Digital Ink System Choices

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SGIA believes any of the ink systems currently on the market can have a positive impact on your business, provided you are fully aware that each one of these inkjet consumables has its own set of benefits and limitations.

When selecting a digital output device that you have determined to be best suited to your intended market, certain factors will affect your operation — your media choices, start-up and maintenance costs for the printer and ink, customers' quality and durability expectations, production speed, the regulations your facility must meet and your workers' health and safety around potentially hazardous chemicals.

Your inkjet printer choice will have the biggest impact on the type of digital ink supplied to work with a particular device. As aqueous, solvent, mild solvent, UV-curable and "bio" vegetable-based inks tend to be best suited to particular substrates, you should understand which ink is appropriate for your products.

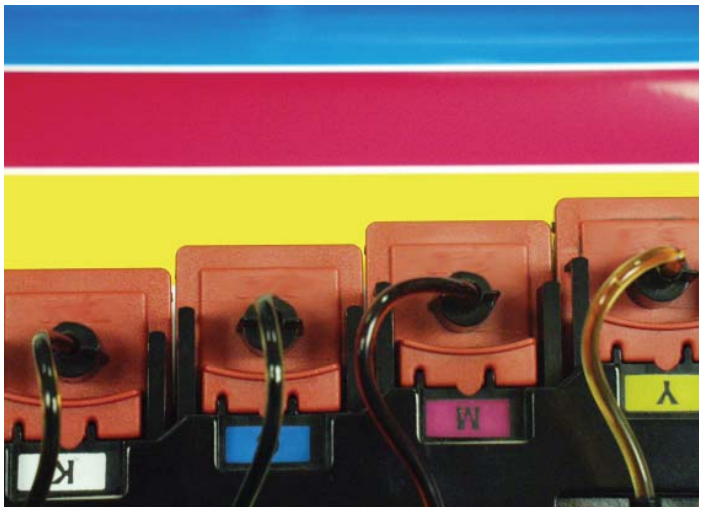
It is important to remember that regardless of how "green", an ink system is said to be, most of them release unsafe chemicals. This means that using some of these inks will require you to comply with the appropriate regulations. While no digital imager is exempt from these rules, they shouldn't fear the regulations. The specialty imaging industry has worked hard to produce effective ways imagers can mitigate an ink's safety and environmental concerns. To figure out which chemicals in your inks may be considered hazardous, request the material safety data sheets (MSDS) from manufacturers for each type of digital ink used in your operation. Even with safety and environmental issues that often accompany ink systems, each one can be properly managed with the right equipment to a successful part of your overall operation. Visit the business management section at SGIA.org for more information on this issue.

Also remember that each ink has a dry time, the time given by the manufacturer of when the ink has adhered enough to the substrate to make it safe for handling, and a cure time, the time in which the ink is fully cured onto the substrate surface. These two times can vary by hours, so check with the ink manufacturer to know how an ink's cure time could affect your total production

Keep in mind that most equipment manufacturers require you to buy their ink, or you risk voiding the printers' warranty. Be conscious of your warranty's extent and coverage conditions when thinking about using third-party ink vendors that sell digital inks.

Once you have a solid understanding of your printing equipment needs, the next step is to compare the digital inks' characteristics and limitations. The right ink should be well suited to your media choice and work best for your production goals.

We've compiled all of the digital ink information in one location to make the process easier for members, drawing from vast industry resources to give the unbiased facts for the ink consumables in order to give you the most expansive and accurate view of the digital ink market.



In addition to a list of characteristics and considerations, our resource center includes "Solvent Ink Confusion," an article that provides a comprehensive rundown of solvent inks, complete with graphs reviewing the steps in the ink's adhesion process. You'll also find a technical glossary of terms to help you understand words that are often bandied about when discussing digital inks.

To further help members in your digital ink quest, contact ASSIST. SGIA's ASSIST program provides free technical service program to members by phone or e-mail. Good preparation at the start of your investment will help you smoothly integrate digital technologies into your operation and save you hundreds of dollars in prevented ink mistakes.

Digital Ink Characteristics

Digital inks are hot. Very hot. To help you make a digital ink system selection that will make your overall production sizzle, SGIA has put together a detailed list of each ink systems' characteristics and considerations. Any of these ink systems can be used safely and effectively in your production. It's all a matter of what will make your business cook!

UV-Curable Inks

Characteristics:

- More versatile in terms of what they can be printed on, rigid substrates, such as board product, plastic, glass, wood, ceramics and metal.
- Can help achieve fast production because there is no wait time for prints to dry.
- Save on production costs and media versatility despite having up front equipment costs that are higher than other digital printers.
- Avoid continual cleaning and purging of the print head to remove insoluble products.

Considerations:

- Tend to be more expensive than other inks. Part of the expense comes from the higher cost for the ink's raw materials.
- In a wet state, they require precise safety handling in every step of delivering and loading them into the printer.
- Requires UV lamps on the print heads for the purpose of ink curing. The UV lamps must be changed out periodically.
- UV-cured prints may require finishing for highest durability.
- The next milestone for UV inks is to continue improving their adhesion on soft, bendable and flexible substrates.

Solvent Inks

Characteristics:

- Commonly regarded as the most economical inks for digital printing today, in terms of equipment costs and maintenance expenses.
- Produce highly durable outdoor prints.
- Media is less costly than coated media for aqueous inks.
- Well suited to printing on soft and compatible flexible materials. They can be used on low-cost, uncoated materials, such as self-adhesive vinyl, fabrics and scrim banner materials.

Considerations:

- Dry quickly but emit volatile organic compounds. VOCs are a hot-button issue in environmental regulations and worker safety debates. For printers that are producing a larger volume of prints with conventional solvent inks (or using wide-formant digital printers), an appropriate ventilation system may be needed to safely and effectively manage VOCs and properly mitigate them.
- Increased VOC emission legislation in North America and Europe could impact the use of these inks in the international marketplace.

- Can clog print heads. An active solvent is needed to clean the heads and requires a proper handling procedure.

Mild Solvent Inks

Characteristics:

- Often dubbed "mild," "low-odor" and "eco-solvents" because they are more economical than conventional solvent inks.
- Tend to have a low odor during production.

Considerations:

- May emit hazardous compounds in the air, even if they are not classified as having VOC content. The variety in state regulations means these inks could be classified as having VOC content in one state but not in another. It's important to check with state regulations to see if any appropriate measures need to be incorporated.
- The "eco" in eco-solvent refers to its economical price rather than the ink being ecological or environmentally friendly, which the ink may or may not be. These inks generally contain glycol esters or glycol ether esters, which are both derived from mineral oil.
- Printers should keep in mind that less odor does not necessarily mean fewer chemicals are released during production.

Aqueous or Water-based Inks

Characteristics:

- Primarily derived from water, 70 to 90 percent, with a small amount of a milder solvent so that the ink will adhere to the medium.
- Mostly used for retail POP for short-term outdoor prints, long-lasting indoor prints and indoor backlit materials.
- Have a relatively clean handling process.

Considerations:

- Typically must go through a laminate finishing process in order to protect them for indoor and outdoor use.
- Require coated print media for acceptable imaging.

"Bio" or vegetable-based inks

Characteristics:

- Made with vegetable oil rather than petroleum oil. The vegetable source, coming from soy, linseed or corn, to make ethanol uses fewer non-renewable sources such as petroleum. However, some conventional solvent is typically used as well.
- Adhere to a wide range of uncoated media.
- Deliver nearly the same durability as compared with conventional solvent inks.

Considerations:

- Ethanol, whether it comes from petroleum or vegetable-based products, is still ethanol. And with any ethanol product, VOCs are going to be released into the air. The amount may be less than other solvent inks, but printers still have to be vigilant about proper ventilation and compliance with environmental regulations.

Glossary of Digital Ink Terms

Aqueous or water-based ink: An ink that is primarily made of water but may contain small quantities of organic solvents, such as alcohols or glycols, to help the ink penetrate the print surface, keep the dyes in the solution and the pigments dispersed during ink storage.

"Bio" or vegetable-based ink: Inks containing ethanol solvents based from vegetables, such as corn and soy, which adhere the ink pigments onto the substrate.

Curing: (1) Drying process that usually requires an elevated temperature of the film that cannot be dried by oxidation. (2) In textile decoration, the application of heat to set the emulsion of pigment dye into the textile fibers. (3) A two-or-more part chemical reaction that, when completed, resembles a dried appearance, such as photopolymerization of UV curable coatings. (see: Ultraviolet Curing)

Ink: An ink is a liquid containing various pigments and/or dyes used for coloring a surface to render an image or text. Common perceptions consider ink for use in drawing or writing with a pen or brush. However, inks are used most extensively in printing.

Ink adhesion: The bond between the ink and the substrate.

Inkjet printing: A non-impact printing process in which a nozzle forces ink droplets from the print head onto a substrate at a high velocity.

Mild, Low-odor or "Eco" Solvent inks: Ink that is adhered to a substrate by a less aggressive or milder solvent. The inks often are referred to as "eco" because they generally are more economical than regular solvent inks. (There has been much confusion in the industry that these inks are more environmentally friendly, but they may not be.)

Solvent: A liquid or agent that can dissolve, reduce or thin another substance.

Solvent-evaporating ink: Ink that adheres by allowing the solvent to vaporize either in ambient or elevated temperature conditions. These inks cure by having the solvent etch into the surface of the substrate used.

Solvent release: The evaporation of a solvent during the ink drying process.

Substrate: (1) A material or surface to be used for printing, adhering or finishing. (Often refers to media or stock). (2) A base material or foundation over which another material is supplied.

Ultraviolet curing: (1) The process of polymerization. (2) A reaction initiated by the presence of ultraviolet light. (3) The use of ultraviolet radiation to convert a wet coating or ink into a solid form.

UV ink: Ink containing an activator that causes polymerization under exposure to an ultraviolet light source.

Volatile organic compound (VOC): a liquid solvent that tends to vaporize at room temperature (High concentrations can be hazardous to worker health and the environment).