

Innovations In Digital Decorating By Bill Leek

FULL-COLOR DECORATING ALUMINUM, BRASS AND STEEL.

The transfer, direct print and engraving options available to digital decorators have increased dramatically over the past 20 years. Older technologies have become more reliable and cost effective. The newest technologies will lead us to open unique market niches and provide greater creative opportunities and production techniques.

This article on full-color decoration of metals is the first in a series. In subsequent installments, the various methods for decorating plastics, acrylics, ceramics, stone, wood, glass and several other popular substrates will be covered. Each article will focus on the advantages of the available decorating techniques for the various substrate families. The processes described in this article include:

- Dye Sublimation Transfer
- Color Laser Printer Transfer
- Desktop Flatbed LED UV Printing
- Anodized Eco Solvent Printing
- Water-Based Pigment Ink Printing

You may be very familiar with many of the processes. Others may not be familiar to you, as they have been introduced or upgraded recently. My goal is to provide a brief capabilities overview that defines which methods are best for specific tasks.

FULL COLOR DYE SUBLIMATION TRANSFER

Dye Sublimation has been a very popular heat-transfer method for decorating coated white, silver and gold aluminum

in matte, satin and high-gloss finishes. The reasons for the popularity are obvious. The color quality and finish are excellent, and the initial investment cost is low, particularly with the new Ricoh printer models and Sawgrass gel sublimation inks. In addition, production is very efficient, and the sublimation learning curve is fast and intuitive.

The key to obtaining great results is the selection of quality coated metals. Thickness of coating, smoothness of coating application, scratch, UV and heat resistance, whiteness of the coating, coating thickness, transfer paper release, and most important, color reproduction and image quality, should all be included in your evaluation.

As with all dye-sublimation tasks, a high-quality, accurate, solidly built heat press is key. A quality press will last well over 10 years. This is not an area to skimp on your purchase.

The most popular coated aluminum for sublimation is gloss white. The white background brings out the fullest gamut of the sublimation dyes. The most popular brands are Universal Wood's Unisub® and ChromaLuxe®, followed by Dynasub, Supermetal and Econosub.

Unisub and Chromaluxe are truly premium products. Unisub is the sublimation industry's leading producer of blank imprintables. Universal Woods has spent the last decade improving their coatings. The coatings are thicker and harder than competitive products, and contain both UV and heat-damage inhibitors that insure longer image display life. In addition,



ChromaLuxe premium sublimation aluminum is available in four durable finishes.

Unisub's unique coating methods produce a flawless glass-like finish that enhances image presentation. ChromaLuxe is the world's leading brand manufacturer of high-definition sublimatable photo panels. ChromaLuxe was designed to meet the demands of photographers, designers and artists. It is available in four finishes: Gloss White, Matte White, Gloss Clear and Matte Clear. ChromaLuxe metal photo panels are available in a wide range of traditional photo sizes, cre-

ative shapes and large wall-panel configurations. ChromaLuxe has a thicker coating (both clear and white) than standard Unisub and has a thicker aluminum base (0.045 vs. 0.030 inches). ChromaLuxe® has been fully lab tested. An aluminum print made with ChromaLuxe and premium sublimation inks will last for several generations under normal indoor lighting conditions.

Dynasub and Supermetal are very good products that image well. They utilize thinner (0.020) aluminum sheet stock that is very easy to cut with an inexpensive manual shear. These two products are very similar in finish and durability. Dynasub is available in gloss white, satin gold and satin silver finishes. Supermetal is available in brushed gold, brushed silver, brushed copper, bright gold and bright silver.

Econosub is supplied in a white finish only and is best suited for higher-volume jobs where production costs are critical.

There are many other coated aluminum products available with two types of finishes: transparent and opaque. Transparent finishes are created by coating bright or satin finished aluminum and brass with a clear or tinted lacquer. These transparent finishes designed for engraving applications will often sublimate well.

It should be noted that different sublimatable aluminum substrates may require different heat pressing instructions. Contact your supplier for recommended pressure, temperature, time and procedures.

All these products are available in sheets or in die cut or sheared sizes. You can create everything from small inserts, name badges, ornaments and plaques to large wall-panel photo and fine-art displays. Thousands of different shapes and accessories are available.

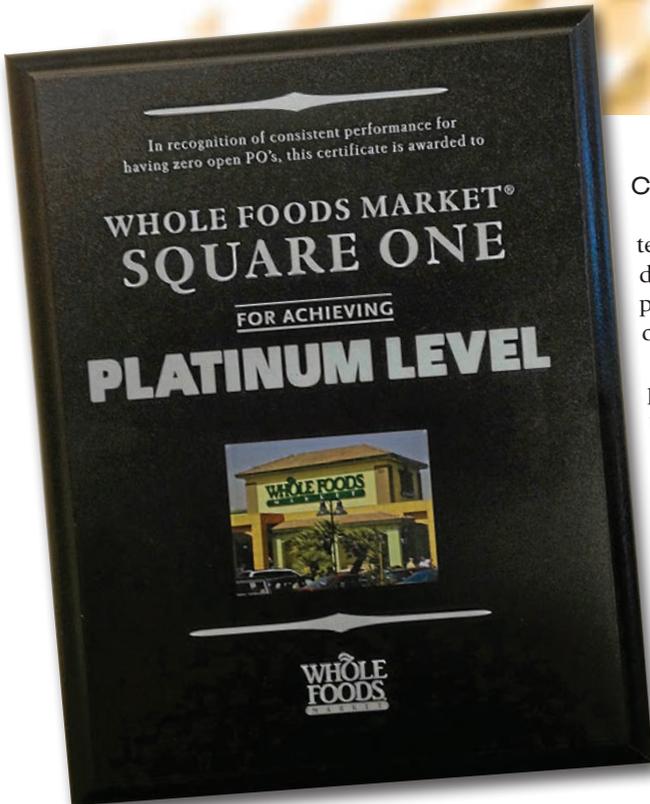
Dye Sublimation remains a wonderful process that provides vibrant, durable, color reproductions with consistent results.



Unisub and ChromaLuxe provide unique ornament and photo panel shapes.



The revolutionary Okidata C711 WT utilizing white toner allows brilliant printing on dark surfaces and fabrics.



Black plaque from TheMagicTouch USA printed using one pass of white toner.

COLOR LASER PRINTER TRANSFER

Major innovations in Color Laser Transfer Paper and Laser Printer technology have created a very viable and cost-effective method for color digital decorating aluminum and other metals. Color Laser Transfer is particularly effective for small to medium shops that cannot afford large capital expenditures.

In order to decorate aluminum, it is critical that you select the right laser printer and a fully compatible hard surface transfer paper. I have found that the Okidata C6150 and C610 are the most reliable letter/legal CMYK laser printers for transfer applications. Print quality is good, but most important; the Okidata models offer a straight paper path that minimizes paper jams that have often plagued other laser printers. In addition, Okidata toner is the most durable for hard surface applications. UV light resistance is superior to other brand toners. Scratch resistance is good and can be enhanced by baking the metal in an oven for a few minutes after transfer.

There are two papers I prefer for trouble-free transfer to anodized aluminum and treated award metals. These papers are CPM from The Magic Touch USA, and CL HARD SURFACE I from Joto Papers and Conde Systems. These papers transfer only toner to the aluminum. Paper release after heat pressing is very smooth with no paper sticking. Full-bleed images transfer very well with complete transfers in solid color areas and along the outer edges of the metal.

The sharpness and density of text applied on the metal background is excellent. Colors are vivid and accurate, especially when a custom ICC color profile is employed.

INDUSTRY BREAKTHROUGH FROM THEMAGICTOUCH USA

TheMagicTouch USA recently announced the release of the affordable Okidata C711WT letter/legal size color laser printer that includes a white toner cartridge. This allows white and bright printing on dark hard surfaces and fabrics, using the white toner alone or as a base for the CMY colors. The white toner density is excellent, so that only one pass of white is required. In addition, TheMagicTouch has developed Print Utility Software for their C711WT, enabling individuals to print 'white-only' with the click of a button. Most important, the "SpaceControl" Software will allow total control over the white toner, i.e. where and how much is printed.

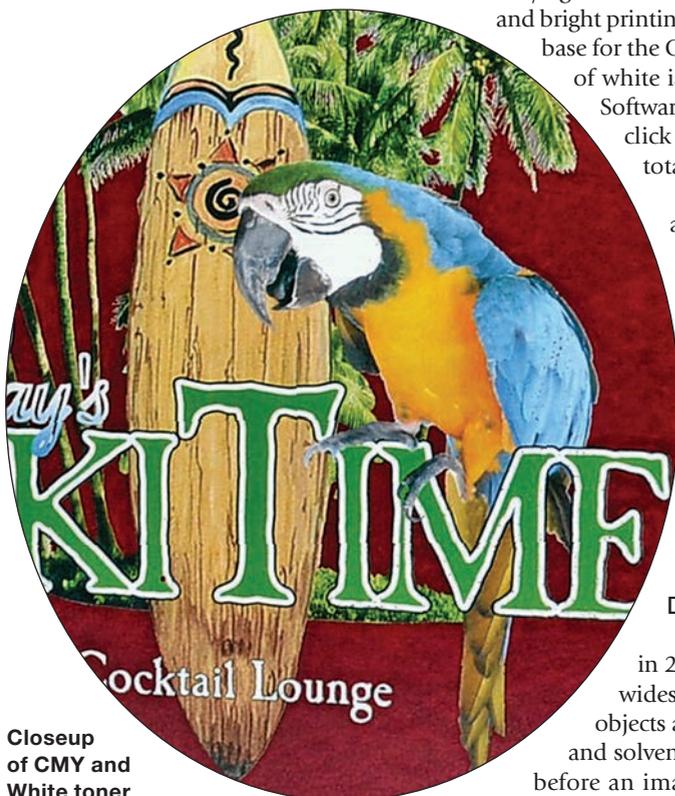
This "SpaceControl" software controls the amount of white toner to be applied. This is a great cost saver, as less white toner is used for application to lighter colors. The printer is designed for vector and raster image input. Okidata has substantially improved image quality, and paper registration is very accurate, so that the CMY and White toner passes will be perfectly aligned.

The C711WT is compatible with the full line of TheMagicTouch transfer papers including CPM and the newest version of WoW for fabrics. TheMagicTouch has upgraded their WoW7.2 transfer media to seamlessly fit the new white technology. Now reduced to a simple two-step process, the new WoW7.5 in conjunction with the C711WT becomes the one single process for all garment decoration no matter what color or type of fabric.

DESKTOP FLATBED LED UV PRINTING

Desktop Flatbed LED UV Printing was introduced to the A&E market in 2011. Utilizing UV LED technology, you can economically print on the widest range of substrates imaginable, including thick, three-dimensional objects and aluminum sheet stock. Unlike sublimation transfer, pad printing, and solvent inkjet printing, most items do not need to be pre-coated or treated before an image is applied. A single LED UV printer can replace other printing methods and provide unique capabilities that will significantly expand your markets and product offerings, while reducing your short-run production times and costs.

Three dominant models in U.S. market are the Direct Color Systems DIRECTJET 1014/1024,



Closeup of CMY and White toner transfer on deep red background.

the Mimaki UJF-3042 and UJF-3042HG, and the Roland DGA VersaUV LEF-12. Each printer model has certain strengths. The DCS DIRECTJET 1024 offers the highest print resolution and provides a 10x24 inch printable area. It can handle items that weigh up to 20 lbs. and are 6 inches high. The MIMAKI UJF-3042HG has an A4 (11.8x16.5 in) printable area and can accommodate items that weigh up to 11 lbs. and are up to 5.9 inches high. The Roland VersaUV LEF-12 has a printable area of 12x11 inches and can accommodate items up to 11 lbs. that are up to 3.94 inches high. These printers employ six-color (CMYK+WHITE+CLEAR) ink sets that are UV curable. The newer Mimaki units optionally offer ink sets that include light cyan and light magenta. All three manufacturers provide proprietary RIPs that allow full control of the clear and white inks. I urge you to visit the manufacturer's websites to fully evaluate features and specifications of both the printers and RIPs.

UV curable inks bond to a substrate and dry immediately when exposed to an integrated UV light source. Older UV printers used light bulbs that consumed a great deal of power and generated high ambient temperatures in the printer. Many substrates that would deform from the heat as well as items that contained electronic components could not run through the older printers. These new desktop printers utilize a UV LED light source. The LEDs generate virtually no heat, turn on and off instantaneously and require little power. In addition, the LEDs will last up to 10,000 hours before replacement is necessary. That's about 10 times longer than a traditional UV bulb.

The CMYK inks provide a very wide, well-balanced color gamut. The coverage of all colors including black, and especially white, is excellent. The density of the white ink allows striking results when printing on dark colors, transparent substrates or reflective metal surfaces. Excellent results are obtained on anodized aluminum. Because of the instant drying time, multiple layers of both white and clear plus CMYK may be applied simultaneously in a single printing pass. The inks are cured as soon as they contact the surface, resulting in minimal dot gain. This allows very fine details and incredibly small fonts to be printed. The inks can also be applied selectively to build up embossed objects and letters as well as unique custom textures. In addition, the clear ink can be "flooded" over the entire or selected areas of the substrate to increase durability or provide a higher-gloss finish. The level of gloss is dependent on the number of final clear layers applied. The opaque white UV curable ink may be used by itself or as a base coat on the aluminum surface.

These unique printing capabilities cannot be duplicated by other printing methods.

All UV curable inks are very durable. As they are UV stable, they will perform well in both indoor and outdoor environments. Manufacturer's tests indicate the potential for 4-5 years useful outdoor life. Applying clear coats during printing will add to the durability on most substrates. Finished surfaces are scratch and abrasion resistant. In addition, they are resistant to most cleaners and solvents.

DURAJET™ ANODIZED ALUMINUM FULL-COLOR PRINTING

DuraJet™ open-pored aluminum was recently introduced by Horizons Imaging Systems Group for revolutionary sub-surface color printing on anodized aluminum. DuraJet™ allows you to print full-color, photo-quality images, logos and text directly

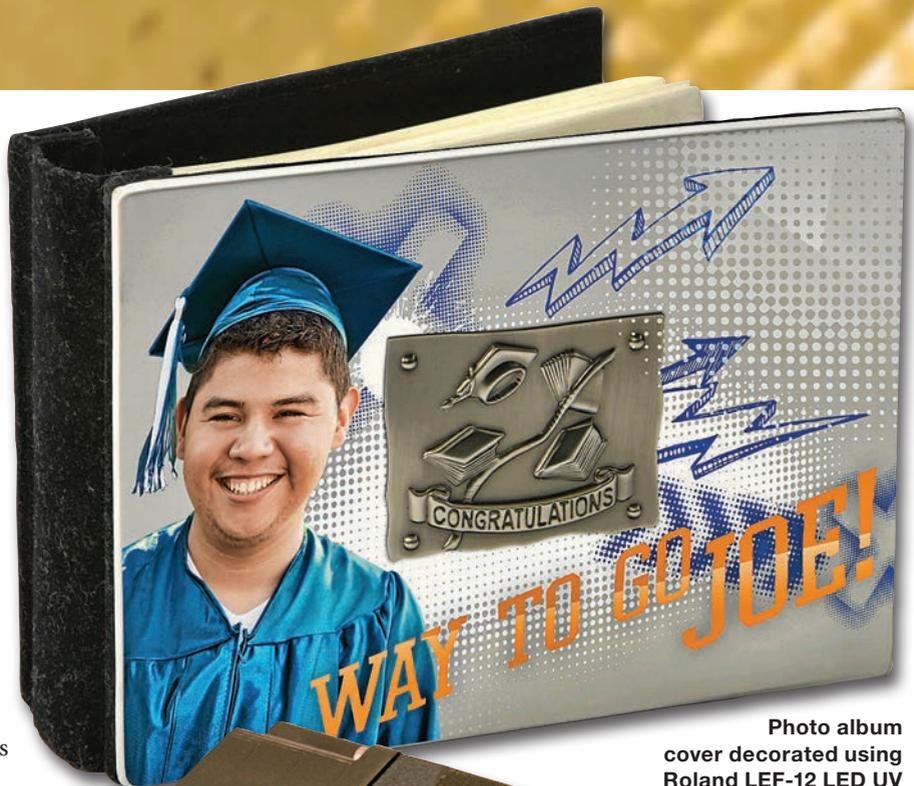
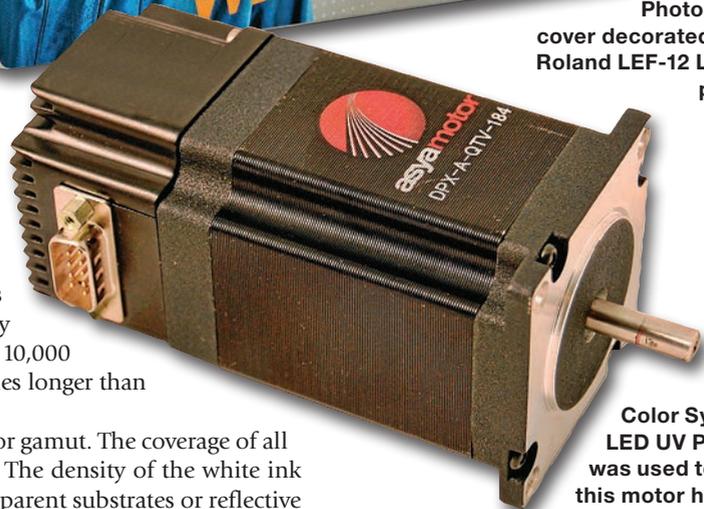


Photo album cover decorated using Roland LEF-12 LED UV printer.



Direct Color Systems LED UV Printing was used to mark this motor housing with a color logo and white print.

Anodized aluminum wall panel created with Horizons DURAJet aluminum and Direct Color Systems dye solvent inks.



Collage of Horizons ALUMAjet prints.

onto anodized (open-pore) aluminum. An image is printed on the anodized aluminum using a dye-based solvent printer like the recommended Direct Color Systems DirectJet. DuraJet™ aluminum is engineered to absorb Direct Color Systems Multisolve™ IR4 Solvent inks. After printing, DuraJet™ is “sealed,” protecting the image inside the metal itself. This second process seals the image under the anodized layer, making it virtually impervious to abrasion, chemicals, moisture, humidity and salt spray.

Anodized aluminum printing has been challenging in the past, but DuraJet makes the process simple and straightforward. The printed aluminum sheet with the pores still open is carefully placed in a processing tank filled with sealing solution. The sealing solution will process about thirty 12x10 aluminum plates before solution replacement is necessary. Multiple sheets may be placed in the processing tank to reduce production time. The aluminum is rapidly boiled in the tank for 15 minutes. After the pores are closed, the aluminum is rinsed with water and dried. If desired, it can also be polished.

Applications for anodized printing include:

- Durable, full-color variable data plates, metal labels and panels.
- Full-color, high-value metal signage that is extremely durable.
- High-end award plaques.
- Full-color magazine article and photographic reproduction/display.

The major benefits of the DuraJet™ process include:

- Full-color inkjet printing with the modern, high-quality look of anodized aluminum.
- Impervious to abrasion, chemicals, moisture, humidity and graffiti.
- Easy to use and reliable: digital process requires no screens.
- Lower acquisition costs than comparable systems such as metal screen printing.

The samples I received from Horizons and Direct Color Systems were excellent. The smooth surface of the aluminum combined with the high-resolution sub-surface DCS DirectJet printing, produced the highest-quality full-color print quality on anodized aluminum samples I have ever seen.

ALUMAJET® WATER-BASED PIGMENT INKJET PRINTING

ALUMAJet®, another innovative product developed by Horizons ISC, allows owners of both pigment and dye inkjet printers the ability to print directly on anodized aluminum sheet stock

with rich, photo-quality color images and crisp text. I prefer utilizing Epson pigment ink, piezo print head models. The color reproduction is great, and the inks are durable and UV resistant.

ALUMAJet® is available in five finishes: matte silver, brushed silver, satin silver, satin gold and white. Standard sizes include letter, A4, A3 and 20x24. The sheets are available in three thicknesses: 0.005, 0.012 and 0.020 inches. Printers that have a straight-through paper path can print all three thicknesses. The 0.005 thickness will work in printers that feed from the top with a “J Curve” paper path and output to a bottom tray. Printers with front feed that curve the paper 180 degrees will not work.

ALUMAJet® is recommended for indoor use. Horizons suggests that printed ALUMAJet sheets should be cold laminated or spray coated before the sheets are cut and displayed.

Applications include: Certificate Reproductions, Newspaper Reproductions, Plaques, Awards, Photographs, Art Reproductions, Name Badges, Equipment Labels, Property Tags, Nameplates and Signs.

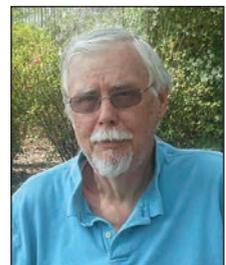
ALUMAJet® offers accurate and durable aluminum printing, particularly if you already own a compatible color inkjet printer.

FINAL COMMENTS

Hopefully, this article has provided a good overview of full-color direct-print and heat-transfer options. For additional information, contact any of the vendors listed below who provided valuable information for this article.

- Unisub.....www.unisub.com
- ChromaLuxe..... www.chromaluxe.com
- Johnson Plastics..... www.johnsonplastics.com
- Direct Color Systems.....www.directcolorsystems.com
- Roland DGA Corp. www.rolanddga.com
- TheMagicTouch USA..... www.themagictouchusa.com
- Joto Paper..... www.jotopaper.com
- Horizons Imaging Systems Group..... www.horizonsisg.com

Bill Leek of Houston, Texas, has over 33 years' experience in digital decorating system development and graphics design. He has developed several lines of color imprintable products utilizing inkjet, sublimation, and color laser transfer technologies. In addition, he has extensive working knowledge of color management and product durability testing and has consulted for many of our industry's leading companies. He may be reached at wfleek@jblgraphics.com.



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