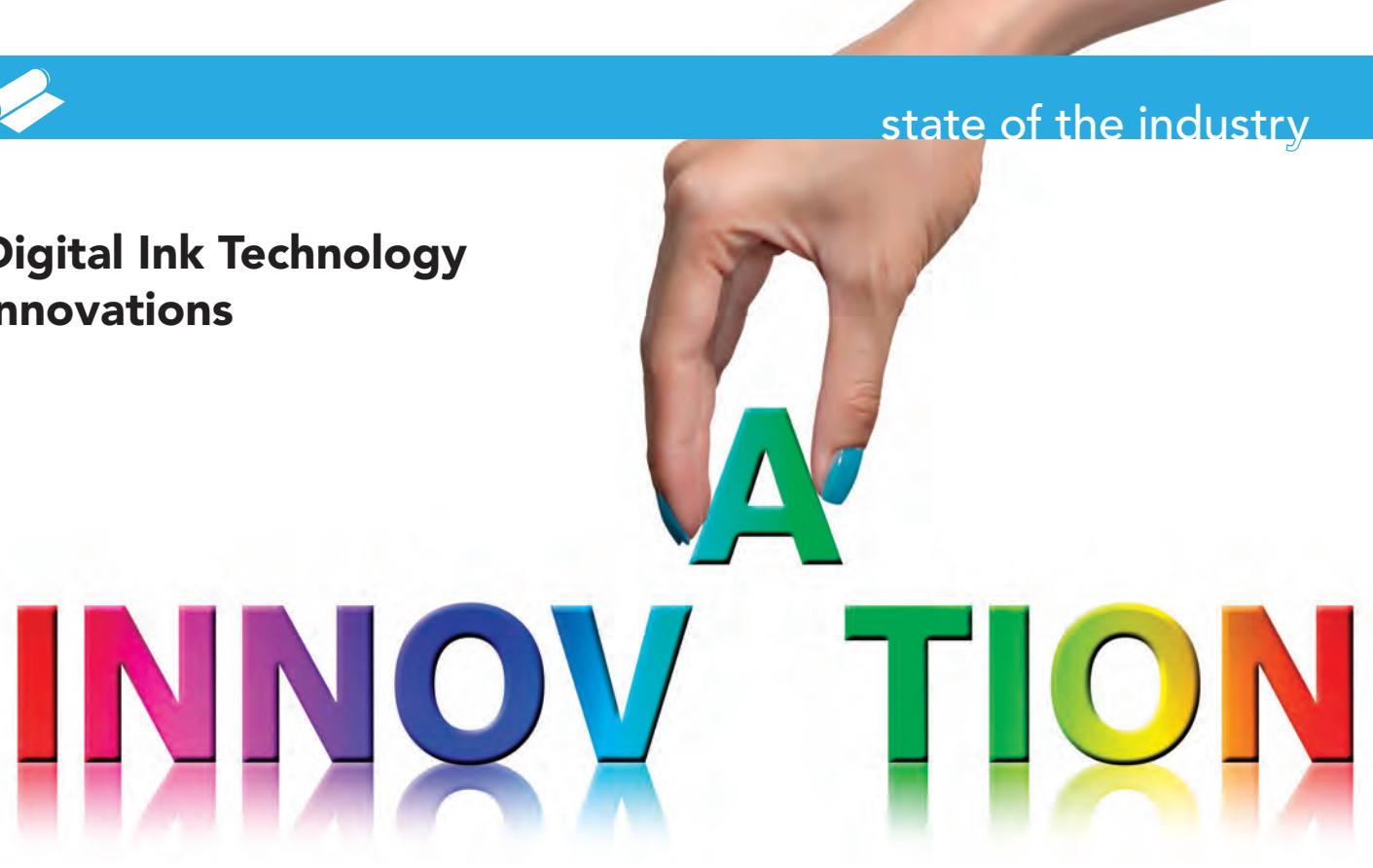
# Digital Ink Technology Innovations




Over the past decade, new developments in digital ink technology have helped change the landscape of the entire wide-format marketplace. These developments have allowed ink suppliers to extend their product lines way beyond the conventional CMYK world, as well as arming print providers with new tools to dramatically expand their output applications and produce vibrant, eye-catching signage for their clients.

Specialty inks, such as white ink, are seeing a boost among in-store marketing applications, while metallic inks are providing a wow factor. Solvent-based and UV-curable inks are among the most popular options for wide-format applications. And while solvent-based inks have, in the past, dominated long-term outdoor prints, many characteristics of UV-curable inks now rival them, in part to many technical advances. To get a better handle on this market, we assembled a panel of industry experts for a discussion on the latest products and trends. The roundtable included Ken Kisner, president of INX Digital International; Julie Gederos, product manager, Roland DGA Corp.; John Kaiser, product marketing manager – Inkjet Inks, FUJIFILM North America Corporation, Graphic Systems Division; and SGIA's digital printing analyst/G7 expert Jeff Burton.

**Schiffner:** *What are the major trends you are seeing in digital ink technology as we head into 2013?*

**Gederos:** If there is any constant trend in the industry, it has to be "change." The industry continues to advance as new technologies and inks enter the market. New applications, as well as new approaches to traditional applications, are allowing print service providers to sell their output at higher margins than ever before.

Our end users are always looking for new ways to improve their print quality and new ways to differentiate themselves from the competition. To stay competitive, your business has to be flexible and innovative. The more products you can offer with higher image quality and more effects, and the more markets and customers you can appeal to, the better off you are and the better positioned you are for the future.

Inks play a large role in growth and diversification. We've seen a lot of development in color management software and tools that allow people to maximize the potential of new ink sets on the market and get the most out of their printer. New products continue to hit the market, making it easy and efficient to achieve color matching for input and output devices.

**Kaiser:** The continued push toward UV digital ink technology will continue into 2013 and beyond. As print speeds continue to increase, ink development must keep pace. UV is the only technology that can currently handle those demands.

We also see UV-LED inks emerging as a viable option for digital print. The advantages are numerous. Lower energy is required to power LED lamps versus traditional UV halide lamps. LED lamps are cooler, allowing for use of very thin materials without heat distortion. The usable life of an LED lamp is 10–15 hours longer, requiring less frequent lamp replacement.

**Kisner:** At INX Digital, we continue to see a strong trend toward speed. Superwide Graphics is starting to speak about 700-plus square meters per hour, compared to what is currently available at nearly 500 square meters per hour with the HP7600, Agfa M-Press Tiger and Gandi Pred8tor. These higher speeds are beyond short-run, and closer to mid-run advertising. The output is no longer just for billboard and outdoor signage with dpi between 720 and 1800. The changes in

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Billboard printed with Roland's SOLJET Pro 4 XR-640.

throughput and quality now are starting to make inroads into the Lithographic and Offset industries.

**Burton:** Other manufacturers are engineering latex and resin ink printers, and third-party latex inks for sale into the marketplace. If these printers are successful in gaining market share versus their solvent printer offerings, then more machines of this nature will start to appear in the market. How latex sales will supplant eco-solvent or solvent sales remains to be seen.

**Schiffner:** *What are the some of the biggest product developments in digital ink technology?*

**Burton:** Ink developments for the UV inkjet printer have been in the area of offering more than a singular UV ink type. This is important, as specific ink types will not perform optimally for all surfaces. The newly developed 3M co-branded UV inks are highly conformable, making them appropriate for applications such as vehicle wraps and other applications requiring high stretch. Durst offers its own Rho Flexible ink, as does FUJIFILM, among others. Flexible UV inks are also a solution when UV ink "chipping" is an issue due to full bleed printing or post-processing cutting or routing.

There is also progress in the UV-LED curable ink field. The cure speed has increased greatly, implying faster line speeds for many processes. These would include coding and marking, digital label production, wide format graphics and in variable data printing. While the ink formulation is critical to the specific wavelength of the LED, the advantages are huge: Long stable life of the LED versus mercury vapor; low electricity consumption; and no ozone generated as a by-product.

**Gederos:** With increased demand for improved image quality, we are seeing the introduction of new inks with greater gamut as well as new colors that are entering the mainstream such as light black (Lk) for smoother gradations, better skin tones, more accurate colors, and truer grays and blacks. Light black opens the door to some of the more popular and higher-margin point-of-sale applications, including cosmetics, jewelry and fashion advertisements. These businesses are very discerning when it comes to color quality, and the addition of light black to any ink set delivers the superior imaging they require.

White inks have improved as well. Initially, the introduction of white inks opened new doors for service providers, from window signs and floor graphics, to labels printed on clear films and package prototyping. While the popularity of white ink continues to soar, so has the need for better, brighter and more opaque white inks. New white inks on the market today, such as Roland's White Eco-Sol MAX 2, have significantly increased their opacity, allowing them to be used on a broader range of materials while still offering the sharpness and brightness that make white such a stand out feature in any graphic.

UV has opened up a whole new world for digital printing businesses, allowing shops to print on just about any substrate. With UV printers and more advanced UV inks, shops can now print on organically shaped items such as packaging prototypes which require the inks to stretch and wrap around curved, folded and indented surfaces. UV specialty inks, including white and clear, enable printing on clear media such as shrink wrap film and also facilitate effects and textures in both gloss and matte finishes.

**Kisner:** Outdoor durability is no longer an issue for inkjet since we are using automotive grade pigments that have fantastic durability. We're also now using inorganic pigments in some cases, which have the ability to get 20 years of outdoor durability. Another trend is smaller drop size and faster print heads, which require new designs for inkjet inks. Polymer design has made some significant advances that allow the inks to print at faster speeds, both in solvent-based and water-based formulations.

**Schiffner:** *How have improvements in chemistry allowed shops to be more flexible in offering a wider variety of output applications?*

**Kaiser:** Because they are not easily changed in a digital printer, inks must perform in a variety of applications. Improvements in digital ink chemistry have allowed print shops to provide prints with adhesion on a wider variety of substrates, and which meet expanded post print performance requirements.

**Burton:** This is more of an issue with shops that are UV ink users than with

any other ink category. As UV inks are available now in two types (from most manufacturers), more rigid or more flexible, the issues of the past are minimized, the issues being chipping on roll material using hybrid printers, or chipping due to post processing or flexion during shipping or handling. Having a more flexible ink helps out the guys who have UV hybrid printers, those who shift printed goods from rolled materials to rigid and back again.

**Kisner:** Inks must be designed for a wide variety of applications. Our latest generation of UV inks, called MultiFlex inks, can print to a huge variety of substrates, and can be finished in all types of ways. This is extremely important for print shops that see a variety of opportunities.

**Gederos:** It's interesting to see how the advances in ink chemistry and hardware have led to a growing number of applications. First, hardware has advanced. Our printers now feature an eight-channel print head with a mirrored configuration, an innovative system that ensures color consistency between passes to eliminate banding. Over the years, Roland technology has evolved to include ink circulation systems that make it easy and efficient to use metallic and white ink sets while lowering your running costs. These systems keep ink pigments in suspension, reducing maintenance requirements and keeping lines and print heads free of clogging. They also extend the life of the printer for an ever-greater return on investment.

In addition to advancements in ink delivery and management systems, new ink formulations have entered the market to extend image quality and durability. Our new Eco-Sol MAX 2 is a great example of this. This new ink from Roland offers higher density output that dries very fast and very consistently across any image. Eco-Sol MAX 2 comes in nine colors, including light black, white and metallic silver, which open up new creative possibilities. Newly formulated white and metallic inks offer better opacity for brighter, higher impact effects. When you combine Metallic Silver Eco-Sol MAX 2 with CMYK, you can get some very impressive results.

**Schiffner:** *What are the benefits of UV curing inks?*

**Kasier:** UV curable inks continue to replace traditional solvent inks in wide- and super-wide format applications. These inks allow for higher printer speeds, lower production costs and are more environmentally friendly.

Printer speeds are increased, as no time for solvent evaporation is needed. UV inks cure instantly when exposed to a UV light source. Production costs are reduced by the elimination of drying equipment and the ability to print directly to rigid surfaces.

Volatile organic compounds (VOCs) present in traditional solvent digital inks are eliminated when using UV curable ink systems. By not releasing VOCs into the atmosphere, UV digital inks are a better environmental solution.

**Gederos:** When it comes to UV, the question is, "Where can't you use it?" UV technology is revolutionary to the industry because of the way it images so well on virtually any surface. We are seeing it used for everything, from package prototypes and labels to personalized laptops, smartphone covers and gift items. New UV inks offer more than double the flexibility of previous formulations, allowing adhesion to any complex shape. These flexible properties allow UV inks to be used in industrial and consumer product printing, as well as packaging, labeling, signage and other popular applications.

**Kisner:** UV curing inks have the ability to print on non-absorbent substrates such as styrene and coroplast, whereas solvent inks must be printed on substrates that can absorb the ink. Another benefit is UV inks are instantly cured so they can be finished quickly after printing.

**Burton:** From the equipment perspective, heads don't dry out as in solvent systems, so down time for cleaning and nozzle outages are minimized. There is also the fact that UV inks have a smaller environmental impact than eco or solvent ink systems.


While the popularity of white ink continues to soar, so has the need for better, brighter and more opaque white inks.

**Schiffner:** *What are the benefits of specialty inks such as metallic inks or latex inks that expand print possibilities for shops?*

**Kisner:** Metallic inks give shops the opportunity to penetrate the packaging, as well as label and tag markets, where metallic is a very important component. Latex inks allow print shops to use low VOC inks with similar quality to eco-solvent inks.

**Gederos:** We define specialty inks as those delivering unique effects and finishes, such as white, clear and metallic. White opens up new applications by enabling printing on clear and reflective media. Metallic takes any existing image, and makes it pop. Clear lends a high-gloss or dramatic matte finish to a design that sends a premium message. At the end of the day, all formulations give the print provider a point of differentiation, so they can build a higher margin business.

**Kaiser:** We have seen the emergence of textured inks and spot clears. These inks produce special effects, which allow the printer to put some "wow" into their prints. While not for everyone, these types of specialty ink applications can help print shops show their creativity and separate themselves from their competition.

**Burton:** Specialty inks and latex inks first had to prove themselves in the market, and I think that they have shown themselves to be very successful. The silver metallic inks have been a boon to anyone who wanted to differentiate themselves from their competition. With the ability to print silver onto labels, doors, posters, banners, fine art, and to mix the silver with other CMYK colors to simulate gold or bronze, producers have a new tier of product to sell. Silver metallic ink is making its way into high-speed digital label printing systems as well.

While latex printers were slow to take off, there are now incredible ranges of roll substrates available that are compatible with this ink technology. I think that some of the misconceptions were that latex printers were paper or vinyl printers only. One of the least spoken about features is the ability of latex to print onto uncoated polyester textile and other textiles with very good color and adhesion levels. Being able to produce soft signage is a huge benefit when selling digital to clients. The more product offerings you can generate (if that is your business model), the fewer clients that you have to turn down.

**Schiffner:** *What does the future hold for digital ink technology?*

**Gederos:** Ink and hardware continue to evolve to match, not only the increased image quality expectations, but also the increasing production requirements of the market as well. As these technologies evolve, they give way to more creative design possibilities. With respect to inks, we expect to see new products with an expanding color gamut, better image quality, longer-lasting durability, more specialty ink options, faster dry times and more sustainable properties. New inks will continue to be engineered specifically for the hardware platforms they support, so shops can rely on consistent print quality and on the performance of their printer over time.

All of these advances are exciting to watch and will lead to new applications and new market opportunities. At the end of the day, the shop that survives is the one that can offer the widest variety of products to the broadest range of customers.

**Kisner:** Digital inkjet inks now hold most of the same base technologies as traditional inks, compared to solvent-based, water-based and UV curable inks that each hold their own market share. It appears the trend will continue to fine tune formulations to specific markets.

**Kaiser:** New advances in ink technology will allow digital printing to continue to expand past traditional point-of-purchase, and into more industrial applications. With increased post-print requirements, these areas require inks to provide more than just the ability to produce an image.

**Burton:** It's wide open at this point. Recent innovations have shown us nano-ink technologies (Benny Landa-Nanography) that were previously unattainable. Although this is a work in process, the proof of concept has been shown and licensed by many in the industry. Are there other inventions or processes waiting in the wings? Yes, at this point in time, there are many companies, around the globe, doing serious R&D in the digital ink development realm.

*Bill Schiffner has covered the imaging industry for more than 20 years. He has reported on the many new digital technologies that have reshaped the imaging marketplace.*

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Metallic silver inkjet ink can be printed as a pure spot color or combined with CMYK.