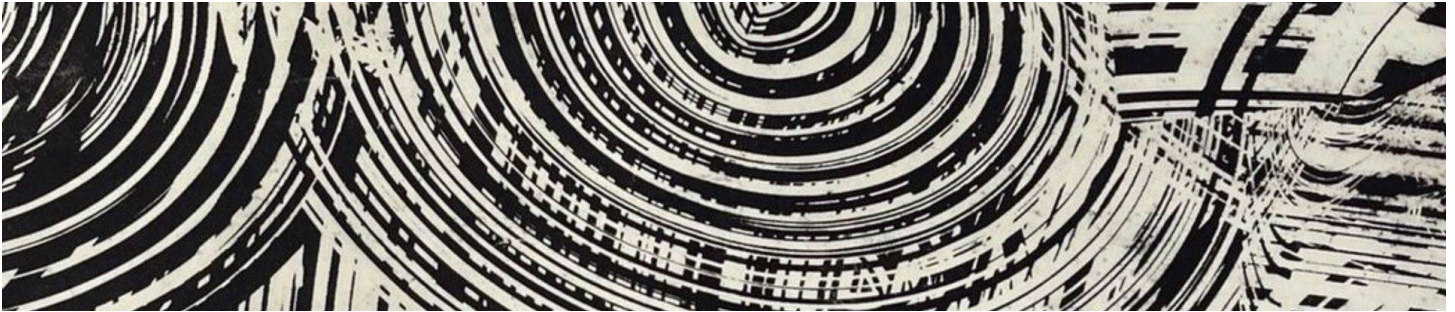


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## Intaglio Manual:

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revised 2012

images:

new intaglio prints made at [Zea Mays](#)

during an artist residency in 2021

## Non-Etch Photopolymer Techniques



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The non-etch photopolymer techniques represent a significant departure from the conventional approach to intaglio printmaking. Here, the acrylic emulsion of the photo sensitive film is not merely used as a secondary transfer medium to facilitate the production of a metal plate etching (as in the etch techniques) but actually becomes the intaglio printing medium itself. The copper plate or any other rigid substrate carrying the film is simply a base.

### **Preparation and substrates**

All initial stages of the plate making process are identical to the etch techniques outlined previously. If copper or other metal plates are used sanding and degreasing are required to ensure good adhesion of the film. No sanding is necessary if plastic plates such as Perspex, plexi, PETG or acetate are used as the base onto which the film is laminated; and some substrates such as thin wooden boards or collagraph plates will also lend their existing surface texture.

All base material need to have their sharp edges removed on both sides to protect the press blankets during laminating and printing. If very absorbent materials are used, such as particleboard, it may be advisable to seal the back with a double coat of acrylic floor varnish to prevent warping during developing and drying.

### **Non-etch line process**

Most artwork recommended for the etch techniques, such as line art on acetate or tracing paper, is also suitable for the simpler non-etch processes. Those positives which consist of a clearly defined network of black lines or dots, without any continuous tones are best suited e.g. rasterised printed images or photocopies of engravings; or an image could be drawn by hand directly onto the acetate with pen or ink. All these types of positive can be exposed to the laminated plate as a single step exposure (see previous section). The developing process now provides the crucial stage in which intaglio grooves are produced in the plate - not by etching into the metal but simply by developing the film in the soda ash solution. After developing, the plate is thoroughly rinsed, spritzed with vinegar and heat dried. This stage is more important than in the etch techniques as the polymer surface must be sufficiently hardened to withstand the tremendous pressure of the press during printing. Also, a plate which does not receive a second UV exposure after developing may still contain moisture and as a result the paper may stick to it during printing.

An image can be adversely affected if there are tonal areas on the positive that exceed a certain width. To avoid this, a double exposure is recommended. The non-etch process using a single exposure is also suitable for high definition half tone work (unlike the etch process), given that the positive is already broken up into the half tone grid structure, which then makes it a half tone positive.

### **Non-etch halftone process**

The amazing potential of the non-etch photopolymer process becomes most apparent when used in the following way. As a double exposure process, the artist is able to make use of any kind of positive for intaglio printmaking - regardless of whether it is crisp line art or the most subtle continuous tone imagery, as in non-rasterized photographs or handmade wash drawings on frosted film (see previous sections on the making of positives).

The extreme sensitivity of the double exposure process also allows the use of any kind of positive. A vast number of direct marks can be drawn or painted onto suitable transparent materials. When pencils and crayons are used, their softness and tonality can be expected to transfer faithfully on the print. Crisp decisive lines are best drawn with pen and ink or black marker pens.

The fundamental difference between a continuous tone positive, regardless of whether it is of a photographic or manual origin, and a halftone positive is that the former has real levels of varying tonality whilst the halftone merely emulates this variation by trickery, using tiny dots that appear as grey tones. The double exposure technique does not require the use of this trickery because it enables the direct transfer of real tones on a positive to real tones on an intaglio print.

#### Random dot screens

Before the double exposure process can be carried out a suitable random dot screen has to be made or obtained. These screens are different to the uniform reprographic screens used in the making of halftones and serve an entirely different purpose.

An ideal very fine and dense random dot screen has been developed by [ELIZABETH DOVE](#) and artists with reprographic experience can make their own screens by using frosted types of glass to obtain refracted random dots on lith film. A very serviceable random dot screen can also be made in any workshop equipped for acrylic resist etching.

#### METHOD

##### Make your own random dot screen as follows:

Spray several even layers of a fine aquatint mist of black or red acrylic ink onto a sheet of acetate until a dot coverage of at least 50% is achieved. Ideally, use a spray aquatint facility but on an improvised level, a spray can may also suffice.

Artists may wish to create a fine or coarse dot screen depending on the required effect; in either case the dot coverage should be as even and as dense as possible. Plates made with a coarse dot screen will have greater contrast and the deepest blacks. Plates made with a finer dot screen will reveal a greater range of mid tones and very precise definition.

Images printed from a photopolymer plate based on a photographic positive in this manner not only have a degree of quality and definition similar to the original but are also enhanced by the tonal richness and depth of the intaglio medium.

#### The double exposure process

To reiterate: this non-etch half tone process should not be confused with other halftone methods in printmaking involving the use of dot screens. According to conventional reprographic thinking a dot screen serves the purpose of translating the different levels of tone in the original into different sized black dots to make them printable. With this method, the transfer of tone from original to print is approached differently. Rather than manipulating the size of dots it directly affects the depth of the intaglio mark that any level of grey on the positive produces in the photopolymer film. So this method takes full advantage of the nature of the intaglio medium in which areas of tone in the printed image always relate to the depth of intaglio marks in the plate.

#### Determining the screen exposure

Before a continuous tone positive is exposed to the laminated photopolymer plate, the plate undergoes an overall exposure to a random dot screen. The correct exposure time should be tested beforehand, and once decided, should remain consistent. This can be achieved by carrying out a step test with a laminated plate; exposing it to the screen for increasing lengths of time. A piece of card can be used to cover up exposed segments. The plate is then developed, dried and printed. The segment on the resulting print that shows a dense mezzotint black represents the correct exposure time for the type of screen being used.

#### The basics of the UV exposure

A stepped test strip also demonstrates the fundamental principle underlying the UV exposure: a short exposure will produce a mark or dot that dissolves in the developing process due to insufficient hardening by UV light. Once a certain threshold is reached the exposure enters its ideal range: the marks exposed to UV are clearly defined and withstand the dissolving action of the developing process, while all areas not exposed to UV are washed away. Over exposures that go beyond this ideal range inevitably lead to an increased hardening and filling-in of areas that are meant to dissolve. As a result a faint print is produced in which the lightest tones are burnt out completely while the blacks and dark areas are brighter than they should have been. If prints consistently have this kind of appearance the exposure times need to be

reduced to properly replicate the tonal values of the original.

How to carry out a double exposure

#### METHOD

Carry out a double exposure as follows:

- Place the random dot screen on top of the laminated plate inside the vacuum frame. It is important to place the emulsion side down on the polymer film.
- Activate the suction pump and the UV exposure will begin.
- Expose the random dot scheme for a length of time which has been calculated to produce a mezzotint black when developed.
- After the first exposure, remove the dot screen while the plate remains in the vacuum frame.
- Now place the positive on top of the photopolymer plate. Remember to reverse the image. If maximum definition is paramount, the positive should be brought into contact with the plate with its emulsion side facing the photopolymer emulsion.
- The length of image exposure varies from positive to positive, but is in many cases in the same region as the screen exposure, or shorter.
- After the second exposure, develop, light harden then print the plate.

REMEMBER: The exposure times for the screen and the image need to be tested out for the type of UV unit, dot screen, positive and photopolymer film used. With a little experience the variables of the process become fairly easy to control and adjust.

Many artists and students introduced to this process for the first time are amazed by the superb halftone reproduction; some find it difficult to understand how it actually works. The secret lies with the screen exposure. The initial exposure to a network of random dots creates a virtual mezzotint - an area of maximum roughness and therefore ink retention. If the plate was developed at this stage it would print a deep black. The next exposure, to the continuous tone positive, is in effect a reprographic equivalent to the scraping and burnishing of conventional mezzotint; it shapes lighter areas out of a dark background. The UV light travelling through the different levels of grey of the positive hardens the underlying dot screen mezzotint to varying degrees, depending on how much light is let through. In an area to be black, which is completely blocked out on the positive, the mezzotint is fully retained, while the film hardens fully in areas to be white, thus creating a smooth top surface. Any grey tones will partially fill in the mezzotint black and register on the plate as an area of a certain depth somewhere in between the deep black and pure white levels.

This explanation shows how the double exposure technique is very similar to conventional intaglio techniques that generate tone out of different levels of intaglio groove. The main difference, of course, is that here these levels are exposed into a photopolymer emulsion rather than etched into metal.

All types of photopolymer emulsion are suitable for use in this continuous tone process. Thicker varieties can sometimes be more flexible as regards exposure times and also yield the broadest range of greys and the richest mezzotint blacks. The thickness of the film can be increased by laminating several layers of photopolymer film together.

Laminating multiple layers of film

#### METHOD

Laminate multiple layers of film as follows:

- Laminate the first layer of film onto a prepared plate in the usual way.
- Return the plate to the yellow light area and carefully peel off the second layer of clear Mylar, making sure that none of the emulsion is also removed.
- Cut the next piece of film to size and remove the soft layer of Mylar.
- To avoid creases and bubbles, briefly dip this second layer of film in a tray of warm water before laying it onto the plate. Gently squeegee off excess water to ensure perfect contact.
- Now run the plate through the press as before.

Due to the wet lamination method it is necessary to fuse and harden the plate in a drying cabinet before the edges can be trimmed and the plate is ready for exposure.

Theoretically, there is no limit to how many layers of film can be sandwiched together to increase thickness. As an additional aid to lamination the surface of each layer can be lightly sanded before the next layer is added.

The increase in film depth and therefore of the range of tonality on the print can be further enhanced if each layer is exposed i.e. by giving each layer of film an initial screen exposure. The actual image exposure then takes place as the last step of this process.

Exposure times have to be adapted to these types of modified plate.

Many other creative interventions are conceivable with multilayered plates, for instance, by exposing different images to different levels of film to produce a pictorial amalgamation.

### **Maximising the exposure**

Intaglio Type prints of a very high quality can be achieved with even a basic, improvised set up and a little bit of practice. Those with access to professional equipment can fine-tune the processes to produce unprecedented levels of quality. Even though small, less powerful exposure units can produce excellent results, the scientists who developed polymer film emphasised the importance of an exposure as short and powerful as possible to yield the most accurate results. This is because UV light is of a very high intensity and is less likely to be diffused by the film positive. Another important factor lies in the degree of contact between the photopolymer emulsion and the screen or positive during exposure. An emulsion-to-emulsion exposure always facilitates a well-focussed reproduction, while any exposure where the non-emulsion side of a positive is in contact with the polymer plate leads to a certain degree of diffusion and refraction. To a lesser degree, this also applies to the thin top layer of clear Mylar which is normally left on during exposure. In some cases, especially when high definition photographic liths are used as artwork, it is worth removing the Mylar prior to exposure. The resulting print will tend to have a slightly broader tonal range, the finest detail but less contrast. However, most types of positive other than lith film tend to bond with the bare polymer plate during exposure, which makes the process rather messy and difficult to control. This applies particularly to any artwork involving a toner deposit i.e. photocopies and laser prints.

### **Flash exposure**

Another way to extend the tonal sensitivity of the non-etch process is by using a sophisticated triple exposure technique which, after a thorough testing and fine tuning of all the variables can enhance the lighter spectrum of greys in the finished print. Follow the double exposure process as described i.e. an initial exposure to a random dot screen followed by the exposure to the image. Now introduce a third exposure to a diffusion screen e.g. a sheet of tracing paper or frosted Perspex or glass. This exposure is so short that it does not produce the overall grey tone that would result from a longer exposure; it should be merely a flash of about 1/10th to 1/20th the length of the main exposures.

### **Experimental Intaglio Type techniques**

Artistic work carried out using the photopolymer medium can easily become a victim of its own success. Its pictorial language can bear a technological perfection and slickness not normally associated with intaglio printmaking. In a sense, it can sometimes be over developed and lose some of the intaglio characteristics and qualities. For this reason it can be beneficial for photopolymer plates to be worked in combination with non-reprographic techniques. As outlined earlier, this may already begin with the manual manipulation of the positive and can continue with the artist fully utilising the sculptural and intaglio nature of the photopolymer material itself. The film can be drawn into with an etching needle to produce drypoint lines, or it can be scraped to create expressive textures, roughened with sandpaper to produce dark tones or burnished to lighten certain areas. In fact the polymer surface can be treated mechanically just like a metal etching plate.

Small pieces of film can also be collaged together in multiple layers or laminated onto existing intaglio plates and then exposed, developed and printed. All the collagraph and intaglio effects yielded by the mechanical manipulation of the film integrate quite naturally with both the photo-intaglio image projected onto the film as well as with any existing etched or collagraphed marks on the underlying base plate material.

Photopolymer work on wood surfaces has a unique character - combining the aesthetics of woodcut with intaglio features. If photopolymer film is to be laminated onto a textured surface such as a wooden board, a slight modification to

the laminating procedure is required. In order for the film to fully penetrate all grooves of the substrate, the plate should be laminated face up and without the use of a protective acetate sheet; foam blankets are ideal for use in the laminating of thicker kinds of base material. After lamination, expose and develop the plate as usual but remember to take care when printing thicker plates. Of course, surface textures can also be manually applied by brushing on acrylic varnish.

### Direct marks on photopolymer plates

Despite its sophisticated possibilities, the Intaglio type medium can also be used on a low-tech level, for drypoint and other direct techniques. Nothing more is required for this but an etching press, a supply of substrate plates, some film and developer. The simplicity and safety of this method makes it ideally suited to school use and introductory printmaking classes.

### METHOD

Safe and simple printmaking with Intaglio Type as **follows**:

- Prepare metal or plastic plates in the usual manner.
- Laminate photopolymer film onto the plate using the etching press.
- Draw or paint straight onto the Mylar film using waterproof marker pens, black acrylic paint, litho crayons and any similar drawing implements so long as they leave an opaque mark. Pencils etc. are less suitable because they do not leave opaque marks. Thinner lines will result in a line bite while broader areas will act more like open bite. Black areas can be scraped into to produce white marks.
- Now expose the plate in sunlight - usually a couple of minutes is enough - and return the plate to the workshop/classroom in a light proof folder.
- Remove the top Mylar sheet and develop the plate in the soda ash solution. All the drawn marks are now revealed as intaglio grooves.
- Stabilize the plate with a spritz of vinegar then light harden the plate in sun light then print as an intaglio plate.

### Finishing touches

Before pulling your print, there are a number of finishing touches that can be carried out on the plate.

If you notice some cracking of the film along the edge, simply remove it by running a sander along the plate at a 45 degree angle. Avoid the problem altogether by using a plate that is slightly larger than the required size and using registration marks on the positive. After exposure and developing the plate can simply be trimmed back to the actual size using a guillotine. Slightly dampen the edges for a clean cut. Once the edges are dry, apply a bevel.

Slight imperfections on the plate surface such as cracks or small bubbles can be carefully filled in with floor varnish, which can also be used for deliberate editing e.g. to remove certain areas of the image.

All types of etching ink can be used for printing photopolymer plates but when preparing the ink, be careful to maintain a certain stiffness of the mix i.e. the addition of easy wipe and light copperplate oil should be somewhat reduced. The soft AKUA intaglio ink has been specially developed for intaglio type.

During inking up and wiping greater than usual care should be taken to only use soft materials that will not damage the fine details of the plate, especially those made with the aid of a dot screen. Soft pieces of card or rubber should be used to gently squeegee the ink into the grooves and initial wiping should be done with soft pieces of scrim with the starch removed. Some prefer to wipe Intaglio Type plates entirely with newsprint or tissue paper.

Wiping is carried out as normal but avoid using excessive pressure and vigorous motion. Due to shallower grooves and a smoother surface the Intaglio Type plate typically require less wiping than metal plates so be careful not to over wipe. Using tissue rather than scrim will help prevent over wiping. The plate is ready for printing when the image is clearly visible in areas that are to print as white.

Printing preparations are carried out as usual. Note: Prints with unaccountable open areas have often been underexposed (some detail has been dissolved during the developing stage); while faint prints are often the result of an excessive UV exposure (details have been burnt out and hardened).

### **Editioning**

Sometimes artists who are not familiar with the new method believe editioning of photopolymer plates to be problematic - preferring to go back to editioning using traditional metal plates. In fact, it is possible to use photopolymer plates for the production of sizeable editions which not only prove to be consistent in print quality but which actually reduce the effort involved in plate origination.

A well-hardened photopolymer plate can easily yield an edition of about 40 consistent prints. If larger editions are required a system similar to screenprinting can be used where a positive master copy always enables the printer to produce any number of identical screens. So long as exposure times are exactly repeated, any number of identical photopolymer plates can now be made from a positive. The intaglio emulsion is stripped off after the first signs of wear, the plate is relaminated and then re-exposed to the master positive. In this way, editioning is very easy to accomplish.

### **Color printing with photopolymer plates**

The photopolymer system lends itself particularly well to intaglio color printing. In conventional etching methods the rewards of color printing are often arduously attained - the need for several plates takes a great deal of time and effort and the difficulty of matching the colored layers keeps many artists from exploring the full creative potential of color intaglio printmaking.

The photopolymer system can be used to produce colored prints using the a la poupee method but its big advantage lies in the ease with which multiple plates can be generated and the accuracy of registration of the reprographic process. The polymer surface also has no soiling effect on any color etching inks.

In a similar way to screenprinting, it is now possible to create four color separation using reprographic means for the production of a set of intaglio plates which can then be overprinted successfully with process colors to produce a full color intaglio print. This process should be used to take creative advantage of the rich colored ink deposit that only the intaglio medium facilitates rather than to strive simply for photo realistic color reproduction.

All kinds of positive and stencil - drawn or reprographic - can be juxtaposed on the light box with registration marks for each layer and plate to allow for the careful planning of a color intaglio print. For instance, areas of flat printing color, similar to manual aquatint, can simply be generated by painting opaque marks onto acetate and exposing it to a coarse screen using the double exposure process. Translucent layers are achieved with similar ease by making a plate from a positive bearing translucent, tonal marks. Finally, vigorous linear intaglio marks to be incorporated in a colored print are best made from a crisp line positive. By assigning different layers of color to different plates a myriad of mixed colors can be realised on an intaglio print.

It is especially in the field of color printing that a marriage of the non-etch intaglio techniques with conventional etching promises great benefits. In color etching artists often use an etched plate as the main pictorial element of a print, while a second plate is meant to work as a backdrop providing another spatial layer and a color complementing the main plate. Rather than having to generate a second etched intaglio plate the artist can now simply execute this backdrop in the photopolymer method; registration can be made precise and easy by working on the positive (for instance with tracing paper) on top of the original etched plate.

The methods outlined here are merely a taste of what is possible.

There are many more ways to use the photopolymer techniques yet to be explored.

It is down to the individual artist to embrace the new methods and materials and to put their own stamp on the medium.