Why The ColorPainter™ W-64s Is A Better Choice Than The Hewlett-Packard™ Latex For Outdoor Graphics
A Competitive Review of Two Popular Wide-Format Printers For Signmaking

2012 Wide-Format Printer Technical Article

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Introduction: This white paper examines the main reasons why customers may want to purchase the Seiko I Infotech ColorPainter W-64s instead of the Hewlett-Packard L25500 Latex printer for printing indoor, near-window, and outdoor graphics. This paper describes common operations where a SIIT ColorPainter W-64s may provide a better solution than a HP Latex printer, and explains some of the common myths or misunderstandings about the HP Latex and other Latex printers. The reader should have a working knowledge of wide-format printing and the production of outdoor graphics.
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Executive Summary

The Hewlett-Packard DesignJet Latex printer was introduced as a completely new non-solvent alternative to traditional solvent printers in 2009. This report was created in late 2011 using the DesignJet L25500 model for testing, which HP recently replaced with the L26500. As the new DesignJet L26500 does not appear to be substantially different from the L25500, this paper remains valid for comparison purposes - although readers should validate whether the new Latex models have improved in these areas or not. It also is applicable to other Latex-like printers in the market that may use a similar high-heat baking technology.

In the 2 years since the launch of the Latex printer by Hewlett-Packard, the industry, magazine writers, technology experts, resellers, and owners have learned a great deal about the significant limitations of the Hewlett-Packard printer and technology. Latex printers use a super high heat dryer to “bake” low solvent inks on the surface of heat-resistant substrates. It is now clear that the Latex printer and this “baking” technology have not lived up to the hype that surrounded the initial launch, or to many of its promises.

The ColorPainter W-64s printer was introduced in April of 2011, and is the 5th generation of the well-regarded ColorPainter line of solvent printers from Seiko I Infotech, a wholly owned subsidiary company of Seiko Instruments Inc. The ColorPainter W-64s is exclusively distributed by Seiko Instruments USA in North and South America. Traditional solvent printers use safe solvent ink (similar to latex paints) that chemically bond with the substrate, without the need of high-heat dryer/ovens. They dry slightly more slowly, but offer numerous advantages over “Latex” type printers.

In the current economic climate, where value is paramount and equipment budgets are carefully managed, the Seiko I Infotech ColorPainter W-64s represents a wiser investment because it can print faster, print better image quality, print on more types of substrates, print with less electrical use, produce better quality output, and print at a much lower cost over multiple years. The output also last substantially longer outdoors than a Latex print.

The ColorPainter W-64s offers 23 significant advantages over the DesignJet L25500 in the following areas:

- Media Flexibility
- Printing Speed
- Wait Times
- Usable Area of Substrate
- Narrow Media Print Speed
- Warm Up Time
- Near Edge Image Quality
- Media Shape After Printing
- Media Length After Printing
- Output Color Gamut
- Output Lightfastness
- Output Glossiness
- Electricity Usage - Environmental Impact
- Fire Hazard Risk
- Makeup Accuracy
- Print Head Replacement Frequency
- Print Head Replacement Costs
- Ink Viscosity
- Ink Usage
- Printer Longevity
- Service & Support
- Resale Value
- Running Costs

HAPs and HAPs-Free Inks

HAPs are Hazardous Air Pollutants that have been identified by the US government (EPA) as hazardous to humans. Most eco-solvent and low-solvent inks for outdoor printing contain HAPs. HAPs are also found in many household cleaners, and common latex paints.

One of the big advantages that the HP Latex offers is low odor, HAPs-Free inks. This document contains numerous downsides of using the Latex printers, but we do see the value of HAPs-Free inks.

The ColorPainter W-64s has two inks sets available:

- GX - a traditional low solvent ink that offer substantial long-term lightfastness and durability.
- IX - a revolutionary new low odor HAPs-Free ink set that does not require a high-heat drying system like the HAPs-Free latex inks require. This ink set is an alternative to Latex ink.

The HP Latex printer can only print low-solvent HAPs-Free Latex inks. With ColorPainter, you can decide what type of ink to use for your business or application, HAPs-Free IX inks with less smell and shorter outdoor durability, or low-solvent GX inks with much longer outdoor durability.
**Media Flexibility**

The HP Latex printer can only print on heat-treated, approved substrates as its internal heating elements must heat up to 190°F to dry the inks. So, owners must be careful to purchase “latex approved” or “heat treated” substrates, or they risk damaging their printer and/or creating a fire risk (see Fire Hazard section). The availability of heat-resistant substrates is very limited (in some cases, only media supplied by HP will work reliably), as the HP printer is the first printer in our industry to require this characteristic. Consequently, these substrates tend to be much more expensive and more difficult to find than traditional solvent printer substrates. For example, many popular solvent printer substrates are not recommended for use in a Latex printer, and many inexpensive chinese-made substrates cannot be used either. Owners of Latex printers have a much more limited pool of substrates and these substrates tend to be much more expensive. *ColorPainter printers can print on a wider range of substrates and medias without any heat restrictions or limitations - allowing owners to purchase substrates from a wider range of vendors throughout the world, at lower prices; and to produce a vaster range of output and products.*

**Printing Speed**

Hewlett-Packard advertises that Latex printers can print up to 250 sfph (approx. 23 m²ph), but the actual print speed recommended for self-adhesive vinyl is 100 sfph. In fact, HP does not recommend printing over 128 sfph on any substrate expect paper! The Latex high-heat dryer has difficulty drying high ink loads on materials like PVC. Any print not completely cured by the drying process exhibits an oily residue that never dries, rendering the output unuseable. Uncured areas of a print are most common on dark, high-ink-load images (such as dark backgrounds), and most common near the edge of a print where the DesignJet dryers have the most difficulty keeping temperature constant due to more exposure to outside airflow. The DesignJet user manual recommends further slowing down of the printer if inks are not fully cured upon exit (and you have to throw the print away, as it will not dry). Overall, the print speed of the HP Latex is highly dependent on the substrate type and the ink load of the image to be printed (light and dark images have lower and higher ink loads). *The ColorPainter W-64s printer can print all standard substrates at its advertised print speeds of 128 - 191 sfph, regardless of the image type, substrate type, or ink load; it delivers more consistent speed and productivity.*

**Usable Areas Of Substrate**

If slowing the printer still fails to dry the ink properly on a Latex printer, HP recommends adding a large unprinted margin to the edge of the output. While traditional solvent printers do take slightly longer to dry and cure, they always dry and cure properly - even with high ink loads. There are no wasted prints with uncured dark areas on solvent prints. Latex printers have more trouble curing ink on the edges of prints than traditional solvent printers, thereby reducing the usable area of a substrate. *The ColorPainter has no wasted printing costs associated with uncured inks, or requirements to leave unprinted margins near the edge to solve drying issues.*

**Narrow Media Print Speed**

As the HP Latex printer must dry the inks completely, it must slow down when printing narrower media to give the heater time to cure the inks. Its square-feet-per-hour speed claims are based on full width media, but the speeds it can achieve on narrower substrates is substantially slower. *The ColorPainter prints at almost the same speed, no matter what the media width.*

**Warm Up Time Delays**

Before it can begin printing, the HP L25500 takes 8 minutes to warm up (probably longer if room is colder). If there is any delay between print jobs, the printer turns off the heaters and then requires another long warm up when the next job is sent. This constant turning on and off of the heaters causes a significant negative impact to productivity. Consequently, the overall output capability of the Latex printer must be calculated with realistic print speeds and delays caused by heater warm-ups throughout a typical work day. *The ColorPainter printer takes 1.5 minutes to warm up, and can be kept at ready temperature for the entire day - eliminating warm up delays throughout the work day.*
Near Edge Image Quality
The heating/drying system of the Latex printer requires precise temperature regulation, as temperature controls the dry time of the ink, and the amount of ink gain (the movement or spread of ink when wet). Unfortunately, the printer is not a closed system, and ambient air enters where the media enters and exits causing the edges of the media to cool faster than the center part of the print. The result is inconsistent color between the center and edges of the print. Latex printers are less color consistent from print to print, and within a print from center to edge. In applications where print to print color consistency is important, or where tiling multiple segments that match is critical, traditional solvent printers offer better, more consistent output. **Traditional solvent printers offer much better print-to-print color consistency, and much better inner to edge color consistency.**

Media Shape Change
Besides affecting color, high heat can also change the shape of many types of substrates - especially those composed of different layers with different thermal properties. Almost all substrates will curl in one direction or another if exposed to enough heat. And many substrates will migrate or shrink when exposed to high heat while ink dries on the surface. The high heat of the HP Latex printer can cause the shape of the printed substrate to change - making it difficult or impossible to tile multiple strips due to uneveness to the edges. It can also cause substrates to “tunnel” or “buckle” from their liner. **The ColorPainter W-64s does not apply severe heat to the substrate, so heat-related shape change does not happen.**

Media Length Change
The high-heat of a Latex printer also affects the length of the output, as the media can literally shrink during the printing/curing/baking process. Output length shortages of .4% to 1.2% are possible due to high-heat. HP states in their user manual that this length change can be countered in the RIP by expanding the print size. However, this would not compensate if the length and width of the substrate did not shrink at the same rate. And as it appears that ink loading is related to shrinking (the ink is helping or responsible for shrinking the substrate as it is dried under high heat), a change in the RIP would not likely offset this problem completely. **The ColorPainter W-64s does not apply severe heat to the substrate, so heat-related length change does not happen.**

Output Color Gamut
HP claims that the Latex output color gamut is “comparable” to low-solvent printers like the ColorPainter W-64s, but our tests clearly show that the Latex inks have a smaller overall gamut. The ColorPainter inks clearly have a much wider color gamut in red, orange, magenta, blue, cyan, and greens.

And as HP Latex inks are not as “thick” as Seiko GX inks, more ink must be jetted and dried to achieve the same color density. There may be some limitation on how much ink can be laid down and dried in a Latex printer.

While color can vary by substrate type, colors on smooth surface substrates such as PVC, banners, and backlit films are critical for many applications such as fleet graphics, exhibit displays, menu boards, window graphics, etc. **The ColorPainter W-64s can print a wider range of colors than the HP Latex.**
**Lightfastness**

HP’s claim that Latex printers outperform eco-solvent inks in outdoor durability is dubious, and their claim that it lasts up to 3 years outdoors does not match our internal testing of Latex inks. The yellow pigment used by the Latex printer contains no nickel. The metal nickel is added to yellow pigments in many outdoor inks to prevent fast decay of the pigment in sunlight (ColorPainter GX ink includes nickel, while IX does not). Nickel is a hazardous air pollutant (HAP), so HAPs-Free inks cannot offer the same long-term outdoor durability as standard solvent inks. According a scientific Xenon-Arc test, the HP Latex yellow ink fades over 30% in 12 months, and 55% in 24 months. The GX inks of the ColorPainter W-64s, when tested using the same methodology, only faded 3% in 12 months. Overall, the HP Latex appears to be only suitable for short-term outdoor and near-window applications.

**Yellow Ink Fading (Xenon-Arc Test)**

Trend lines above are based on actual measurement data points displayed from Xenon-Arc test. Test conforms to JIS B-7754, and represents lightfastness estimate for Chiba, Japan at a 30 degree orientation. Chiba, Japan has a similar solar radiation rate per year as the northern US.

**How Important Is Yellow?**

If long-term outdoor durability of your graphics is important to your business, you would be better served buying a ColorPainter printer with GX inks - the premium outdoor ink in the outdoor graphics market today. If HAPs-Free, low-odor inks are more important than long-term outdoor durability, then a ColorPainter printer with IX ink is a better solution than the HP Latex.

**GX inks offer outdoor lightfastness that is about 10x longer than Latex, and IX inks offer 10% better lightfastness.**
**Glossiness**

Glossiness is almost as important as color when it comes to rich color graphics. Latex printers have difficulty achieving glossy colors, especially in black and yellows. HP resellers recommend lamination on almost every substrate type, mostly to offset this shortcoming. Compare the rich glossy blacks of an unlaminated ColorPainter print with either GX or IX ink to an unlaminated latex print, and you will see a huge difference in glossiness. *The glossiness of the ColorPainter and HP Latex output are similar in cyan and magenta, but the ColorPainter prints much glossier blacks and yellows than Latex.*

**Air Filtration**

HP implies that low-solvent inks require air filtration and Latex printers don’t. Legally, most business with 1 or 2 printers will not come under any current regulations - with either printer (remember, HP latex ink has solvents in it too). Seiko Instruments USA recommends air filtration and here’s why. Air filtration pulls air out of the printer while printing, which reduces ink build up in the printer. It also reduces airborne smells, and particles in the air during and after printing. Air filtration helps printers stay cleaner and provides a cleaner work environment for employees. If you are concerned about employees breathing HAPs (see Page 4) or would like to use an ink that has less or no odor, then we recommend you choose to use the ColorPainter W-64’s HAPs-Free IX ink instead of the low-solvent GX inks.

*Note: When you heat up many substrates to Latex temperatures, they may outgas chemicals. HP does not disclose how much, or which chemicals are coming out of substrates as they are being heated in a Latex printer. But we can clearly smell something when the Latex printers are printing. HP goes to great lengths to talk about the safety of their inks - but they do not publish the emissions of the printer itself while printing. The obvious smell from a Latex printer and the omission of emissions from literature leaves the question of substrate outgassing from Latex printers unanswered. We recommend filtration for the ColorPainter W-64s, and for all Latex printers.*

**Electricity Usage**

The electricity required to run the HP Latex printer is fairly well known. The high-heat dryer/oven in the Latex printer requires 2 dedicated 220v outlets - which, in itself may cost $1,000 to $2,000 for installation. The amount of watts consumed per hour is 2.7 to 4.8 kW, roughly 2 to 4x over traditional solvent printers such as the ColorPainter W-64s. HP fails to mention that the printer can quickly heat up a room due to the extremely hot heating element. The exact same wattage or electricity is needed to cool down the room if air conditioning is used. Consequently, the real electrical costs can be up to 8X over a traditional solvent printer. Electricity usage is directly associated with pollution to our environment, as most electricity is created by burning fossil fuels. *The ColorPainter W-64s uses a standard 110v, and uses up to 8X less electricity than the HP Latex printer.*

**Risk As Fire Hazard**

The user manual for the HP Latex printer recommends that two fire extinguishers be strategically placed near the printer before operation. Why? Our guess is the high heat oven inside the printer has the potential to catch on fire due to the high temperature it operates at. There also is the possibility that certain business insurances could be higher once the insurance company is notified that such a high-heat device will be used in the building. *The ColorPainter printers do not require fire extinguishers nearby, and pose no credible threat of fire.*

**Takeup Accuracy**

The media feeding/takeup accuracy of the HP Latex L25500 is poor, resulting in frequent attention by the user. The new L26500 Latex printer recently introduced reportedly has been improved in this area, but we have not yet had this confirmed. *The ColorPainter has a proven, reliable media feeding/takeup system.*
Print Head Replacement Frequency
The HP Latex printer uses 3 pairs of “bubblejet” print heads, or 6 print heads total. Each ink cartridge is 775ml or about 3/4 of one liter, and warranted for just 1 liter of printing. If you had to replace every print head every liter (HP warranted length), the average life of a print head would 500 square feet (@1.55 ml per square foot). HP Resellers say the print heads should last up to 6 ink changes (4.632 liters) or about 2,988 square feet (@ 1.55 ml per sf). We have not tested this claim, so we are not sure if this is true or not. But if you were replacing 1 print head every 2,988 square feet, your average stop for head replacement would be every 30 hours -about once a week! Even if the print heads last 6 times longer than their warranty, the operator of the HP Latex printer will be buying and replacing print heads very frequently, and committed to doing this forever. HP print heads are almost exactly like the small ones you see in desktop printers, so they are easy to replace. But to replace a print head, you also have to let the printer cool down for several minutes, and then let it rewarm up for an additional 8 minutes. The frequency of printhead replacements is a major blow to productivity if any type of volume printing is attempted with it. And the constant disposal of print heads into landfills is not environmentally friendly. The ColorPainter W-64s printer uses much more robust industrial piezo print heads that are designed to last for years, so printer uptime and productivity is substantially better than the HP Latex printer, and there is much less waste.

Print Head Replacement Costs
At the warranted life of print heads, the HP Latex printer would use approximately 6 print heads every 35.7 hours of operation (using PVC speed of 100 sfph). Even if the print heads lasted 6 times that long, you would still be purchasing and replacing 6 heads every 214 hours of operation. That means at US$110 each, that you could be spending $660 per month, or $7,920 per year just on print heads! What happens if the print heads don’t last 6 times longer than their warranty, like some HP Reseller claim? The ColorPainter W-64s average print head replacement is <1 per year, and all print heads are covered by a 2 year warranty. ColorPainter printers also offer Smart Nozzle Mapping, a feature that prints one nozzle in another’s place - lowering head replacement costs.

Ink Viscosity
The thickness of the ink (viscosity) is important, as the amount of pigment that can be loaded into an ink is limited by what the print head can jet reliably. The more pigment in the ink, the less ink you will need to print a specific color. In general, higher viscosity inks (thicker) can use less ink to create the same amount of color. The ColorPainter W-64s print heads can jet thicker ink, and the ColorPainter GX and IX inks are more viscous than the HP Latex inks.

Ink Usage
As explained, thicker inks require less ink to print the same color versus “watery inks”. But how does this translate into actual ink usage and costs? According to our testing, ColorPainters will use about 25% less ink to create the same color and color density on adhesive PVC than the HP Latex. On the image above, the HP Latex used 16.7 ml of ink to print one square meter (10.76 sf), or about 1.55 ml per square foot. The ColorPainter with GX used 11.9 ml, or 1.1 ml per sf, and IX used 12.6, or 1.17 ml per sf. The ColorPainter uses about 25% less ink than the Latex printer.
Ink Costs
ColorPainter GX ink has a MSRP of $225 per liter, and the HP Latex ink has an MSRP of $210 (March 2012). The ColorPainter HAPs-Free IX inks are $265 per liter. Due to the high ink usage, HP attempts to keep their price below competitors, but the price would have to be much, much lower in order to match the ColorPainters ink running costs. As the HP Latex printer uses approximately 25% more ink, the effective HP ink price is really $262.50 versus the ColorPainter inks. Consequently, the ColorPainter GX ink is 14.2% cheaper than the HP latex, when factoring the ink usage difference. **ColorPainter GX inks are less expensive than the HP Latex printer and IX inks are about the same. However, when considering actual ink usage, the ink costs of the HP Latex are significantly higher than either ColorPainter ink type.**

Printer Longevity
Seiko I Infotech ColorPainter printers have a long history in the outdoor graphics industry. Introduced in 2003 - 2004, the original ColorPainter low-solvent printer sold 1,000s world wide, and many are still in use today. Why? ColorPainter printers are designed and built for high-volume printing. Unlike many of the inexpensive printers in the industry today that are designed with plastic parts - that quickly wear out in a high-production environment, ColorPainters are “over-engineered” to provide years and many miles of substrate printing. The HP Latex printers were only introduced 2 years ago, and how long they last is still not known. **But when you compare designs, the quality of the individual components, and the history of both companies, we believe ColorPainter printers will be a product that lasts much longer in real printing environments than the HP Latex printer.**

Service & Support
ColorPainter printers are sold, supported, and serviced by the sign industry’s most respected sign and screenprint technology suppliers. These companies have offices with knowledgeable trained service personnel strategically located all over North and South America. They are your local supply company, and they will sell you a printer, train you, sell you consumables, and be there when you have a problem or a question. On the other hand, HP Latex printers are sold by national mail order companies and local suppliers with no service obligations. Often, they just sell the box - and leave the rest to HP’s direct installation and service organization. With no skin in the game, these resellers often offer very low prices, but their commitment to helping you with any post-sale issue is low. So HP Latex printer owners are completely dependent on HP’s national service organization - which services many other products. A billion dollar corporation’s service organization or a local technology company you have known for years? Which one is more dedicated to servicing their customers? Which would you rather have servicing your printer? **ColorPainter printers come with better service from local resellers - and longer warranties than the HP Latex printers.**

Resale Value
ColorPainter printers have a proven history of printing for years in a high-production environment, and are routinely sold at high resale value on websites such as ebay and craigslist. Look at HP products in general and see how fast their prices tumble from introductory MSRP. Do you think 4 year old Latex printers will have a high resale value or not? We cannot answer that question. **But ColorPainter printers have a history of high resale value in the used printer market because they are built to last, and their design is proven to be reliable in high-volume environments.**
Running Costs

The chart below compares the estimated costs of the printer, inkjet heads, and ink (substrates, labor, and other maintenance costs are excluded for clarity) of the ColorPainter W printer and the HP Latex printer. These costs are commonly called running costs, and constitute an important factor in determining which printer is best for your business. As these are estimates, we encourage you to do your own calculation based on your business.

As you can see from the chart below, the amount of ink and printheads used by the Latex printer is substantially more for each print, and for each day. The higher cost to run the HP Latex is composed of 3 components: higher ink usage, more frequent print head replacement, and a much weaker print head warranty. As the ColorPainter comes with a 2 year on-site print head warranty, there is absolutely no costs for print heads for the ColorPainter for the first 2 years. This alone will cost a Latex owner approximately $7.92 per day if printing 20 prints per day (and if the print heads actually last for 6 ink cartridges). Ink savings by ColorPainter owners runs $3.40 (IX ink users) to $16.70 (GX ink users) per day.

The chart below indicates a running cost of approximately $0.24 for the ColorPainter W with GX ink, $0.30 for the ColorPainter W with IX ink, and $0.36 for the HP Latex printer (without electricity). This means that the ColorPainter printers would cost you 18% - 35% less to own and operate than the HP Latex printer. The cost of electricity per print is approximately $0.02 for the ColorPainter (either ink) and $0.05 - $0.20 for the Latex because the Latex uses so much electricity, and cannot print as fast as a ColorPainter printer (less prints per hour of operation).

**High Latex Electrical Costs Not Included In Running Cost Chart**

Please note that we did not include the additional cost of electricity the HP Latex printers require. For an average owner in Los Angeles, the additional costs of running the Latex printer instead of the ColorPainter printer would be about $0.42 per hour on cold days to $1.39 per hour on warm days (due to the need for offset air conditioning). That means the Latex printer will cost you $3 to $11 more per day (@ 8 hours per day) - just for electricity!

The chart below indicates a running cost of approximately $0.24 for the ColorPainter W with GX ink, $0.30 for the ColorPainter W with IX ink, and $0.36 for the HP Latex printer (without electricity). This means that the ColorPainter printers would cost you 18% - 35% less to own and operate than the HP Latex printer. The cost of electricity per print is approximately $0.02 for the ColorPainter (either ink) and $0.05 - $0.20 for the Latex because the Latex uses so much electricity, and cannot print as fast as a ColorPainter printer (less prints per hour of operation).

<table>
<thead>
<tr>
<th>Running Costs Per Day</th>
<th>ColorPainter GX</th>
<th>ColorPainter IX</th>
<th>Latex</th>
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<tr>
<td>Prints Per Day</td>
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<td>20</td>
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<tr>
<td>Ink Used Per SF</td>
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<td>Running Costs Per SF</td>
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**Summary:** The ColorPainter costs substantially less to operate on an hourly basis, costs much less per print, and prints more printer per hour than the HP Latex printer.
SUMMARY
If speed, image quality, or long-term outdoor durability of your graphics is important to your business, then your business would be better served buying a ColorPainter printer with GX inks - the premium outdoor ink in the outdoor graphics market today.

If HAPs-Free, low-odor inks are important to you and your need long-term outdoor durability is low, then a ColorPainter printer with IX ink is a better solution than the HP Latex or Epson GS printers.

Overall, ColorPainter printers are much faster, more flexible with substrates, produce output with much richer colors and overall glossiness, and offer much better long-term outdoor durability. They are easy to use, reliable over years of heavy use, and backed by the industry’s best technology resellers.

Want to learn more about why the ColorPainter W-64s is the best choice for most digital printers and signmakers?

Send your name, and email address to colorpainterinfo@seikoinstruments.com and we will send you a complete literature package including print samples printed at the speeds we quote in our literature.

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