system to operate at peak efficiency. With the improved transfer efficiency offered by dense-phase technology—in addition to the high cost of down time to change colors as compared to the cost of powder—many powder coaters are choosing to spray-to-waste rather than reclaim powder.

The Heart of the System: The HDLV Pump

The HDLV powder feed pump transports precise amounts of powder from a feed source to a powder spray gun. The pump consists of two halves that function identically while isolating the suction and dispensing processes. The halves alternately draw powder in and

dispense powder out of the pump. While one half is drawing powder in, the other half is dispensing powder out. As each half dispenses powder out, the powder in the tubing blends together, resulting in a consistent flow of powder from the spray gun.

The two-chamber design allows for high-density powder, low-velocity air to propel more powder with less compressed air. The design also allows for smaller 8 mm suction and delivery tubing, which ensures denser powder in the line. Dense-phase pumping can move up to four times the powder of conventional venturi transfer pumps. Examining the pump operations when the left half is drawing powder in, the left suction pinch valve is open, while the left delivery pinch valve is closed.



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From Liquid to Powder: Computer Modeling Tool Shows Your Options

Advancements in spray application equipment and systems, like dense phase technology, are not the only options available when it's time to make a decision to improve your finish quality and operating efficiency. New computer modeling tools have been developed to determine your best choice—given your particular requirements. With only a few specifics about your

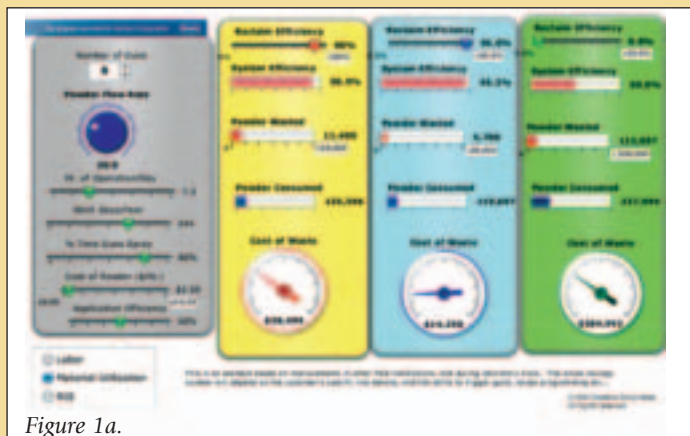


Figure 1a.

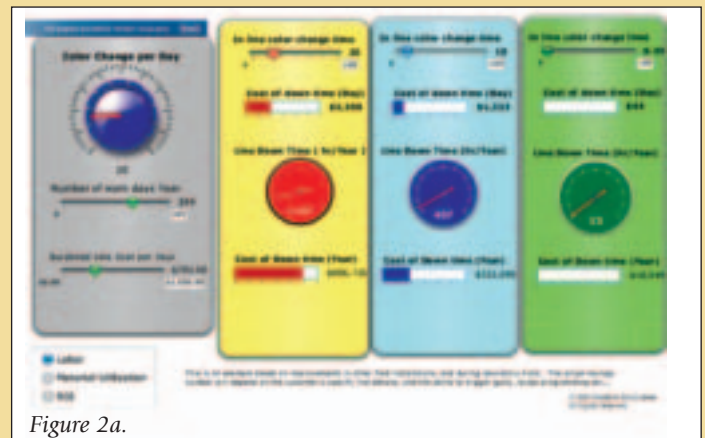


Figure 2a.

current and/or future operation, you can put these user-friendly tools to work for you to sort out the options and show you what to expect — before making that critical purchasing decision.

Calculators work with three variables to produce your best-bet “what-if” scenarios. They include the number of guns, number of color changes per shift, and

HDLV Technology in Action

Here are just a couple of examples of customer successes with HDLV technology.

Productivity Increases Par for the Course

For one precision sheet metal fabricator and finisher, this technology has provided a big boost to its golf cart finishing line. Using two Nordson HDLV systems, the job shop cut coating time in half—from 28 minutes to 14 minutes. It also increased output by 30 percent.

A playground manufacturer is using HDLV technology for spraying textures and metallics. The result has been an increase in line speed from 4 fpm to 5.5 fpm. The same technology has also reduced color-change time from 3.5 minutes to 45 seconds, which has had a tremendous impact for a company that averages 40 color changes per shift and is running two shifts per day. Higher transfer efficiency has reduced scrap powder by

as much as 80 percent. They previously recovered one drum per shift. They're now recovering one drum every four to six shifts.

Material Savings on Display

More powder on the part and greater powder material savings are easy to see at one retail fixture manufacturer. They've realized a 24 percent increase in powder material savings using HDLV technology, while increasing line speed from 11 fpm to 15 fpm, and reducing color-change time from four minutes to one minute.

A leading manufacturer of refrigerated display cases replaced its venturi-based equipment with HDLV technology. The result has been \$300,000 saved in only eight months through powder material savings, and greater line density has been achieved due to decreased line spacing.

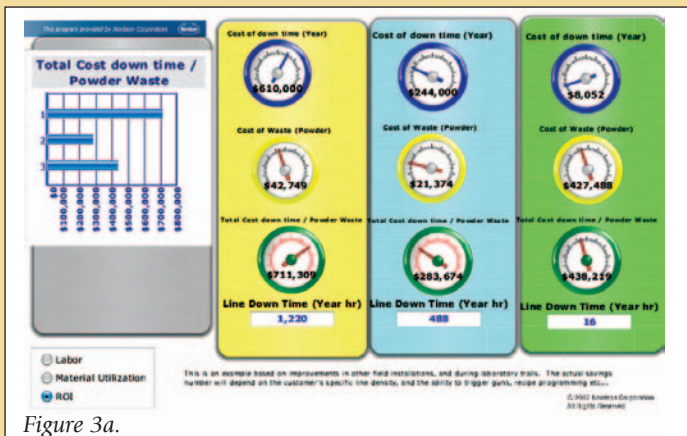


Figure 3a.

return on investment (ROI) payback. You simply plug this information into the calculator. The tool then generates three options that you can analyze, evaluate and compare to make an educated decision on what coating system is right for you.

For example, suppose your plant only does 10 color changes per day (Figure 1a), and you work 244 days in

Editor's Note: To try this interactive modeling tool, go to www.powdercoating.org and click on our digital version of the magazine. Flip to pages 28-29 by clicking on it on the Table of Contents.

a year with a burdened cost of \$793.50 (Figure 2a). The systems have eight auto guns spraying 20 lb/hour with a 50% transfer efficiency and a powder cost of \$2.50/lb.

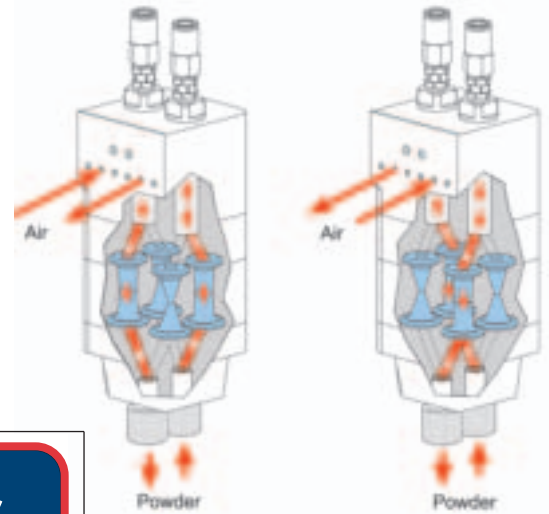
The model provides for three options:

1. A cartridge booth with a 35-minute color change
2. An advanced color booth with a 10-minute color change
3. A lean booth with a 20-second color change

For this scenario, Figure 3a indicates your return on investment to help make it easier than ever before to invest your powder coating capital wisely.

Dense-Phase Technology

Figure 1. In this example, the right half is dispensing powder out. The right suction pinch valve is closed, while the right delivery pinch valve is open. Positive air pressure is applied to the right porous fluidizing tube, which dispenses powder out of the fluidizing tube, down the right delivery pinch valve, down the right side of the outlet manifold wear block, out the delivery fitting, and out to the tubing that leads to the powder spray gun.



Negative air pressure is applied to the left porous fluidizing tube, which draws powder in the inlet fitting, up the left side of the inlet manifold wear block, through the left suction pinch valve, and into the fluidizing tube. After the negative air pressure has been on for the specified time, the fluidizing tube's negative air pressure shuts off and the left suction pinch valve closes.

In this example, the right half is dispensing powder out. The right suction pinch valve is closed, while the right delivery pinch valve is open. Positive air pressure is applied to the right porous fluidizing tube, which dispenses powder out of the fluidizing tube, down the right delivery pinch valve, down the right side of the outlet manifold wear block, out the delivery fitting, and out to the tubing that leads to the powder spray gun. (Figure 1)

The pump design also allows for faster color changes, with either automatic or manual color changes. Spray guns can be automatically purged with either continuous or pulse purge for fast cleaning of the gun during color changes without disassembly. A playground manufacturer who uses HDLV technology does 40 color changes per shift. The manufacturer reduced color-change time from 3.5 minutes to 45

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SELLING KNOWLEDGE WITH EQUIPMENT



With HDLV technology, powder coating systems can achieve more than 70 percent first-pass transfer efficiency. This provides excellent powder coverage for even difficult parts, while dramatically cutting down on the amount of powder used—and wasted in non-reclaim systems. Colors can also be changed on the fly with nearly instantaneous agility.

seconds (see sidebar for more details). A Color-on-Demand® controller is also available, which offers color changes in less than 20 seconds and up to 28 colors per operator. When the operator initiates a color change, the pump goes through a three-stage process:

- Soft purge to spray gun. Air dispenses powder out of both fluidizing tubes, through the powder delivery tubing and spray gun, and out into the booth.
- Soft purge to feed source. Air dispenses powder out of both fluidizing tubes, through the powder suction tubing and back into the powder feed source.
- Hard purge to spray gun and feed source. Pulses of air remove any powder that remains in the pump, spray gun, and suction and delivery tubing. After the delivery side is purged, the suction side is purged in the same manner.

Guns to Match

Because of the new pumping technology, a new gun had to be designed with smaller diameters inside and new nozzles to complement the dense-phase process. Nordson's HDLV system integrates specially designed manual and automatic powder spray guns. These powder spray guns use conical and flat-spray nozzles to atomize, shape and spray dense-phase powder delivered by

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Dense-Phase Technology

the HDLV pumps. This system has a manual powder spray controller with 10 user-configurable presets to build recipes for specific parts and powders.

The combination of less compressed air and features of the new

spray gun results in a softer spray at the gun tip for higher first-pass transfer efficiency. That leads to faster coating at high line speeds with higher powder output, plus better coverage in cavities and corners. For example, a

precision sheet metal products company was coating large textured panels in 4.5 minutes at 3 to 5 mil thickness. Using HDLV technology, they reduced coating time to 3 minutes and increased thickness to 7 to 8 mil. The same company was able to replace two guns with a single HDLV gun, and still increase line speed from 10 fpm to 11 fpm.

Using less compressed air to propel powder to the gun means less overspray, more powder on the part, and greater powder material savings.

With HDLV technology, powder coating systems can achieve more than 70 percent first-pass transfer efficiency. This provides excellent powder coverage for even difficult parts, while dramatically cutting down on the amount of powder used—and wasted in non-reclaim systems. Colors can also be changed on the fly with nearly instantaneous agility.

Dense-phase powder technology promises to redefine powder coating. It provides material cost savings, faster color change, reduced wear on system parts, better finish quality and greater control of film thickness. The bottom line is higher application efficiency, which is critical for any powder coating operation.

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Technical Specifications

	SilBerCote® PC X Series	SilBerCote® PC Z Series	Silvet® J Series	Silvet® E Series	Silvet® P Series
Models in Series	8	4	6	10	4
Driving Technology	Advanced Inorganic	Advanced Organic	Aldehyde Carrier	Polyolefin Carrier	PMMA Carrier
Delivery Features	Dry Product	Dry Product	Granule	Granule	Granule
Handling	Safe, Easy	Safe, Easy	Safe, Easy	Safe, Easy	Safe, Easy
One-Coat Performance	Excellent	Excellent	Excellent	Excellent	Excellent
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