

# Terrific Toner Techniques

**T**oner is the magic powder used to create the final hard copy images in today's copiers and PostScript laser printers. Until recently, it was absurd to even suggest that toner could ever be "as good as" real printer's ink. Or as cheap, versatile, durable, or colorful.

But so much has happened to toner in the last few weeks that ink at long last should be getting an honest run for its money. And opening up plenty of exciting new *Midnight Engineering* opportunities in the process.

Brand new opportunities that now include high quality photos; genuine raised thermography; easy printed circuit prototypes; better durability; exciting low tech decals that now let you magically water transfer toner onto *anything*; custom rubber stamps; and iron-on fabric toners for use on T-shirts and gimmie caps.

So, I thought it might be a good time to review just what is coming down in the explosively expanding world of toners. We might start with the obvious question of...

## What is toner?

Traditional toner is mostly an inert and finely ground polyethylene plastic to which some carefully formulated additives of carbon (for color and electrical conductivity), iron oxides (for the magnetic transfers); triboelectrics (for electrostatic transfer); anti-caking agents (for free flow); and lubricants (for longer life) have been added.

You could also think of toner as a wonderfully magic mixture of black stuff, hot glue, and etch resist. You can look at the black stuff, use your hot glue to *selectively* grab and bond other materials (such as thermography powder or hot stamp foils), or use the etch resist to eat holes in circuit board conductors or artistic engravings.

While you can buy toner at your local retail computer store or directly from your printer manufacturer, to do so costs you lots of extra money and sometimes gives you a poorer final product. For instance, a new cartridge for a Canon SX engine lists for \$125. A nickel per page.

If you shop around though, you can find wholesale or "near wholesale" sources that offer the very same thing for around \$65. Useful sources for OEM cartridges advertise in *Computer Reseller* and *Recharger* magazines.

Better yet, by personally refilling your own cartridges with a good grade of third-party graphics toner, you can actually create denser and blacker images for as little as \$5.50 per refill. Which translates to 0.18 cents per page, or less than *one twenty-fifth* of the list price.

So, our first toner breakthrough is the dramatic per-page

price reductions possible by handing your own cartridge recycling. Such activities as *Book-on-demand* publishing are eminently practical at 0.2 cents per page, but totally absurd at a nickel a page.

There are now hundreds of sources for refill toners, along with the third party hard drums, wiper pads, and other recharging products. Although one of my favorites remains *Static Control Products*, you will find plenty of ads for others in the greatly expanded issues of *Recharger Magazine*. Recharger is also now publishing a free *Supplies Unlimited* shopper.

Recharging any toner cartridge is trivially easy. With practice, anyone can do it in two minutes flat. The three key steps in the process involve dumping out the collected spent toner, pouring in new toner, and replacing the wiper pad. Full details on recharging Canon engines appear in my *Ask the Guru III*, and also on my *Guru's Lair* website in a number of files. We might also do some future *Blatant Opportunist* column on recharging as well.

There are two schools of thought in toner recharging. One (preferred by for-hire commercial rechargers) uses the *total teardown* method, while the other (preferred by end users) uses *punch and go* refills. I overwhelmingly prefer punch and go for one quite simple reason – this can deliver *by far* the lowest per-page end user toner costs. Thus, while a total teardown *may* (this is arguable) give you one extra refill or two, it only does so at costs that *raise* your end user per-page costs. At great risks of damaging or fingerprinting stuff that ain't broke.

After personally running several million pages through all my laser printer Book-on-demand operations, I flat out cannot afford the total teardown method.

## Fine Grinding and Photorealism

While the text and graphics of traditional PostScript laser printers was acceptable for many users, previous attempts at reproducing high quality halftone photos failed miserably. But the latest PostScript Level II printers now let you print medium to high quality photographs. That new *Photograde* process used on the *LaserWriter F* and *G*, and those 600 x 600 DPI printers from QMS are typical.

Special "microfine" toners are required for these higher resolution processes. These are starting to be commercially offered and the third-party prices are dropping radically. Check the *Recharger* ads for availability.

Do be extra careful to get a reliable source. Improperly formulated finely ground toner can easily explode.

## Other Specialty Toners

Yes, you can get color toners through many *Recharger* advertisers. Red, blue, and brown are the most popular. The colors are better than ever and the prices have been newly lowered to \$20 or so. But many users will still find their results both disappointing and expensive. Color toners are best used for spot or duplex color where precise registration is not a problem. And not for exact color matches.

There are also full color toner systems available, such as is used in the *Canon* color copier and similar products. The results can look quite good for any use that can justify the higher per-page print costs.

A special toner is required for printing the *machine readable* portions of custom checks. This is called MICR toner, and is newly available through any of a number of *Recharger* and *Supplies Unlimited* advertisers.

Several new *dye sublimation* toners are now offered. You first print a reverse image to paper, and then iron or heat press the paper over a T-shirt or other fabric. The heat vaporizes the sublimation dyes which then transfer into the cloth as a vapor. Colors can also be applied to certain metals, especially plaques and trophies.

Check the ads in *Recharger*, *PrintWear*, and *Impressions* for suitable sources of supply.

The dye sublimation toners work best with polyester or polyester-cotton mix fabrics. More and denser colors have recently been added. So far, the results cannot compare with commercial silk screen work. But they certainly are useful, especially for any rapidly customized items in low quantities. And are bound to get even better.

## Transfers and Substrates

Toner can obviously be used as an intermediate artwork or prepress generator. One trick beginners often miss is that by *working double size, you can quadruple the resolution of your laser printer at zero cost*. At least for any process that is going to require some litho camera work anyway.

As an intermediate, toner can get you to rubber stamps (from *Grantham/Polly-Stamp* or *Merigraph*); aluminum nameplates, dialplates, and trophies (from *Metalphoto* or *Fotofoil*); vinyl labels and decals (from *Scotchcal*); badges (from *Badge-A-Minit* and *Super Button & Badge Supply*); for silk screens (more info is in *Screen Printing* magazine; materials from *Advance Process Supply*, or *Dick Blick*); and even for glass etching (from *Hartco*).

One other approach to T-shirts and such is the *Transfer Magic* system, available in most notion stores. You laser print to your sheet, iron the sheet to your fabric, and then dissolve the paper away with warm soapy water.

What you print on can make a big difference. Colored paper is your simplest quality upgrade. Some papers work very well with toners and others do not. The obvious thing to do is experiment. Two superb paper sources include *Paper Plus* and *Paper Direct*. Do not forget the heavier index stocks for covers and the parchments for certificates and awards. Fluorescent self-stick papers can be used for disk labels and bumperstickers. A wide variety of die-cuts are obtainable from such sources as *Die-o-Perf* and *Polyline*.

Non-papers can also get used on a try-it-and-see basis. But be careful when experimenting! One no-no material is Tyvek. Toner does not stick to Tyvek. But that does not

matter in the least, since your fusion rollers will convert Tyvek into a black lagoon style gloppy syrup.

Of the transparent materials, the high temperature mylar or polyesters work best. Plain old acetates are a no-no unless they are properly backed and supported. Even then, acetate is risky because of its low melting point. Obvious uses of clear films include overhead transparencies and window decals. One trick: A piece of blank clear film on top of a piece of printed clear film locks your toner inside and makes it more durable.

There is a non-woven interfacing fabric known as *Pellon* found in most cloth stores. With care, you can feed thin Pellon sheets through the laser printer. The print quality is low but useful. Besides dress patterns, Pellon can make excellent transfer stencils, especially for primary education and other kiddy projects. Among other things, it can be painted and possibly vinyl dipped for bright colors. One warning: There is both *plain* and *heat fusible* Pellon. The latter is obviously unsuitable.

Thinner versions of a product called *static cling vinyl* can be printed, so long as you are super careful, use a backing sheet, and pre-trim your vinyl edges well away from the backing sheet. But be extremely careful. Static cling vinyl sticks to any clean surface and provides superb window lettering. *Joseph Struhl* is one source. The usual signcutting vinyls can also be used. But, once again, backing sheets and caution are needed. Check the ads in *SignCraft*.

## Hot Stamp Foils

There have long been several quite good processes for converting toner into hot stamp foils. Sadly, these systems have been (and still remain) monumentally mismarketed and obscenely overpriced.

While first developed by the English firm *Omnicrom*, *Kroy Color* is the leading supplier today. There are several other rebranders and repackagers.

To use *Kroy Color*, you put your toner hard copy into a suitable carrier and apply heat and pressure. Preferably with a special machine, or else just by running on back through your laser printer. The heat and pressure melt your toner, and the resulting hot glue selectively grabs your foil or ink from its backing sheet. Metallics, golds, silvers, glossy colors, and matte colors are available. The red and blue foils work by far the best, while the yellow and green mattes usually end up totally useless. Laminating and gloss varnish films are also offered.

Allowing for scrap and temperature errors, most popular *Kroy* and *Kroy-like* products will end up costing you well over one dollar per application. Yes, you can chop up the sheets for spot color, trading labor for dollars.

The present prices stupidly exclude *Kroy Color* from 99+ percent of the potential market for this incredibly great product. While quite useful for high value-added stuff like custom point-of-purchase displays, no way can *Kroy* be used on routine letterheads or economy business cards.

On the other hand, if you are willing to buy transfer foils in very large quantities and do your own conversions, the raw cost of the material is in the three cents per sheet range. Suitable hot stamp foil manufacturers include *Transfer Print Foils* and *Maple Roll Leaf*. Others advertise in both *Converting* and *Paper, Foil, and Film Converter*.

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## SOME TONER RESOURCES

**Advance Process Supply**  
400 North Noble Street  
Chicago, IL 60622  
(312) 829-1400

**Badge-A-Minit**  
348 N 30th Road Box 800  
LaSalle, IL 61301  
(815) 224-2090

**Bennet LaserBrite**  
720 4th Street SW  
Rochester, MN 55902  
(507) 280-9101

**Dick Blick**  
Box 1267  
Galesburg, IL 61401  
(800) 447-8192

**Die-O-Perf**  
1721 East Pioneer Drive  
Irving, TX 75061  
(800) 843-2807

**DynaArt Designs**  
4707 140th Ave N #212  
Clearwater FL 34622  
(813) 524-1500

**Fotofoil**  
4400 N. Temple City Blvd.  
El Monte, CA 91731  
(818) 444-4555

**GEnie**  
401 N. Washington St.  
Rockville, MD 20850  
(800) 638-9636

**Grantham/Polly-Stamp**  
418 Central Avenue NE  
East Grand Forks, MI 56721  
(218) 773-0331

**Hartco**  
1280 Glendale-Milford Road  
Cincinnati, OH 45215  
(800) 543-1340

**Impressions**  
1515 Broadway  
New York NY 10036  
(212) 669-1300

**Kroy Color**  
14555 N Hayden Road  
Scottsdale, AZ 85260  
(602) 951-1593

**Maple Roll Leaf**  
2285 Ambassador Drive  
Windsor, Ont CAN N9C3R5  
(519) 966-4721

**Meadowlake**  
25 Blanchard Drive  
Northport, NY 11768  
(516) 757-3385

**Merigraph**  
641 South Palm Unit H  
La Habra, CA 90631  
(213) 690-4445

**Metalphoto**  
18531 South Miles Road  
Cleveland, OH 44128  
(216) 475-0555

**PaperDirect**  
57 Romanelli Avenue  
S Hackensack, NJ 07606  
(800) 272-7377

**Paper Plus**  
300 Oceangate #800  
Long Beach, CA 90802  
(213) 436-8291

**Polyline**  
1233 Rand Road  
Des Plaines, IL 60016  
(708) 298-5300

**Printwear**  
1008 Depot Hill Road  
Broomfield Co 80020  
(303) 469-0424

**Recharger**  
3870 La Sierra S266  
Riverside, CA 92505  
(714) 359-8570

**Scotchcal/3M Graphics**  
6023 South Garfield  
Los Angeles, CA 90040  
(213) 726-6343

**Screen Printing**  
407 Gilbert Avenue  
Cincinnati, OH 45202  
(513) 421-2050

**SignCraft**  
1938 Hill Avenue  
Fort Myers, FL 33906  
(813) 939-4644

**Static Control Comps**  
3115 H Siler Drive  
Sanford NC 27331  
(800) 488-2424

**Sunraise**  
PO Box 487  
Lexington, MI 48450  
(800) 521-6367

**Super Button & Badge**  
2338 West Burnham Street  
Milwaukee, WI 52304  
(800) 533-4911

**Synergetics**  
Box 809  
Thatcher, AZ 85552  
(520) 428-4073

**Techniks Inc**  
45 J. Ringo Road  
Ringoes, NJ 08551

**Therm-O-Type**  
509 Church Street  
Nokomis, FL 34275  
(813) 488-0123

**Thompson & Thompson**  
6 Morgan #112  
Irvine CA 92718  
(714) 855-3838

**Transfer Magic**  
PO Box 895  
Saddlebrook, NJ 07662  
(201) 712-1234

**Transfer Print Foils**  
PO Box 538  
East Brunswick, NJ 08816  
(908) 238-1800

**USI Systems**  
Box 644  
Branford, CT 06405  
(800) 243-4565

Engineering product here include low end-user cost, low end-user cost, and low end-user cost.

### Improving Durability

When properly applied, today's toners are reasonably durable and fairly crease resistant. But you still would not want to keep a stack of unenhanced toner business cards in your wallet. Nor use raw toner on a menu or book cover.

Your first step towards toner durability lies in your printer maintenance. Printers should be kept squeaky clean. Especially those corona charging wires and those hidden mirrors nobody ever mentions. Fusion rollers and sensors must be kept spotless and free of any caked-on spent toner. The density dial must be properly set for an optimum tradeoff between the image blackness and the number of copies. Note that most Canon engine laser printers have a backwards dial, with "1" as densest and "9" as the lightest setting.

Maintenance help is available through *Hewlett Packard* with their excellent manuals which also apply to many competitor machines. See the new compatibility listing in HACK51.PDF on [www.tinaja.com](http://www.tinaja.com). Individual parts and repair training is available through *Thompson and Thompson*.

Older laser printers tended to have a ghosting effect and a drum history of previous latent images. One way to beat this is by *blackflashing*. When you blackflash, you simply print one or two all-black pages before your final image. Even with modern printers, a blackflash can dramatically improve any large gray areas and other halftone images. Normally, you only blackflash your final product.

As one offbeat durability improver, note that most laser printers kick up the fusion temperature a tad when you go into manual feed. This is done expecting a heavier paper. Thus, you may get somewhat more durability by manual feeding rather than tray feeding. A second pass through the printer (while printing a blank page) or a trip through a Kroy Color machine can also help your durability.

The next step up for durability is a sneaky and zero cost calendaring process called *Bakerizing*. Just place your toner in contact with an ultra-smooth surface and apply heat and pressure. An "empty" Kroy Color sheet is ideal for this. Just run the page and the sheet back on through your laser printer or use a Kroy Color machine.

Bakerizing makes toner a dense black and a medium high gloss. It is great for medium quality business cards. You have to see it to believe it. I do have lots of Bakerizing film on hand. Call me for further info.

The ultimate protection for toner is to seal it in plastic, using some sort of lamination. There are useful but way overpriced lamination films available through Kroy. The laminate sticks everywhere, not just where there was toner.

But conventional laminates are far cheaper and much easier to do. The clear matte stock looks especially good on book covers. A leading source of low cost laminating films and machines is *USI Systems*. Also try *Printer's Shopper*.

### Real Thermography (!)

Heat is one way to temporarily soften toner. But you can also soften toner chemically. All it takes is some suitable solvent that attacks polyethylene.

A product called *Bennet LaserBrite* can actually let you

convert selected toner areas into raised print *thermography*.

To create your own thermography, you spray on the magic softening solvent to temporarily liquify your toner. Then you dust on the usual thermography powders and wait for the toner to again harden. Next, you shake off all of the loose powder remaining. Finally, you apply flash heat to expand your powder. Popcorn style. For lower volumes, a high intensity desk lamp can be used for heat.

Obvious uses for "raised print" thermography do include logos, letterheads, distinctive business cards, and *Braille* messages for the blind. Sources for thermography powders include *Sunraise* and *Therm-O-Type*. Others advertise in the *Quick Printing* and *Printing Impressions* trade journals. Colors, clears, metallics, and "fuzzy" glitters are offered.

Several people have been experimenting with using toner as bookbinding glue. Leading to the interesting prospect of a Book-on-demand system that is *self binding*. While toner can in fact bind books, results so far are unreliable and disappointing. But softening chemicals may be able to help. Let me know what you find here.

### Water Transfer Decals

Sometimes hindsight can make even the most stunning breakthroughs rather obvious. A new product called the *Toner Transfer System* from Frank Miller of *DynaArt Designs* is absolutely astonishing in what it does and how well it does it. In one swell foop, this single unique product simultaneously lets you make real decals and solve those printed circuit board transfer problems. You can now put accurate toner images on virtually *anything*.

Start with a six mil stable paper substrate that's half the thickness of traditional decal backings. Apply a magic coating of high tech sugar water. The coating is (a) water soluble; (b) a fairly decent glue; and (c) high temperature resistant. Then sell it for two bucks a sheet retail.

You can use the Toner Transfer System either for "cold" or a "hot" transfer. For a cold ferinstance, print your *frontwards* image onto the toner transfer system. Then spray on some clear covering glop. Either lacquer for a temporary transfer or else clear epoxy or urethane for something more permanent and durable. Cut your image out, leaving a margin. Next, model railroader decal style, put the image into water till the glop softens. And then slide the toner image onto anything you like, again letting the glop harden and act as an adhesive. Note that your overspray is holding the toner image intact.

Full color results from a *Canon* copier look especially impressive. Stunning even.

For a hot transfer, print your *backwards* image onto the toner transfer system, and then iron or heat press the toner onto your final substrate or trophy or whatever. Then soak the whole works in water for two minutes till the backing sheet floats off. Only a fairly modest amount of heat and pressure are needed for most uses.

Either way, you now have the ability to take a toner image and move it onto virtually *anything*. What new uses can you come up with here?

There's a continuum of pressures and temperatures that will transfer toner. Some new systems are based on extreme pressures and modest temperatures. So far, these seem to be unproven and overpriced. Some appear to be franchise scams as well.

### Printer Circuit Boards

We did look at the fundamentals of the Direct Toner method for doing printed circuit boards back in *Blatant Opportunist* #9. There, we found that properly transferred toner makes an excellent etch resist. Which meant that you could, in theory, make high quality printed circuit boards in minutes for pennies without any darkroom.

And, thanks to the magic of the PostScript language, any old word processor on any old computer could do an outstanding board layout job for you. For example code and a working layout package, see my [PRINCRCT.PS](#).

Until recently, the key problem lay in a suitable transfer material. One early product was the *TEC-200* film from *Meadowlake*. This was simply a film with a slick surface. The image was supposed to weakly stick to the transfer film and then strongly stick to your circuit board. While it sort of worked some of the time, many found (and still do find) the film unsuitable for their use.

A month ago, a greatly improved product appeared called the *PCBF-1000* film from *Techniks Inc*. This product did a much better job, especially when transferred by a Kroy Color or other powered heat roller machine, using SX graphics toner, onto a clean board with a slight pre-etch.

But the big problem of *differential sticking* remains. The odds of toner falling off the film or failing to transfer to the copper remains high, leading to non-uniform results.

The hot mode of the water decal Toner Transfer system from *DynaArt* solves the differential transfer problem in spades. Your toner first tightly sticks to the film. After an ironing or other heat transfer it also tightly sticks to the circuit board. A water soak then dissolves the backing film away from the circuit board, leaving *all* of the toner on the copper. And more water removes any trace of potential etch contaminants. The stuff really works great.

It seems to me that this new *SynaArt* product finally "turns the corner" on the direct toner pc method, making it ridiculously cheaper and vastly simpler than most of the conventional printed circuit processes.

The opportunities here are mind-boggling. All of a sudden, your high quality PostScript art can be precisely transferred onto nearly anything. Any place and any time.

### A Contest

But, why don't you tell me instead? For this month's contest, just tell me about any little known toner trick or technique that works for you. they'll be dozens of my newly revised *Incredible Secret Money Machine II* books going to the better entries, with an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* going to the very best of all.

Let's hear from you. ♦

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*Microcomputer pioneer and guru Don Lancaster is the author of 35 books and countless articles. Don maintains a US technical helpline you'll find at (520) 428-4073, besides offering all his own books, reprints and consulting services.*

*Don has a free new catalog crammed full of his latest insider secrets waiting for you. Your best calling times are 8-5 weekdays, Mountain Standard Time.*

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