False Transfer Method:

Non-Printable & Non-Interfering Matrix-to-Matrix Transfers for Multi-Run Registration in Traditional Stone and Plate Lithography

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Abstract

This research was done to discover a method that would allow printers and artists to create perfectly registered multi-run lithographs on the traditional surfaces of stone and plate without having to resort to cumbersome or tedious processes. The current technique most often employed involves tracing a previous drawing onto a new matrix. This method is labor intensive which can interfere with the creative process, and it can be inaccurate depending on the skill and patience of the person doing the tracing. In other lithographic processes, such as photo-lithography, we are able to draw each layer on a transparent polyester sheet which allows for perfect registration with previous layers. My research was to develop a method on the traditional surfaces of stone and plate that would allow the same ease as photo-litho of seeing the previous layer's location of key design elements whilst creating additional layers.

I followed the methods discussed in historical treatises and referred to as a *false transfer*, in which a print is pulled from an initial matrix, dusted with a powdered pigment, and then transferred to a new matrix. This method will transfer the pigment without the ink, it will not print, and it allows the artist to make a new drawing over the transfer without interference. I went further than the historical methods to test and develop a precise step-by-step process that would be reliable and produce consistent results. In particular, I was interested in a technique that would transfer the most subtle and delicate marks and tones, would not interfere with new drawing, and would not be burdensome to the printer or artist.

I tested various substrates, dusting powders and pigments, methods for cleaning the dusted print of excess dust, and methods of producing the transfer through the press. My conclusions are that it is possible to get a clean and robust non-printing transfer of even the most subtle and delicate marks and tones which will not interfere with new drawing; thus, allowing the printer to create new layers with perfect registration.

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Glossary of Terms

Ball-Grained Aluminum Plate- A traditional surface for creating lithographs made from a thin sheet of aluminum in which the surface has been coarsened with ball-bearings so that it mimics the surface of grained lithographic limestone.

Dusting- refers to applying a fine powder to a substance that it will adhere to, while being removed from the areas that it doesn't adhere to. In this case, we are "dusting" printed ink with a powdered pigment.

Image area- refers to the "positive" areas of an image, ie. the ink areas of a printed drawing, or the grease receptive (ink-receptive) areas on the matrix.

Inert- refers to the fact that these transfers do no react with the stone or plate in any way.

Matrix- In printmaking, a matrix is the physical object that contains the design which can be inked and printed many times. In traditional lithography, the matrix is either an aluminum plate or a lithographic limestone.

Non-image area- refers to the "negative" areas of an image, ie. the blank paper on a printed drawing, or the non-grease- receptive "open" areas on the matrix.

Non-interfering- means that the false transfer does not block new drawing material from achieving contact with the surface of the matrix.

Non-printing- refers to an area of the matrix that will not print because it is not receptive to the greasy, oil-based ink. In this case, the false transfers are non-printing because they are not grease-receptive and do not attract ink.

Pigment- a fine powder that carries a hue, typically used for mixing paint, ink, or dye. In this case we are using both a Red and Blue Iron Oxide pigment to dust prints for transfer.

Stone- refers to the traditional matrix used in lithography (limestone) which has been made perfectly flat and level and grained to a smooth surface for drawing and printing.

Substrate- in printmaking, this refers to the surface on which a design is printed, such as paper, fabric, wood, plastic, etc. In this case we are using various paper and plastic substrates to print and transfer from.

Transfer- refers to a design that is printed, or transferred, from one surface to another, usually in ink. In the false transfer method we are transferring the design as a powdered pigment rather than ink.

Introduction

In color lithography, it is necessary to have at ones disposal a method for properly registering each layer as it gets printed on top of previous layers. Many devices and methods have been used over the years, some working better than others, and some working only under certain circumstances. While many techniques exist and have been used successfully, they each have their own difficulties associated with them, which make them more or less desirable depending on the needs of the artist.

For this research, I have been interested in discovering a method that will allow an artist (with relative ease) to register multiple color layers while working directly on top of a facsimile of their original design. Put another way, I endeavored to discover a method of transferring a design *directly* from one matrix to another in a manner that would not print nor interfere with new drawing material. This allows the artist to draw additional layers directly on top of an *inert* transfer of their original design, helping to achieve exact registration between the layers.

My primary focus was on a method that is discussed in historical treatises on lithography and referred to as a *false transfer*. I have adopted this historical title for my research and will henceforth refer to this method similarly as the false transfer method. This technique is discussed by W.D. Richmond in his treatise, from 1878, *The Grammar of Lithography*. It is also covered in detail by Michael Twyman in his massive tome, from 2013, *A History of Chromolithography* (see Appendix B). And variations have been used throughout the history of lithography by printers as a method for producing a non-printable, non-interfering, transfer.

Purpose and Intent of Research

The purpose of this research, as touched upon above, is to give artists and printers ability to perfectly register multi-color runs on stone and plate without having to resort to the tracing methods we currently use. Tracing works much of the time, but it is often cumbersome and tedious which can be disruptive to an artist's creative flow. In addition, tracing is only as accurate as the person doing the tracing, and even the most careful tracing will still be off registered either in areas or by small degrees throughout the drawing. This research is not as concerned with photo-litho processes which already allow artists to make marks on clear polyester sheets (such as Mylar®) which can be laid on top of one another. The methods that I have researched will allow us to give the artist a similar ease of registration on the traditional matrices of stone and plate. The ability to see exactly where the marks from previous layers are and to draw directly on top of them will greatly enhance our abilities to create perfectly registered color lithographs.

In addition to these goals for my research, I have also sought a method that is relatively quick and easy. In doing my research I have discovered many ways throughout the history of lithography that have been utilized to allow for this kind of precise color registration. Many of these techniques require complex processes and/or additional materials and equipment which do not make them attractive alternatives to the tracing method. A goal of my research was to find a technique that aides the printer and artist, would be straightforward, and would not require any additional materials or complex processes that hinder the creative flow. Therefore, I limited my research to techniques and materials that would be readily available in most studios and able to be performed by most printers or artists.

In addition to outlining my research procedures and results, I will also include discussion of the historical methods and techniques I discovered in Appendix B, following the main report.

Overview of the False Transfer Method:

"This method of transferring to stone for the purpose of obtaining a mere faint tracing for a guide in the actual drawing, may appear more complicated than the ordinary tracing and retracing; but where the details are minute and numerous, it will be found that time is saved by its adoption; while the artist, being saved the drudgery of the intermediate operation, will approach his task with better spirit, knowing that a more correct trace is before him than would have been obtained by any other method." (Richmond, 121)

Simply stated, the false transfer method involves pulling a print from one matrix and dusting the print with a pigment (for example red iron oxide), then placing this print face down onto a new matrix and running it through the press. The result is a transfer of the original design on the new matrix as pigment (without transferring any of the ink). The transferred pigment design is *inert* on the stone or plate (i.e. non-grease receptive) thereby producing a non-printable, or "false" transfer.

Beginning with this basic method, my research looked further to discover the exact procedure necessary for achieving a clean transfer that captured the faintest details along with the heaviest marks and tones *while not interfering with new drawing*. I tested various dusting powders and pigments, various papers and substrates, different manners of dusting and cleaning the excess dust from prints, various pressures of the press, various registration methods, and transferring to dry versus damp stones and plates. A full discussion of the testing procedure and results follows the step-by-step summary.

Of particular consideration for me were three primary issues: 1) To create a clean and legible transfer that held the full range of tonal and mark-making values from the faintest, most delicate marks through the heaviest and boldest areas; 2) That this transfer would not interfere with new drawing material but would allow the artist to draw directly on top of a visible facsimile of a previous design; 3) That I could pinpoint the exact steps required to make this technique reliable to any printer or artist who wished to reproduce my results.

Step-by-Step Summary

It is indeed very possible to achieve a matrix-to-matrix transfer in a non-printing and non-interfering manner without too great difficulty. While some practice may be necessary, a printer or artist can master the techniques in short order and without the need for extra equipment or materials to those they might already have on hand or could be acquired with ease.

The Following is a step-by-step guide for creating *False Transfers*. Afterwards is a more detailed summary of the specific test procedures and results leading to these recommendations.

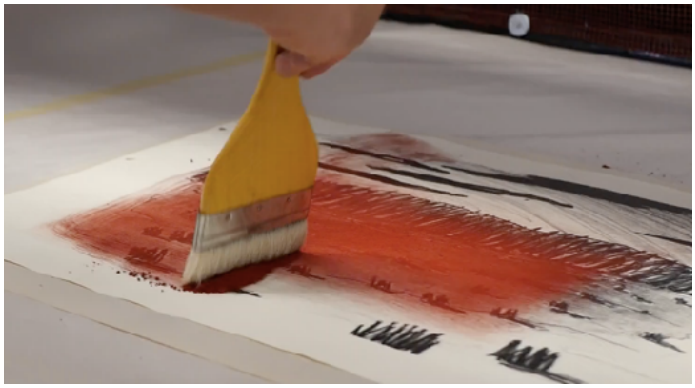
STEP ONE: QUALITY IMPRESSION

The first step is to take a quality impression of the matrix to be transferred. If you do not begin with a quality impression, you cannot expect to create a quality transfer. Pull the print from a *dry* stone or plate, as this will help prevent paper stretch and will facilitate cleaner dusting. Of consideration when choosing a paper or substrate is to choose one that will A) take a good impression; B) not stretch; and C) be easily cleaned of excess pigment after dusting takes place. Textured polyester sheets (such as the matte or frosted versions of Mylar®) work great and satisfy all the criteria. I also had success with PLike® paper, a *plastic-like* paper; and with Mohawk® Superfine, a ubiquitous letterpress and book-making paper. In addition, I found that newsprint works quite satisfactorily, however it is more difficult to clean with an air compressor due to its fragile nature (see below: Removing Excess Pigment*)*.

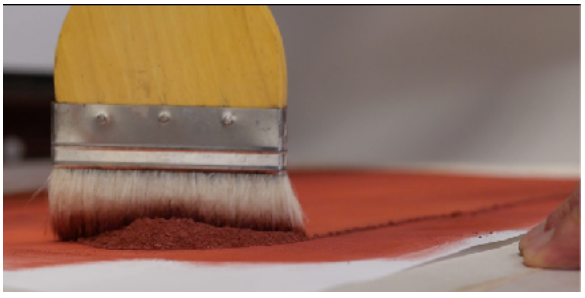
A note about registration: If you are using T and Bar registration, it is advisable to draw these marks on the initial matrix so that they will print and ultimately be transferred to the new matrix. I recommend using a fine tip ink pen with solid tusche. After the transfers have been made, you can scratch these marks into the stones or plates, and then delete the drawn marks so they no longer print. If you are using punch registration, no special steps are required.

STEP TWO: DUSTING PRINT

After taking the impression (using standard shop mix black ink), it is then important to dust the print with pigment within 1-2 hours. In fact, waiting 1 hour is advisable to allow the ink to settle into the substrate slightly while remaining tacky enough on the surface to accept pigment. My preferred dusting mixture is 50/50 red iron oxide and talcum powder mixture. This mixture dusts very smoothly, is easily cleaned off of excess pigment, and creates a robust transfer that can withstand gentle sponging after the transfer takes place. I also found that straight red iron oxide works very well; it is slightly darker once transferred, and does withstand some gentle sponging albeit with greater loss to the lightest areas than the 50/50 mixture.



To dust the print, lay it flat on a surface with a newsprint backing. If you are able to place the print in front of an extraction fan and inside a ventilation hood (homemade will suffice) then do so. Otherwise, do it outside or away from prints or papers that could be damaged by contamination from the pigment. Deposit approx. 1 TBS of pigment for each quarter-sheet size of the print (eg full sheet receives approx. 4 TBS of pigment) onto the center of the print. Using a soft brush (I used a Japanese Hake Brush), gently move this pigment pile into one corner of the print. Then (again, gently) move the pile across the print horizontally until you reach the other side. Bring the pile down slightly and travel back the other direction, overlapping the previous pass slightly (think “mowing the lawn”). Once



you have covered the entire image horizontally, repeat this in the vertical direction. Take care to make sure every area is covered well. You can see if areas need more coverage quite easily. Go slowly and deliberately so as not to create too big of a mess. Try to avoid the clean borders as much as possible. Once you have thoroughly covered the entire image, sweep the pile into the center of the edge closest to you. Lift the opposite edges to create a “half-funnel” shape and deposit the remaining pigment into a container for future use. Note: a thorough and complete dusting is necessary for a clean transfer.

STEP THREE: REMOVING EXCESS PIGMENT

Next is to remove the excess pigment from the print. The cleaner you can make the print the cleaner the transfer will be.

Air Compressor: The best method is to use an air compressor, air hose, and dusting nozzle. (In lieu of an air compressor, a can of electronics duster may work for smaller prints). Keep the nozzle between 1/2” and 1” from the surface of the print at a slight angle facing away from you (toward the ventilation exhaust if available). Sweep the nozzle side to side while also moving from the front edge to the back edge of the print. You can also sweep side to side in narrow columns (about 2”-3” wide) from the front to the back, and then return to the front edge, move over slightly, and repeat with a slight overlap to the previous column. Rotate the print 90 degrees and repeat this process in a methodical fashion from every side of the print. Remember to also blow off the margins of the print.

Sponging: If you do not have access to an air compressor, you may rely on cleaning the print with a damp sponge, however *this may only be achieved on Mylar® or a similar substrate that*

will not absorb any moisture. The technique is a bit more difficult and requires some practice to get the proper finesse. My recommendation is to practice on a small print, and make sure you have taken several impressions so that you have some back-ups.

Begin with two clean sponges that have not been contaminated and devote them to this task as they will get stained from the pigment. Have ready at least one bowl of fresh water and an empty bowl. (Note: You will likely have to refill the fresh water and rinse your sponges several times during the process.) Wring out your sponges so they are just damp. Hold the print firmly in place with one hand by pressing down in the margin. Using the other hand, begin with the sponge over a top corner of the image (on the side that is held in place) and hold it at a slight (5-10 degree) angle so the raised edge is facing toward the direction you will move the sponge. Put slight downward pressure while moving the sponge across the entire width of the image (away from the hand holding the print in place). (Note: you can only sponge in one direction, as stopping and coming back will cause the print to buckle and be damaged.*)* Repeat this motion slightly down the image to cover a new area, while shifting the hand holding the print to always be counter to the direction you are moving the sponge. Continue until you have reached the bottom of the print.

After a complete “pass” through the image, rotate the print 90 degrees and repeat the entire process for another pass. Keep rotating 90 degrees and repeat from each new direction until the non-image area is clean. By the third or fourth pass it should be suitably clean for transferring. You may want to do several separate passes to clean the margins.

[Note: *You may see lots of "smearing" after the initial passes and the sponge will become saturated with pigment. Do not worry, this is normal. The process will take several passes and lots of sponge rinsing. Flip to a fresh side of the sponge and continue for several more swipes. After both sides of the sponge have been used, switch to the second sponge and repeat. Once all your available clean sides of sponges are used, rinse the sponges and continue.*]

STEP FOUR: TRANSFER

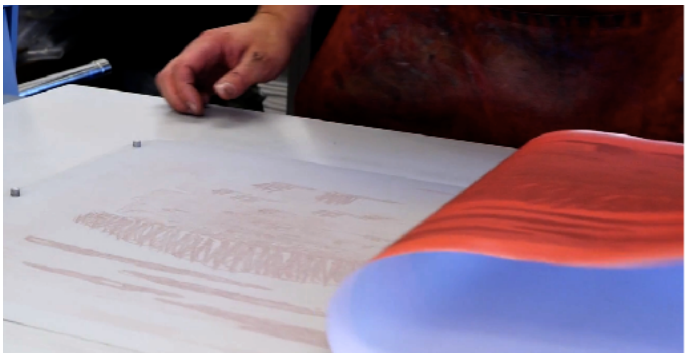
After the dusted print is properly cleaned of excess pigment, it is now ready to be transferred to the new matrix. It is worth mentioning here that at this point it makes no difference what the first matrix was. This process can be used to transfer designs from matrices other than lithographic ones, such as etchings, woodcuts, or screenprints. In this way, using this method, a printer or artist can create lithographic layers that perfectly register with layers from other print media.

The next step is to set up the press in the normal fashion. Place your stone or aluminum plate on the press, set your starts and stops, and select an appropriate tympan and scraper bar. The scraper bar should be wider than the paper and narrower than the stone or plate. Set the pressure to slightly less than normal printing pressure. Too light of pressure will result in a weak transfer; too strong of pressure increases chance of paper stretch.

If you are using T and Bar registration, and the marks have been printed onto the transfer sheet, simply lay the print upside down on the new matrix as close to the center as possible. The T and Bar marks will transfer and you can scratch them in after the transfer is complete. If you are using punch registration, make sure you have punched the plate or added a pin strip to the stone, and make sure to use these as you position the print for transfer.

Once your sheet is in place, cover it with newsprint backing sheet (for my tests I did 4 newsprints for additional padding), cover with tympan, and run it through the press. You may want to carefully lift a corner and check to see if the transfer was strong enough, if it is weak

then increase pressure slightly and run it through again. I do not recommend running it through more than twice as you increase the chance for paper stretch. After this, remove the transfer sheet and reveal the completed transfer.



STEP FIVE: SPONGING OR RINSING AFTER TRANSFER

At this point, you should have a successful transfer. In some cases you may wish to sponge or rinse the stone or plate now to remove excess pigment from the surface. Too much pigment may effect how tusche washes settle and sponging or rinsing may also help to provide the artist a cleaner, less confused surface in which to draw on.

The transfer is resilient and can withstand some gentle sponging with a slightly “damp” sponge (about the level you would use for your “dry” sponge while printing). You may also rinse the stone with water on the graining sink, blot with newsprint, and fan dry. The 50/50 talc mixture will be more robust and resilient to sponging and rinsing, so if you are planning to do this step it is recommended that you use the mixture while dusting.

This step will depend on the needs of the artist and printer. There may be some loss to light areas so only do this step if the artist does not require the lightest marks and tones to be visible to draw on this layer. Experience will tell the printer how much they can expect to lose from sponging or rinsing after the transfer.

STEP SIX: NEW DRAWING

My experience has shown very minimal interference with the addition of new drawing material after these transfers. Even placing the most delicate washes over areas of heavy mark-making had little to no interference. I also tested applying gum-etch stop outs over heavy mark-making and did not get any interference here either. In some instances (if you have not properly and

thoroughly dusted your print) trace amounts of ink may transfer, which will appear as a faint ghost. Even if this does occur, it may be such that it does not cause major issue, depending on how the artist works and what type of layer they are creating. For instance, heavy drawing or flats overtop of these ghost areas will cover them completely, rendering them inconsequential. However, if the artist requires delicate drawing to be done on this layer, subtle changes caused by these ghost areas may cause problems. Use your best judgement depending on the needs of the artist. However, if the dusting was thorough and you followed the steps outlined above carefully, there should be little to no transfer of ink.

Test Procedure and Results Summary

The following is a detailed description of my test procedures, materials used, and the results. Later, in Appendix C, I have included my laboratory notes on the process for even more detail. See above for a step-by-step summary of the process.

Materials and Equipment

MATRICES:

- Lithographic Limestone
- Ball-grained Aluminum Plates

SUBSTRATES:

- Bristol® Paper, 2ply
- Mohawk® Superfine, text weight
- Clear Mylar®, .003in.
- Matte Mylar®, .003in.
- PLike® Paper, 95lb text wight
- 100lb Glossy Paper, aka “Poster Paper”
- Newsprint
- *Brown Packing Paper**

INK:

- Graphic Chemical® Shop Mix Black Ink

DUSTING MATERIALS:

- Red Iron Oxide Powder
- Blue Iron Oxide Powder
- French Chalk (Talcum Powder aka “Talc”)
- Dextrose Powder

DRAWING MATERIALS:

- Korns® #3 and #4 Litho Pencils
- Korns® #2 and #3 Litho Crayon
- Korns® #3 Drawing Tablet
- Korns® Liquid Tusche diluted with water
- Charbonnel® Rubbing Crayon, medium
- Stones® Solid Tusche concentrate
- Korns® Stick Tusche diluted with water

ETCHING MATERIALS:

- Gum Arabic
- Tapem
- 20x plastic shot glasses
- Japanese brushes
- Nitric Acid (for etching stones)
- Phosphoric Acid (for etching plates)
- Rosin
- Talc
- Cheesecloth

MATERIALS AND EQUIPMENT FOR DUSTING:

- Glass custard dish for dusting powders
- Tablespoon for measuring powder and depositing on print
- 3.5” Japanese long handled Hake Brush for dusting print
- Newsprint
- Pressurized air hose
- Electronic air compressor
- Homemade dusting hood (see photos)
- Ventilated exhaust system (see photos)
- New, clean sponges, for sponging print after applying dust INSTEAD of using pressurized air

MISCELLANEOUS MATERIALS AND EQUIPMENT:

- 34x60in. Takach Press® Hand Operated Lithography Press
- 6-hole Punch Registration System from Takach Press®
- Tympan, various sizes
- Scraper Bars, various sizes
- Newsprint, for printing
- New, clean sponges, for sponging stone after transfer to remove excess dust

**Brown Packing Paper was theorized but not tested*

Test Procedure and Results

MAKING A DRAWING

The first step in the testing process was to make a representative drawing on a matrix that would then be printed and transferred to additional matrices. For my first two rounds of testing, I did the drawings on small test stones. These test stones allowed me greater flexibility in the initial trials because I could easily grain off poor transfers as I tested different materials and methods. In later tests, once I was confident in materials and methods that would produce successful transfers, I was able to use aluminum plates. I was also able to do larger tests on the aluminum plates, and this allowed me to test paper stretch (which was of lesser concern in the initial small trials on stone).

I created drawings for these tests with a variety of drawing materials and made an effort to create a full range of marks and tones in order to test the quality of transfer in these different areas. I used litho pencils, crayons, tablets, rubbing crayon, and solid and diluted tusche washes in a variety of mark making, tones, and textures.

Next, I etched the drawings in the normal fashion, rolled up, and etched again before printing.

REGISTRATION

T and Bar: For the trials on stone, I wanted to test T and Bar registration. I drew marks on the stones using a fine tip ink pen with solid tusche so that they would transfer onto the new matrix and assure good registration. After transferring, I scratched these marks into the stones and then deleted the drawn marks.

Punch: For the trials on aluminum plates, I used a 6-hole Punch Registration System from Takach Press®. I punched the initial matrix and all sheets for transferring, along with the plates that received the transfer.

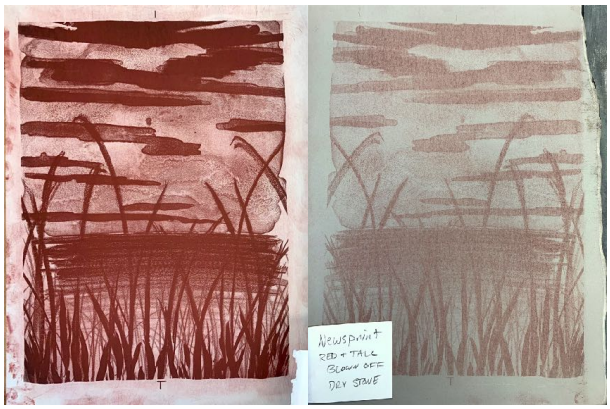
PRINTING THE DRAWING FOR TRANSFER

The next step was to print the test drawings onto different papers and substrates that will later be dusted and printed. I found that printing from a *dry* stone or plate was preferred as it helps guard against paper stretch, and it helps the non-image areas of the print remain dry which facilitates a cleaner dusting. I wanted to find a substrate that would: 1) be readily available to artists and printers; 2) take good impressions; 3) be easily dusted and easily cleaned of excess dust from the non-image areas; and 4) withstand the pressure of going through the press at least twice without stretching (because stretch eliminates the chance of a good transfer).

Overall, my results showed that almost any substrate will work to varying degrees. The substrates I preferred are as follows: Mohawk® Superfine Text Weight, Matte Mylar® .003in., and PLike® Paper 95lb Text Weight.

Summary of the results of the papers tested:

Newsprint: Worked satisfactorily, especially the smoother variety. It takes a good impression, cleans well after dusting, is thin enough to not stretch during printing, and produced clean transfers with lots of subtle detail. The problems I encountered were due to it being so fragile; it was difficult to handle using a pressurized air to blow off the excess dust.



(Image Left: dusted newsprint that was cleaned with pressurized air; Right: transfer on stone)

Clear Mylar®: Worked satisfactorily, but it does not take as good of an impression as the matte variety, which I preferred. It also deposited ink in some of the transfers I tried with it, where as the matte variety did not. I theorize that the slicker surface released the ink rather than holding on to it, which it does better in the matte variety. The pros are that it cleans well after dusting, and does not stretch. Cons are that it doesn't take the best impression and may deposit ink in the transfer.

Matte Mylar®: This worked very well. It takes a good impression. It dusts cleanly and is easy to remove excess. It doesn't stretch and it produces a very strong and clean transfer in the full range of value. Also, if you do not have access to an air compressor and ventilation, it is one of the only substrates that can be cleaned with a damp sponge.

(Image Left: matte Mylar® dusted with red iron oxide and talc and cleaned with pressurized air; Right: transfer on stone)

100lb Glossy Paper, aka "Poster Paper": This is a standard glossy coated paper that is used for printing posters and is commonly known as "Poster Paper". This is readily available and can be sourced by recycling old posters such as movie, music, or other posters you may have available. It can also be purchased from digital printing paper suppliers. It has a slick surface which cleans well after dusting, is thin and hard so it does not stretch, and it transfers well but does not take as rich an impression as other surfaces.

Bristol®: This is a hard and sturdy paper that does not stretch very much, it dusts well and cleans off excess well. It transferred fine, however the downside is that it doesn't take a very rich impression so therefore the transfers lack detail.

PLike®: This paper was suggested to me by Maurice Sanchez (Tamarind Fellow 1966-68, Owner and Printer at *Derrière L'Etoile Studio* in New York City). It is a "plastic like" paper, which means it is slick but it also has some softness and tooth to it. Overall it is a very nice paper that takes a beautiful impression, cleans well, and is thin and hard enough to not stretch. It also produced a very clean and strong transfer in full range of value. I liked this paper a lot and recommend it highly, however the downside is that it may not be readily available in the shop and will require a special order.

(Image above left: PLike dusted with red oxide and talc then cleaned with pressurized air; above right: transfer on stone; bottom left: detail of transfer)

Mohawk® Superfine Text Weight: This is another of my favorite papers. It is thin, smooth, and soft, which make it ideal for this process. It takes a beautiful impression, cleans well after dusting, does not stretch very much, and produced a beautiful transfer in a full range of value. This paper is more readily available then PLike®, but it also may need to be special ordered.

Brown Packaging Paper: I hypothesize that this paper will work great, but I did not get the chance to test it. It has all the factors that would make it great: It is smooth, thin, and will probably take a clean impression like newsprint. It is more durable than newsprint, which will

make it easier to handle. It is also readily available and comes in large rolls. I have plans to do more tests with this paper and will add the results to this report at a later date.

DUSTING THE PRINT

After pulling several prints, and while they were still fresh (within 1-2 hours from printing), I dusted them with various mixtures of pigment powders. I used the procedure of dusting discussed above in the step-by-step summary.

My overall finding is that the best dusting powders are either regular red iron oxide pigment, or a 50/50 mixture of red iron oxide with talcum powder (talc).

Summary of the results of different pigments and additives:

Red Iron Oxide: Red iron oxide worked the best in my trials, with or without the talc additive. It is the most ubiquitous and therefore readily available in any shop, and/or is easily acquired. It shows up well after the transfer, and being red in color, it is easy to distinguish between it and the drawing material. It is a fine powder that dusts well and adheres well to the ink.

Blue Iron Oxide: I tried the blue pigment because I hypothesized it would be slightly darker in value and therefore easier to see the faintest details in the transfer. However my results were not as good as with the red. It did not adhere as readily to the ink and therefore the transfer was inconsistent. In addition, some ink was deposited in the transfer.

[Note: *Ulrich Kuehle (TMP 2001), Master Printer and Co-Director at Keystone Editions in Berlin, has had success using a Milori Blue pigment due to it being an extremely fine and concentrated pigment. I did not test this pigment, but Ulrich informed me that it is difficult to work with because it is so fine, and it has a tendency to "get everywhere" and contaminate the shop very easily (see Appendix B).*]

Dextrose powder: Initially I hypothesized that using an additive that was easily soluble in water, such as a powdered sugar, would facilitate a transfer onto a damp surface. I ultimately abandoned this approach as I found that transferring to a damp surface was less desirable for several reasons: 1) the transfer tended to be uneven as it was difficult to maintain an even moisture level across the surface through printing; 2) transferring to a damp surface increases the chance of paper stretch and/or warping; and 3) sponging an aluminum plate creates the additional threat of oxidation. Furthermore, my tests with dextrose, while they did produce acceptable transfers, showed no noticeable improvement over the transfer without dextrose.

Talcum Powder (talc): I had good results with a 50/50 mixture of talc and red iron oxide. The transfer produced was often more robust and captured more detail then using red iron oxide alone. The white color of the talc produced a slightly lighter "pinkish" hue to the transfer. The talc mixture made the spreading of the pigment easier by creating a smoother dust that brushed well over the ink. It may help in drying the ink slightly as it adheres which will help to prevent the transfer of ink. It also made cleaning the print after dusting easier and more efficient, for both blowing off with pressurized air or using a damp sponge (see below: Removing Excess Pigment). When sponging *after* the transfer (see below: Sponging After Transfer), the transfers using the talc mixture withstood the sponging better while still leaving a suitable transfer even in the faintest areas.

REMOVING EXCESS PIGMENT

After dusting the print, I next wanted to remove the excess pigment from the non-image areas to ensure a clean transfer. I discovered that the cleaner I made the print at this stage, the better the transfer.

Summary of methods for removing excess pigment:

Snapping: This is the method discussed in the old treatises on lithography (see Appendix B). They simply suggest holding the print by one corner and giving it several vigorous "snaps" to shake off the excess pigment. I did not have good results with this method. I found the pigment adheres to the non-image areas even on the slickest substrates such as Mylar®, likely due to a combination of static and friction. While a transfer is achieved and may be suitable for certain artists, it produced a very "dirty" transfer with a lot of tone in the non-image areas (see photo). Sponging does help to clean the non-image areas, but it also removes some of the image areas of the transfer. If this method is to be used I would recommend using the 50/50 talc mixture and sponging the stone or plate after the transfer. I would also only recommend this for use with artists that will be very bold in application on this layer, and are not planning to create any delicate drawing.

(Image Left: Plike® dusted with red iron oxide and cleaned with snapping; Right: transfer on stone)

Pressurized Air: I used the air compressor and extraction fan ventilation system available in the Tamarind Workshop and a homemade dusting hood (see photos). I had the air compressor set to 100psi and used a standard duster gun nozzle. I used the procedure discussed above in the step-by-step summary to blow off the excess pigment.

My results show that this was the best method for getting the prints clean for transfer. I had some difficulty with the softer papers,

and found that the slicker papers, such as Mylar®, PLike®, and Mohawk®, were the easiest to clean. Newsprint was difficult to clean this way due to its fragile nature. [Note: *There was always* some *tone left in non-image areas (see photo), sometimes a considerable amount. However, I found that as long as I had done my best to be thorough while using the air, this tone did not transfer.*]

(Above Right: Ventilation set-up; Left: dusted print that was cleaned with pressurized air)

Damp Sponge: I tested this method in case a shop does not have access to an air compressor. I found it is possible to attain good results using a damp sponge. I would only recommend this method with the Mylar® or a similar substrate, as it will damage the other papers and destroy the print before a transfer is made. I made sure to use brand new sponges that became reserved for this purpose only, as they get stained from the red pigment, and I did not want to deposit any gum that may be present in used sponges. I used the procedure discussed above in the step-by-step summary. It took me a couple practice attempts to figure out the right procedure. I did have some ink transfer after using this method, and I discovered that it is easy to remove too much pigment from the image areas if one is not careful. Therefore, it is very important to have done a thorough dusting. The use of the talc mixture creates a stronger bond with the ink and produced better results with the sponge then straight red iron oxide.

TRANSFERRING

The next step was to transfer the pigment from the dusted print onto a new matrix. In these tests I was transferring from either stone to stone, or plate to plate; however, once the print is pulled and dusted it makes no difference what matrix it started from, and one could even dust a print pulled from another printmaking form such as an etching or even a screenprint.

I made sure the press was set up with the new matrix in place, selected a scraper bar as I would for printing (i.e.,

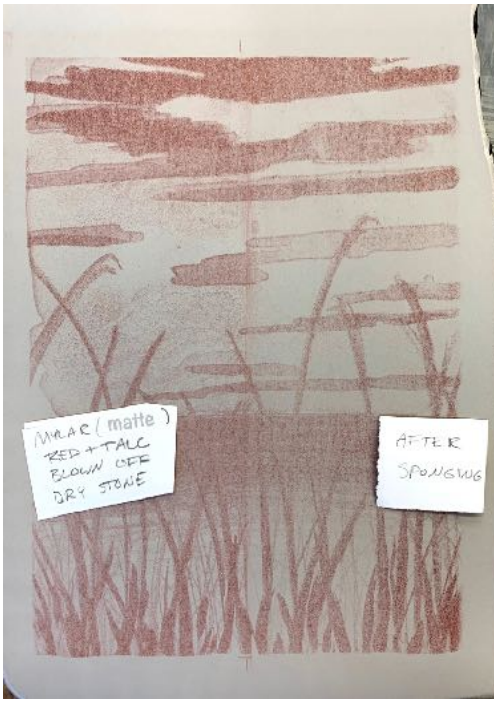
wider than the paper but narrower then the margins of the stone or plate), and set the starts and stops on the press and the pressure. For setting pressure I used the “kiss plus 1/4 turn” method for “full printing pressure” on a Takach hand-driven press, and then backed off slightly (about 2-3 minutes). If using another type of press, set it for slightly less than full printing pressure. The reason for backing off slightly is that I wanted to use the least amount of pressure possible to avoid stretch, and I gave myself room to add more pressure if needed.

I experimented with both damp and dry matrices for the transfer. My results show that a dry matrix is better. While I was able to achieve very good transfers on damp stones, it also is more difficult to control. Many transfers came out mottled and uneven due to the difficulty in maintaining even moisture through printing. In addition, dampening the stone creates more opportunity for paper stretch and warping which creates a transfer that will not register with the other matrices.

In some cases, I ran the print through a second time at stronger pressure because I carefully lifted a corner and saw that the transfer was weak. I increased pressure by 2-3 minutes (up to full printing pressure) and ran it through again, which produced a stronger transfer.

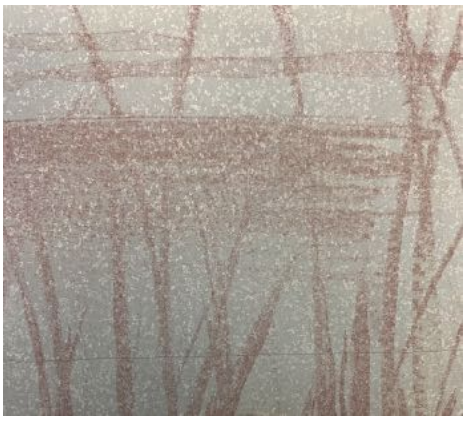
SPONGING & RINSING AFTER TRANSFER

I tested sponging and rinsing after the transfer on stones only. I was hesitant to try it on aluminum plates due to the oxidation that would occur; however if done carefully with a fan to dry it off quickly, I believe it can work on plates as well.



The reason to test sponging and rinsing is because I theorized it may help to remove excess pigment that could interfere with new drawing material. It is worth noting that in my trials I had very little (if any) interference from the pigment with

drawing material, on both un-sponged and sponged plates. However, it is possible that too much pigment floating around may interfere, especially with how tusche washes settle on the stone. Also, sponging or rinsing may help in order to provide the artist a cleaner, less confused surface in which to draw on.



I used the methods described in the step-by-step summary. In addition, I also removed transfers from stones by gentle graining with 220 grit at the graining sink. This was easy to do and found that it took two passes at 220 to completely remove the transfer.

I discovered that these transfers are surprisingly resilient to sponging and rinsing. However, there is always some loss to the quality of the transfer, especially in the light areas. I found that the transfers done with the 50/50 talc mixture were more resilient to sponging and rinsing than the straight red iron oxide transfers were, and allowed more of the faint areas to remain visible.

(Image above right: transfer with no sponging on left and sponging on the right; Image below left: detail of a sponged transfer)

CREATING NEW DRAWING ON TOP OF TRANSFER

After testing these transfer methods, I next tested how these transfers would effect new drawing material. Overall, my results were very positive. I did not experience very much interference at all. In some instances, where minor interference may have been visible, the subtle effects I observed would only cause issue for very delicate layers and most artists would not even notice nor be concerned in the slightest. Ink transfer was a greater issue than interference. Ink would occasionally remain as a slight “ghost” on the new matrix and was visible in printing. However, even this would only cause problems in some cases, and depending on the artist it may not be an issue at all.

Crayon Marks over Heavy Marks/Solids: I saw no interference from placing crayon marks directly on top of a transferred mark that was heavy or solid.

Crayon Tone over Heavy Marks/Solids: In most areas where I placed tone over transferred marks, there was no interference. In one instance, a poor transfer from sponged Mylar® that transferred some ink, produced a slight ghost image underneath the tone. This was a result of the excessive cleaning of the pigment from the sponge. In other areas, crayon tone was not interfered with by the transfer.

(Image: detail of tusche washes and crayon over red iron oxide transfer marks showing no interference)

Tusche over Heavy Marks/Solids:

I purposely placed delicate water tusche washes over transferred areas of heavy crayon mark making, and the results were very little to no interference. I could not distinguish any interference in most cases, and in one test I again experienced some ink had transferred (from clear Mylar®, see above) and there were very faint ghost marks visible in the tusche.

Gum Stop-out over Heavy Marks/Solids: I also tested placing a gum stop-out over heavy marks to see if they interfered with the gum. There was no interference whatsoever.

Crayon over Light Marks/Tones: No interference.

Tusche over Light Marks/Tones: No interference.

Conclusion

The results of my tests have shown that it is possible (with relative ease) to make non-printing matrix-to-matrix transfers that will aid the printer and artist in creating additional color layers with precise registration. I was able to repeatedly attain consistent results when I followed a few simple steps and used the methods and materials outlined above. Some practice may be required for full confidence by a printer or artist in using these methods, however I believe that by following these guidelines one may expect to get the same results as I have attained. The key (as in most lithographic processes) is to be methodical and thorough in your technique. As always, a certain amount of finesse is gained through repeat attempts as one learns from the mistakes in previous attempts. The primary concerns, as outlined above, are to create a quality impression, to dust the impression thoroughly, to clean off excess as much as possible, and to transfer using sufficient pressure to produce a clean and accurate transfer. If these steps are followed with precision and accuracy, then the results will be a clean transfer of the most subtle detail through the boldest mark-making in a manner that will not print and will not impede the addition of new lithographic drawing material. The final result is that the lithographer will have the ability to create new layers which register perfectly to as many other layers as is required for a given project.

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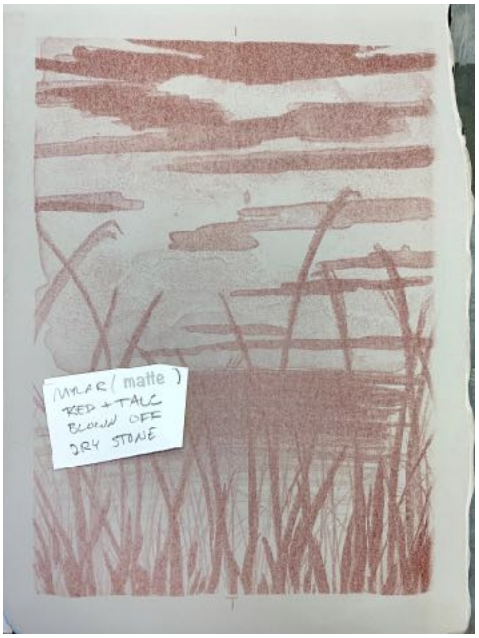
Appendix A

Images

matte Mylar® dusted with red iron oxide only and blown off with air compressor

transfer on stone from above left image

matte Mylar® dusted with red iron oxide AND talc and blown off with air compressor

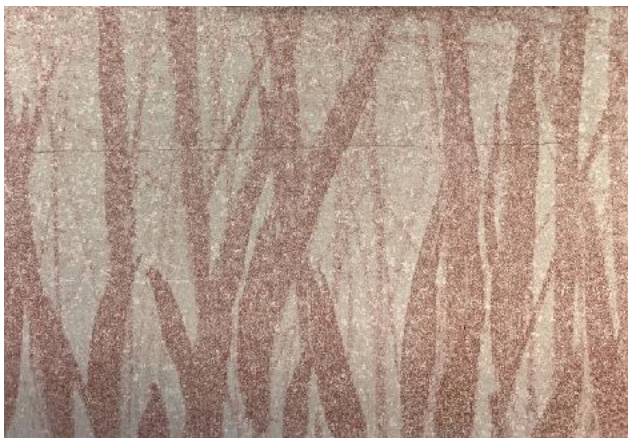


transfer on stone from above left image

PLike® paper dusted with red iron oxide only and blown off with air compressor

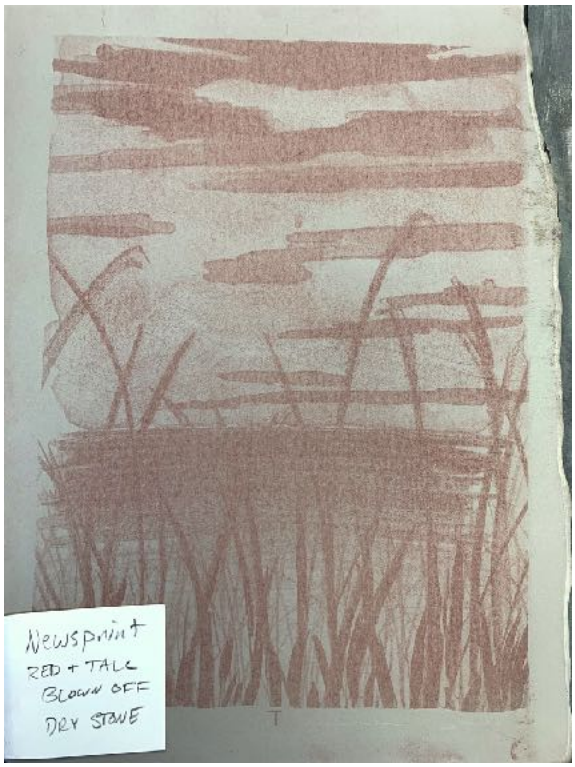
Transfer on stone from above left image

PLike® paper dusted with red iron oxide AND talc and blown off with air compressor

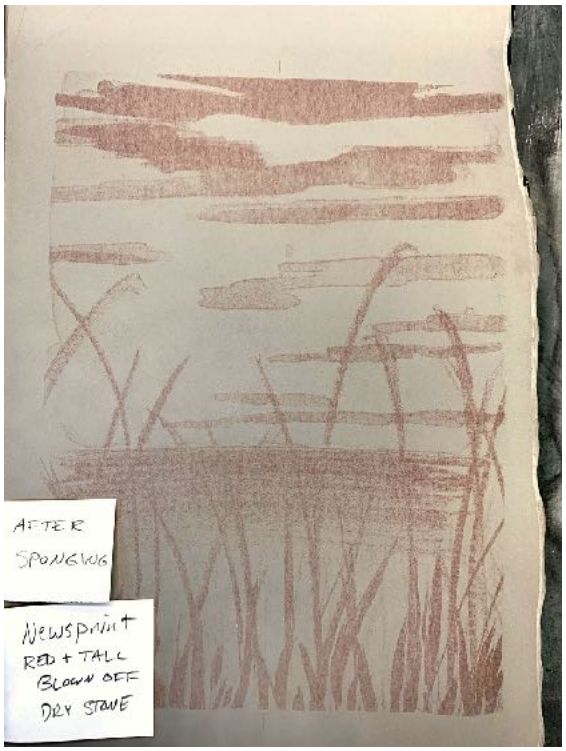


Detail of transfer on stone from above left image

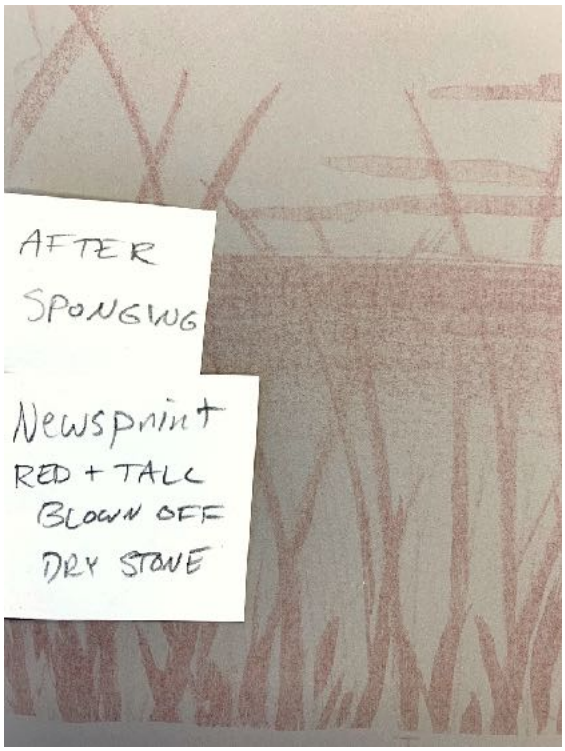
Newsprint dusted with red iron oxide AND talc and blown off with air compressor



Transfer on stone from above left image



Transfer from above images AFTER sponging



DETAIL of image from above left

Mohawk® Superfine dusted with red iron oxide AND talc and blown off with air compressor

Transfer on stone from above left image

Transfer on stone from Mohawk® Superfine dusted with red iron oxide only

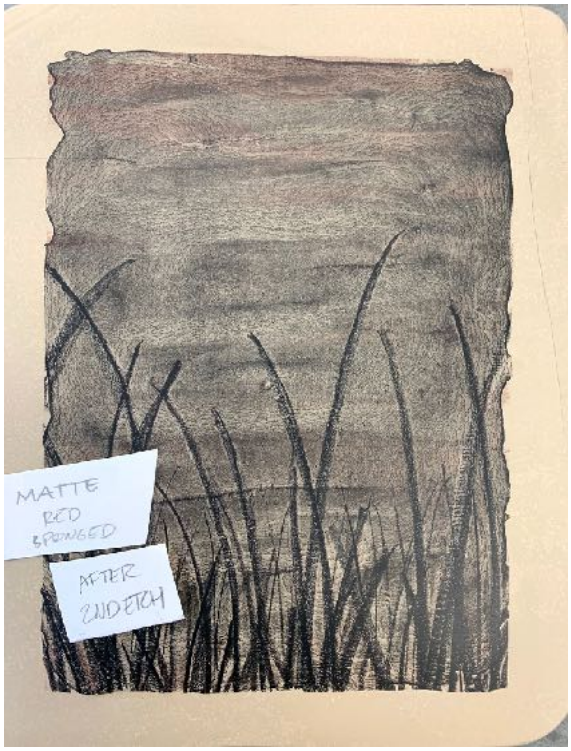
Detail of transfer on stone from above left image

Detail of transfer from matte Mylar® dusted with red iron oxide AND talc and blown off with air compressor

Detail of same transfer as above left image after it had been sponged to show loss of light marks

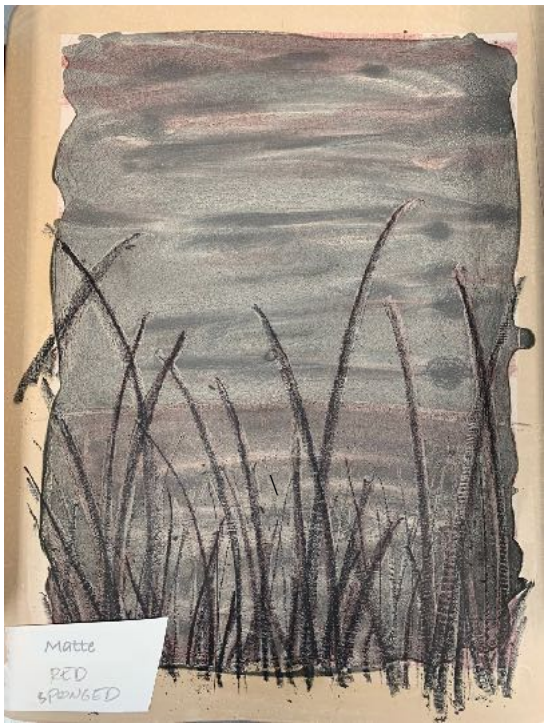
Transfer onto plate from a *sponged* matte Mylar®, showing some ink transfer

Above left plate after tonal areas were applied. Visible in the mountains are the ghost marks from the inky transfer (note: the mark in the upper left was caused by a piece of tape under the plate during transferring which created an indentation that picked up ink when rubbed with a crayon)



Drawing on stone over top transfer (after etch and roll up)

Detail showing tusche wash unaffected by pigment transfer after roll-up



Drawing on stone over top transfer (before etch and roll up)

Detail showing dried tusche wash drawing unaffected by the pigment transfer

Appendix B

Historical Techniques

W.D. Richmond, *The Grammar of Lithography, A Practical Guide for the Artist and Printer (*London: Wyman & Sons, 1878), 120-22.

On Pg. 120 Richmond discusses a technique for transferring a chalk or ink tracing from a photograph or painting onto a stone:

> *"Sheets of transparent gelatine may be laid over photographs or paintings, and the tracing made by scratching the outline with a sharp steel point. The scratches thus made are to be filled with powdered red chalk, dusted on with cotton wool: the scratches being rough, retain the powder, which is rejected by the smooth surface of the gelatine. If the gelatine, thus prepared, be laid upon a stone and passed through the press, a red chalk tracing will be left upon the stone. The scratches may also be filled in with lithographic writing-ink, dissolved in spirits of turpentine, wiping it clean off the smooth part of the gelatine. This being laid upon the stone as before, and subjected to pressure, will leave an ink outline that may be rolled up as an ordinary transfer. Or the gelatine may be treated, after filling-in with ink, as an ordinary transfer, by damping it between sheets, applying it to a warm stone, passing through the press, and finally washing it off with hot water. It requires a very slight etching before rolling-up."*

Richmond continues on page 121 to discuss a method of transferring a faint ghost image:

> *"Having obtained a slightly grey impression on* printing*-paper, we put it, face downwards, on the grained stone and past it through the press, which then gave a faint*

set-off. The small quantity of grease thus added to the stone was removed by the etching after the drawing was finished, and was found to give no trouble whatever…"

And He goes on to discuss the method to produce a red chalk transfer, which was the basis for my research:

"…As, However, some might prefer a red chalk outline, we may state that it can easily be obtained as follows. Instead of taking a weak impression on printing-paper, take a full one on highly-sized and glazed writing-paper; place upon it a quantity of finely-powdered red chalk; holding the paper by opposite edges, raise and lower each hand alternately, until the chalk has been brought into contact with every part of the outline; pour off the superfluous chalk, and finish by giving it a smart jerk or two to remove the remainder from all parts except the lines. The prepared print may then be laid upon the stone and passed through the press, as before described. This method is very applicable for drawings in ink.

This method of transferring to stone for the purpose of obtaining a mere faint tracing for a guide in the actual drawing, may appear more complicated than the ordinary tracing and retracing; but where the details are minute and numerous, it will be found that time is saved by its adoption; while the artist, being saved the drudgery of the intermediate operation, will approach his task with better spirit, knowing that a more correct trace is before him than would have been obtained by any other method."

Notice that in Richmond's description of the red-chalk dusting method, he mentions that it is must applicable for drawings in ink. He also refers to the image as "the outline". It is my belief that he is describing a bold outline drawing of the key-image (not a subtle tonal drawing), and therefore is able to achieve suitable results with the simple dusting method described. My research was aimed at transferring subtle tones and delicate mark-making, which required the more thorough method that my research details.

Michael Twyman, *A History of Chromolithography: Printed Colour for All* (London: The British Library, 2013), 559-68.

In his chapter titled "The Key-Line Drawing" on pages 559-568, Twyman discusses several techniques that were used by artists and printers to transfer a drawing to a stone or multiple stones for color registration.

On page 560, He first describes the basic tracing method that we still use today:

> "*We do not know how the very earliest chromolithographers allocated an image to different stones, but some kind of tracing would almost certainly have been used from the outset. Lithographers would surely have been influenced by practices in other processes, some of which were centuries old. One such method, which had long been used to transfer a monochrome image to a single copper plate or wood block, involved dusting a piece of thin paper with red chalk, placing it between a drawing and the printing surface, and then working over its main lines with a point of some kind.*"

He next describes the technique used by early lithographic printers, Charles Hullmandel and Godefroy Engelmann, to create color tint layers that registered with a key image. Some exquisite examples of this technique can be seen in the early color tinted lithographs by Thomas Shotter Boys, printed by Hullmandel, titled, *Picturesque architecture in Paris, Ghent, Antwerp, Rouen, &c* (1839):

> *"[Hullmandel's and Engelmann's] approach was to take a proof of a drawing made on stone for the black printing and transfer this to a fresh stone. Once the drawing was transferred, its whole image was covered with a transparent greasy substance, leaving the transferred drawing visible beneath it. All that remained to be done was for the artist to remove the greasy covering where highlights and halftone effects were wanted, using the initial black drawing as a guide; the printer would then desensitize those parts*

> *of the stone that had been laid bare. Alternatively, where highlights were needed in parts of an image in which registration was not critical (for example, cloudy skies) they could be reserved on the tint stone with gum Arabic before the greasy coating was applied. A tracing was unnecessary when the first of these methods was used, and only a most elementary version would have been needed, or perhaps none at all, when reserving light areas in skies."*

Twyman goes on to discuss a further development of the tracing method that produces a key-line drawing on a stone, which is then transferred to each individual stone needed for the color layers. These transfers of key-line drawings became known as "set-offs", and became a popular method in the early nineteenth century. Twyman takes an excerpt from Matthew Digby Wyatt's book, *The Industrial Arts of the Nineteenth Century (*London: Day & Son, 1851-53), to describe the process. Quoting Wyatt:

> "*…the original drawing requires, in the first instance, to be carefully traced. It is then retraced, or transferred to the stone, by interposing between the surface of the latter and the drawing a sheet of thin paper, prepared on the side next the stone with red chalk. The lithographer then draws upon the stone with a greasy chalk or ink, as the case may be, the whole of the outline of the subject, and as much of the shading as he may think necessary. On the conclusion of this drawing in black and white, the stone is sent to the printer, who, after chemically preparing it for the operation, takes off carefully as many impressions as there are colors required to perfect the polychromy of the original drawing. These impressions on thin paper are laid, whilst yet moist, upon a corresponding number of supplementary or colour stones, and passed through the lithographic press. By this means, the outline of the first or key-stone is printed off upon each of the remaining stones of the series, and the artist is provided with an outline upon the latter, identical with that which existed upon the key-stone."*

Later in the chapter, on page 563, Twyman discuss in detail the origin of the title of my research, "False Transfers". He again quotes another author, this time it is George Ashdown Audsley, from his book *The art of chromolithography popularly explained* (London: Sampson Low, Marston, Searle, & Rivington, 1883), and is taken from an account headed "Preparation of the false transfers". He tells us that the technique described is based largely on those used by Alfred Lemercier, a pre-eminent lithographer from Paris in the later nineteenth century.

Discussing the meaning of the term, "False Transfer", Twyman states:

> *"...It implies, on the one hand, that a key-line drawing includes marks that were not to appear in the final print and, on the other, that the image transferred is fugitive and does not print... "* and then quoting Audsley, *"[such transfers are] designated false, because they are of such a nature as not to affect the surface of the stones in any permanent way."*

Twyman then summarizes Audsley's account of the "False Transfer" as follow:

> "*A key-line drawing was traced on stone and as many impressions taken from it (usually in a thick varnish tinted with brown pigment) as there were colors in the intended chromolithograph. While still fresh, these impressions were dusted with finely ground brown or red powder, placed face down onto a set of stones, and pulled through the press in turn. In theory, only the powder on the impression was transferred to the stones, leaving non-greasy marks that would not print. Audsley insisted that great care had to be taken to ensure that the paper did not stretch and that each transfer was therefore of equal size. This was absolutely crucial, and to avoid stretch when transferring large images he mentioned that it was usual for the key-line impressions to be pasted onto thin zinc sheets."*

Another interesting technique used by Lemercier in Paris was described on page 566. It involved printing onto a stretched sheet of rubber, which was then reduced to its normal size and transferred to stone. This technique was "very commonly followed by the French lithographers when objects of great delicacy and minuteness of detail have to be represented", allowing large images to be reduced in scale. Alternately, it could have been used to enlarge images as well.

Carolyn M. Muskat (TMP 1988), Owner and Master Printer at Muskat Studios, email message to author, January 20, 2020.

Many of the printers that I corresponded with remembered a technique that used screenprinting emulsion and a photographic process. Carolyn Muskat (TMP 1988) gave me the most clear and thorough description of the process as she had learned it from Ernesto de Soto (TMP 1966) while working with him at the de Soto Workshop, located in San Francisco from 1967-1993 .

The following is an excerpt from an email exchange I had with Carolyn:

> ***"****When I worked at the DeSoto Workshop (Lo, these many years ago!) – we used the iron oxide paper for general images. For either more complex or extremely detailed images, we used a different method – I'll call it the de Soto method:*
>
> *This method uses negatives, so we would make a line drawing of the image and have that made into a to scale film negative. Clean aluminum plate of oxidation (hot water method will work). Apply ONE thin coat of Hi Concentration Negative coating (Diazo compound) – this was the Diazo photo emulsion – 1 bag of 'powder' to 1 pint of liquid. Wipe smooth and DRY. --- No direct light —— Prepare Vacuum Table (back then we were using carbon arc lamps – super cool, but scary!). Expose for a shorter exposure than needed for regular photo shoot (you'll need to experiment to see how much less – you want to still see the lines when rinsed). Remove plate from exposure unit. Rinse plate with water. NOTE: you are NOT applying developer! Counteretch plate briefly with aluminum plate counteretch. Rinse and Dry. Plate is ready for drawing.*

What you have on the plate then is an exact line drawing from the film in a pale dirty yellow (color of the Diazo) – it will be EXACT.

Artist then can draw onto the plate with whatever materials they choose. When ready, do your first etch. Then remove image and put it in shellac (we used lacquer back then) and roll up the image. The Diazo lines should not take ink (remember, you did not apply developer).

To remove the photo registration lines:
Talc thoroughly. Wearing gloves, use a Webril wipe and massage the Neutralizer solution over the image area for approx. 3 minutes. Add Dissolving Etch directly to the plate over the image and let sit for a few minutes. Massage with the webril wipe again. Lines will start to disappear. When lines are gone, rinse with water and dry the plate. Apply second round of etches and you are ready to go ——

*****NEUTRALIZER SOLUTION**** WEAR GLOVES*
¾ oz. Potassium Permanganate
1 qt. Distilled Water
*****DISSOLVING ETCH SOLUTION**** WEAR GLOVES*
2/3 oz. Oxalic Acid (powdered)
1 qt. tap water"

Jeffrey Sippel (TMP 1979), Tamarind Education Director 1988-98, email message to author, December 30, 2019.

The following process is a modern version of the process described by Richmond (above) in which a drawing is traced into a sheet of gelatine and inscribed with a steel point. In Richmond's version, these lines are then filled with lithographic ink, and wiped clean like an intaglio plate before being transferred onto the stone. Jeffrey Sippel described his experience with a modern

take on that technique using Mylar®. He also suggested the possibility of using water-based Akua® inks, which may work as a non-greasy alternative:

> *"...I like your topic for research and should be exciting. While directing a collaborative studio in Germany during 1981 a German printmaker shared with me a technique of scribing a composition into mylar, inking like etching and transferring to stones or plates for registration. I was able to take advantage of this technique when collaborating in 1993 with artist Deborah Remington. Since I was familiar with collaborations with Deborah (at Tamarind and Arizona State while in Graduate school) I was aware of how time consuming this was and how critical the tracing was for very tight registration. Also, Deborah was in NY and I was working at Ocean Works in Newport Beach, CA. I sent Deborah a sheet of mylar and asked her to carefully incise her composition and return to me. I then inked the mylar like etching and transferred to 5 aluminum plates. This also served the purpose Tamarind adheres to of the tracing or registration should be made "by the hand of the artist". I gummed out the negative areas, applied lacquer base and rolled each plate up in black ink thereby making all the plates ready for proofing before she arrived. I am quite pleased with the result (see attached). Now with Akua inks it might be possible to use a water-based ink for this practice..."*

Ulrich Kuehle (TMP 2002), Master Printer and Co-Director at Keystone Editions, email message to author, January 3, 2020.

Ulrich Kuehle described to me his experience with the technique that I have described in my report and am referring to as a *False Transfer*. As mentioned in the above report, Ulrich suggested the use of a Milori Blue pigment. Here is an excerpt from our email exchange in which he describes the process:

> *"In the past I have been using a method that I learned before going to Tamarind.*

This one is very similar to what you have been describing. We used to print the processed key drawing on to a very smooth paper. Something like a coated offset paper. Not too thin. We used the reverse side of posters. But most imported was, that they are very smooth and hard so that it does not stretch. The ink we used was just regular roll up black. Inked not too heavy, so that the image doesn't fill in when printing on the non-absorbing surface of the coated paper.

Then I would dust the print with milori blue pigment. The advantage of that powder is that it is very fine and will have a high contrast, when transferred to the stone. The downside of it is also that it is so fine. One has to work very carefully with it so it doesn't spread through the whole workshop. It seems to travel to places you don't want it to even more than toner powder.

So after printing, I would wait a few minutes for the moisture from the stone to evaporate from the paper. Then put a little powder in the center of the paper, move that around by tilting the paper carefully. Then put excess powder back in a jar. (This is ideal in front of an extraction fan. After that I would go outside and shake the print a little to displace all excess powder.)

Then over to the next stone. That one is dry. You would have to experiment with the pressure, but it would be around newsprint pressure, so that the paper doesn't stretch. It helps to have the T and bar on the first stone drawn instead of scratched so that they transfer as well. We would scratch and erase these from the key drawing later.

After transfer, there is sometimes too much pigment on the stone. In that case I would take the stone to the graining sink and rinse it of with cold water. Maybe even use cotton to agitate the pigment. Blot off with newsprint and dry. Ready to draw.

Occasionally when a very light tusche wash is placed over a dark line from the first drawing, the difference between an area with pigment and one with out can be seen in the tusche wash, but most of the time this gets covered by the key drawing anyway."

Appendix C

Laboratory Test Notes

Jan 2, 2020

10am-12pm

Chose a small test stone, approx 10inx12in, in order to perform a sample drawing for transfer tests.
Created a mylar with guidelines for paper dimensions (7.5in x 11in) and image dimensions (6.5inx10in).
Transfered guidelines to test stone using iron oxide transfer paper. Incised T and Bar marks.
Created a drawing using Korn's #3 litho pencil, and Korn's #3 drawing tablet. Also did some minor scraping with x-acto blade. Drawing has a variety of tones, marks, textures, dark and light lines. Effort was made to have a full range of drawing marks in order to see the quality of transfer in different mark making.

1pm-3pm

Etched the stone: dusted with rosin and talc. Etched with 50/50 for several minutes, refreshing the 50/50 2 times. Cooled down with Gum and buffed in. Waited 1 hr.
Washed out and rolled up in shop mix. Drawing came up in ink almost identical to crayon drawing. Some light values rolled up lighter than the drawing but nothing was lost completely.
Prepared paper: Cut Bristol paper to size (11x8in), "Text Weight" paper, and clear mylar. Mylar was left slightly larger than stone to accommodate T and Bar marks.

Jan 3, 2020

10am-12pm

Prepared additional sheets to print using the back of an old poster. Suggestion from Ulrich at Keystone because it is a coated and glossy paper, it will be easy to remove excess dust and will not stretch.
Printed impressions from stone, 2 each, on: Bristol, Text Wht, Mylar, and Poster paper. Printed well, but stone was slightly wedged (1mm) and needed to be shimmed with paper.

1pm-3pm

First test transfers! NOTE: at least 2 hrs had elapsed since the prints were pulled before being dusted.

Test 1) Bristol paper, dusted with red iron oxide, transferred to DRY stone.

I used 1 TBS of red iron oxide spread around the print using a 3in wide soft brush. The excess was blown off using a pressurized air hose and ventilation. The print was still pretty "dirty" but I was unable to get anymore off, so I went ahead a tried it out.
Next, I laid it on a dry stone and placed 2 newsprints overtop of it. Using newsprint pressure (or slightly higher, ie "heavy newsprint pressure") I ran it once through the press.
The results were OK. I got a fairly decent transfer of the medium to heavy marks, although the moderate to very light lines and marks dropped out. Surprisingly, even though the print still had lots of iron oxide "tone" in the non image areas, this did not transfer, and I got a clean transfer.

Test 2) Bristol Paper, dusted with red iron oxide, transferred to DAMP stone.

The same method of dusting the print was used as in test 1)
Using fresh sponges (so that no trace GUM would be present) I dampened the stone as if I were inking it, a little on the "dryer" side but evenly damp.
Next, I transferred the dusted print in the same manner as test 1) Using 2 newsprints and using "heavy newsprint pressure".
The results were better than test 1) It was a clean transfer of the moderate, medium, and heavy marks, the light and very light marks did not transfer well.

Test 3) Text Weight paper, dusted with red iron oxide, transferred to DAMP stone.

I decided to do all further tests on damp stones because the first two indicated that damp stones produced better results.
I dusted the print in the same manner as test 1) and 2)
I used the same manner to dampen the stone and transfer as in test 2)

The results were inconclusive. I got an unclean transfer that was spotty in areas, with some areas transferring clean and others very faint. However, trace amounts did seem evident in even the light marks. Overall, I believe that the dusting was done in an uneven manner and the results are therefore inconclusive.

Test 4) Poster paper, dusted with red iron oxide, transferred to DAMP stone

Dusted in the same manner as previous tests. Noticeably cleaner "non image areas" after the pressurized air, due to the "glossy" nature of the paper.
Stone dampening and transfer same as previous tests.
Inconclusive. Poor transfer. Again some areas transferred clean in an uneven "spotty" way. Even though the non image areas were cleaner, more of this tone transferred to the stone. Again, I would say results were inconclusive and it may have been an uneven dusting that led to the poor results.

Test 5) Poster paper, dusted with red iron oxide AND DEXTROSE MIX, transferred to DAMP stone

Dusted in the same manner as previous tests. However, I used a 50/50 mix of red iron oxide and "Fruit Preservative Powder" which is composed of Dextrose and citric acid.
Stone dampening and transfer same as previous tests.
Very faint transfer. Even darkest marks were very faint. However still the light marks were visible somewhat as a very faint "stain". Much more even transfer overall than the previous one.

Test 6) Mylar, dusted with red iron oxide, transferred to DAMP stone

Dusted in the same manner as previous tests using red iron oxide only. Again, the print was much "cleaner" after the pressurized air than Test's 1) thru 4) due to the slick surface of the Mylar.
Stone dampening and transfer same as previous tests. EXCEPT, I used 4 newsprints instead of 2.
Clean and strong transfer. Light to Heavy marks all transferred. Light tones dropped out, but Medium and Heavy tones transferred. HOWEVER, there seemed to be some ink transferred as well. Not sure if this would interfere as it is surely a faint ghost of ink.

Test 7) Mylar, dusted with red iron oxide AND DEXTROSE MIX, transferred to DAMP stone

Dusted in the same manner as test 5).
Stone dampening and transfer same as Test 6) , with 4 newsprints.
Clean transfer, but uneven. Darkest marks were faint, but strangely the light marks were transferred well and clean. Some ink may have transferred as some "grey" was visible in dark areas. Surprisingly, the moderate to light marks transferred the best, with the medium to dark marks transferring weak with some ink. Not sure if this ink would interfere or not as it may be sitting on top of red iron oxide and is in any case a very faint "ghost".

Test 8) Text Weight paper, dusted with red iron oxide AND DEXTROSE MIX, transferred to DAMP stone

Dusted in the same manner as tests 5) and 7). Extra care was taken to dust very thoroughly, pushing the pile around in all directions to make sure it was a thorough and even dusting. Extra care taken to blow off as much excess as possible, getting the nozzle very close to the paper.
Stone dampening and transfer same as Test 6) and 7), with 4 newsprints, and "heavy newsprint pressure".
Best transfer yet. Very clean, very even. Light through Dark lines all transferred well and clean. The very lightest lines did not transfer. Overall, this was the best transfer.

CONCLUSIONS

Very promising results. Interesting that the best transfers were from the bristol and text weight papers, which are the softest papers. The glossy poster paper was the worst transfer. The mylar transferred OK but it also transferred some ink, which may be because the ink was unable to absorb into the mylar. The softer papers had considerable more iron oxide "tone" in the non image areas, but this didn't seem to matter much as not much of it transferred. I think the softer paper, while not getting as clean, was also holding onto the iron oxide and not allowing it to transfer from these non-image areas.

Also, it is unclear if the dextrose mix had much affect. The text weight paper that was dusted with the dextrose mix was the best transfer and considerably better than the text weight using plain iron oxide. However, I also learned as I went on to be more thorough with the dusting, and so the final text weight was also dusted considerably more than the first one, which may be why it was a better transfer. Will have to test more with dextrose mix to be conclusive.

Overall, it seems that all the papers I tested showed some promise, while the bristol and the text weight did perform the best today. I would like to get an even cleaner transfer of even the very light marks, but I did achieve a suitable transfer.

I think what I learned was that a thorough dusting is the most important. They also seemed to transfer better under the cushion of 4 newsprints. I believe the "heavy newsprint pressure" is sufficient, and would not want to use any higher pressure as it would increase paper stretch, and possible transfer more ink.
Not yet understood is what if anything the dextrose mixture does. Also, not sure if we are getting any paper stretch, particularly from the bristol and text weight.
Next I will need to draw on top of the 2 transfers I saved and see if there is any interference with new drawing.

Jan 19, 2020

2pm-3pm

Made a drawing on top of iron oxide transfer (Test 8) from Jan 3.
Drawing consisted of water tusche wash made from Korn's liquid tusche diluted with water; #4 and #3 Korn's litho pencil; and #3 Korn's litho tablet.
I intentionally used the liquid tusche over the heaviest areas of iron oxide in order to provide the best test of a delicate drawing material over top a heavy iron oxide transfer. Hypothesis is that if the iron oxide is going to interfere with the drawing material, it will be best observed through a delicate tusche wash.
I also was intentionally making drawn marks using the pencil directly over other marks from the original drawing. In other words, efforts were made to test as best as possible any interference from the iron oxide on new drawing material. In addition, this will test the registration accuracy if these are ever printed together*.

*note: this test may not end up being printed as I was not accurate enough with transferring the registration marks from the initial drawing. However, these tests are demonstrating other important elements such as the transfer itself and whether or not the new drawing material is effected by the iron oxide.

I also tested removing some of the iron oxide with a damp sponge before making the drawing. I used a damp sponge on the right side of the image in order to remove some of the iron oxide. This had the affect of lightening the iron oxide in this area, and causing some of the lightest lines to disappear. We will see if this helps the drawing material in this area, and if it's worth losing the lightest lines.
I left the drawing to penetrate into the stone overnight.

Jan 20, 2020

10am-12pm

Etched the drawing from yesterday.
Used Gum +4 drops Nitric on the crayon areas. Gum +8 drops Nitric on the tusche wash. Buffed in Gum.
Waited 1 hr before wash-out and roll-up.
Washed out with lithotine and buffed in asphaltum. Rolled up using a stiff ink made from 3/4 Shop-mix and 1/4 Senefelder.
Image rolled up well. No obvious interference from the iron oxide was evident. The wash behaved strangely when I was applying it, so the texture to the wash is a little odd but it is not immediately apparent that this has anything to do with the iron oxide rather than just the strange nature of washes to begin with.
The area that was rinsed with a damp sponge shows no apparent difference from the other areas of the stone.
There may be a slight residual trace of the bold "zig zag" lines in the "tree line" from the first drawing that is visible in the second drawing. I can't remember if I also made these marks in the second drawing to be honest.
Marks that were made with pencil directly on top of previous iron oxide marks show no evidence of interference.
Overall, I'm pleased with the results. It shows only minor interference from the iron oxide with the new drawing, if any at all. Would not pose any serious detriment to an artist's second layer from what I can tell from this test.

Jan 25, 2020

10am-12pm

Made a new drawing on stone.
Drew T and Bar marks with solid tusche and a fine-point pen nib
Drew with #2 and #3 Korn's crayon, Medium Charbonnel rubbing crayon, solid tusche, Korn's Stick Tusche (light to dark), and #4 Korn's pencil

Feb 1, 2020

10am-1pm

Printed new stone. Dried stone before printing (to avoid paper stretch) and printed as *rich impression* on one sheet each of: PLike® paper, Bristol, and Text Weight. Best impressions were on PLike® and Text Weight, Bristol did not take a clean impression. Loose gummed the stone.

TEST 9) Dusted the Text weight with red iron oxide. DID NOT BLOW OFF

Transferred onto a DRY stone using 4 newsprints and a little under printing pressure. The transfer was pretty POOR considering all the excess powder on the paper due to not blowing off the dusted print.

TEST 10) Dusted the Bristol with red iron oxide. BLOWN OFF w/ PRESSURIZED AIR

Transferred onto a DRY stone using 4 newsprints and a little under printing pressure. The transfer was GOOD. The light crayon marks transferred, but the light tusche wash did not.
I sponged the stone and photographed the results. I lost the light crayon marks, and the entire transfer lightened considerable. But the darker areas were still very visible. Conclusion that sponging off the excess powder will work if the artist only needs the darkest marks to be visible and doesn't mind losing the light areas.

TEST 11) Dusted the PLike® paper with red iron oxide. BLOWN OFF w/ PRESS. AIR

Transferred onto a DRY stone using 4 newsprints and a little under printing pressure. The transfer was VERY GOOD. The light crayon and most of the lighter tusche wash transferred. The darkest areas were very heavy with iron oxide, and would probably interfere with new drawing.
I sponged the stone and photographed. Similar to last one, everything was lightened considerably with loss to the light areas. The strongest areas remained and were clearly visible.

Next, I washed off the gum from the stone and printed 3 more *rich impressions* from a dry stone as before. One each on: Text Weight, Bristol, and PLike®. Again, Bristol took the worst impression. Then I loose gummed the stone again and put it away.

TEST 12) Dusted the Text Weight with red iron oxide + TALC. Blown off w/ press. air
Transferred onto DRY stone using 4 newsprints and a little under printing pressure. The transfer was FAIR. The entire transfer was lighter in tone, perhaps due to the talc in the mixture which "greyed" out the red iron oxide mixture. The lighter crayon lines were still visible, the light tusche was not visible. This may be a good mixture to lessen the interference with new drawing materials in heavy areas, however would not be suitable for light drawings especially light tusche areas.
Again sponged and photographed. Same as previous, lightened overall, loss to light areas.

TEST 13) Dusted the Bristol with red iron oxide + TALC. Blown off w/ press. air
Transferred onto DRY stone as previously. The transfer was GOOD. Again, the overall transfer was lighter in tone, but the detail was good and the light crayon lines transferred, but the light tusche did not.
Again sponged and photographed. Same as previous, lightened overall, loss to light areas. However, it is notable this time around that the overall loss is less in both of these so far using talc in the mixture. It may help to stabilize the transfer on the stone to withstand sponging, which I believe will be helpful to prevent interference with new drawing.

TEST 14) Dusted the PLike® with red iron oxide + TALC. Blown off w/ press. air
Transferred onto DRY stone as previously. The transfer was GOOD. As in previous tests, it was lighter in tone overall. It did not transfer the light tusche wash as well as the previous PLike® paper using plain red iron oxide. This was still the best of the talc mixture transfers.
Same as previous tests with the sponging.

2pm-4pm

I washed off the loose gum and printed 4 more *rich impressions* from a dry stone on the PLike® paper only.

TEST 15) Dusted the PLike® with red iron oxide. DID NOT BLOW OFF
Transferred onto DRY stone as previously. The transfer was OK, but had lots of excess iron oxide due to not being blown off. (SEE PHOTO). It is almost certain there is too much iron oxide and this will interfere with new drawing.
Sponging removed much more oxide then in previous tests and left the faintest ghost only in the darkest areas, and would not be very useful.

TEST 16) Dusted the PLike® with BLUE iron oxide. BLOWN OFF w/ PRESS. AIR
Transferred onto DRY stone as previously. The transfer was FAIR, and did not transfer the light tusche. It appeared to transfer some of the black ink. The print did not dust as well or as completely as with red iron oxide. Sponging revealed that indeed lots of ink transferred. I had to grain the stone twice at 180 to get it out.

TEST 17) Dusted the PLike® with RED iron oxide. Blown off w/ press. air.
This was a repeat of TEST 11). The results were the same. A VERY GOOD transfer was achieved, although it may even be too heavy in the darkest areas which may interfere with new drawing.
I only sponged half of the image this time, to leave room for testing the addition of new drawing materials on both a non-sponged and sponged area. Again, most of the light areas were lost in the sponging, and the dark areas were considerable lightened.

TEST 18) Dusted the PLike® with RED iron oxide. Blown off w/ press air.

This was identical to the last test, except I transferred onto a DAMP stone. This was the only test today using a damp stone. I had the control of TEST 11) and TEST 17) to compare this test too. The results were a POOR transfer. The damp stone definitely seemed to interfere with the transfer. The transfer was splotchy and inconsistent.
Sponging half as in previous test resulted in almost complete loss of transfer on this side.

CONCLUSIONS

Today I learned several things. First of all, the PLike® paper works very well. It takes a very rich impression, it cleans up nice, and it transfers the red iron oxide very well without depositing any ink. It's a little slicker than the other papers I used today, but still has some softness and "tooth" to it compared to the poster paper or mylar in the previous tests. The problem with PLike® paper is that it is not a common paper and would have to be special ordered.

Second, I would say the text weight paper (mohawk?) is better than the Bristol. The advantage to Bristol is that it is more common, the draw back is that it does not take a rich impression very easily and was more prone to lose the lightest tones,

especially from the washes. This prevents the possibility of getting a full transfer. The text weight is nice because it is thin and smooth and takes a rich impression. It was only slight less effective than the PLike® paper. It is more common and less of a special order paper than PLike®, and would be on hand in any shop doing letterpress.

Next I learned that the blue iron oxide does not work very well. I will try it again, especially to see if I can get it to dust more fully. However, it did not transfer very well and it also let ink be deposited on the transfer. It also did not add very much in terms of being a more visible hue than the red.

So far, I am unable to get a very good transfer if I do not blow off the excess iron oxide with pressurized air. Flicking and snapping the paper does not clear away enough. The cleaner the print is, the better and cleaner the transfer is. I need to do further tests with perhaps sponging the print after it's dusted.

I think I can rule out damp stones for transferring. My transfers today were all pretty good on dry stones, some of them being among the best transfers I've gotten. The one damp stone test from today was the worst transfer of the day, and the dampness was definitely the cause of the uneven and mottled transfer.

The talc mixture needs further testing. It did seem to lighten the transfer a little, but it also withstood the sponging better. It also may be a benefit to have less transfer in the darkest areas. My hypothesis is that the talc will actually benefit the transfer to make it less interference with the new drawing.

Sponging the stone after the transfer definitely lightens the transfer considerably, although less so with the talc mixture. My advice to printers would be that if the artist can work with a transfer where only the darkest areas are visible, then sponging would be beneficial. It will make interference with new drawing much less, especially in the dark areas. However, if the lightest tones and marks are necessary for the artist to add new color layers, then sponging should be avoided, or, if possible only sponge away the darkest areas of transfer.

My overall recommendation would be something like this: If available, purchase some PLike® paper. If you have some text weight (Mohawk?) paper available use that. If not, then whatever the slickest paper you can find. Poster paper or mylar should work (I will test those more using dry stones). Even slick newsprint will probably work (I have not tested this). Print a rich impression and dry the stone before printing to prevent paper stretch. Dust the print with red iron oxide as soon as possible, within a couple hours. Dust thoroughly and heavily, with a soft brush and moving a pile of iron oxide around the print in all directions. Use a pressurized air nozzle (mine was set at around 90-100psi) and carefully blow off the print. Again, go from all directions and get as close as you can to remove as much excess as possible. The cleaner you get the print at this stage, the cleaner the transfer will be. Next, lay the dusted print upside down on a dry stone and run it through the press using extra newsprints (i used 4) for extra padding, and set the pressure to normal printing pressure or slightly less (kiss + quarter turn on takach presses.) You should have a pretty clean transfer. To make a slightly lighter transfer, mix 50% talc into your red iron oxide. This will avoid a heavy build up of iron oxide in the dark areas which will interfere with new drawing. In addition, if the artist does not require the lightest tones or drawn marks to be visible, then sponging the stone with a clean damp sponge will remove excess iron oxide.

Feb 8, 2020

10am-2pm

TEST 19) Dusted newsprint with RED, blown off, transferred to dry stone
The newsprint was more difficult to blow off due to the light weight of the paper and the iron oxide wanting to stick to the non-image areas of paper. The transfer was OK, but it left a lot of tone on the stone due to the excess iron oxide on the paper
Sponging cleaned it up considerably but left only the darkest lines.

TEST 20) Dusted newsprint with RED + TALC, blown off, transferred to dry stone
The talc mixture made dusting and cleaning much easier. The dust spread easier around the print, and it was also easier to blow off and make clean. The transfer was really good.
Sponging left a clean transfer, with even some of the light lines still visible. The talc seems to make the transfer withstand the sponging better.

TEST 21) Dusted Matte Mylar with RED, blown off, transferred to dry stone
Very strong transfer. Lightest tusche washes and lines were very clear. The mylar dusted nicely and was easy to blow off.
Sponging left a good amount of the transfer. Even the light lines were still visible.

TEST 22) Dusted Matte Mylar with RED + TALC, blown off, transferred to dry stone
Dusting was again made easier and smoother with the addition of talc. The blowing off was also much more efficient and clean. The transfer was beautiful, very clean and held all the detail of even the faintest details.
I sponged half of the drawing which removed the lightest washes but the light lies were still visible. It still left a clean and easy to read transfer.

Afterwards I put a tusche wash and some drawn lines over these transfers. I made efforts to register with the first drawing and to put marks and washes over areas that might be prone to resist the new drawing material. I made efforts to make each of these drawings identical so the only variables is one stone had RED only, the other had RED + TALC. Also, the RED stone had been sponged completely, the RED + TALC stone was only sponged on one half.

Feb 9, 2020

10am-2pm

I etched each of the new stones around 10am. Note, I used a VERY weak etch in both cases. Just straight gum seemed to lighten and even wash away the tusche quite shockingly. I etched the crayon lines with 4drops nitric/1 oz gum, and I etched the tusche washes with 2 drops nitric/1 oz gum.

I came back around 1pm to roll up the stones. I started with stiffer ink mixed with a little senefelder in the Shop Mix. After a couple passes I switched to straight Shop Mix. They each rolled up beautifully, but also very quickly (due to the weak etch). The washes came back just as they were drawn. INTERESTING NOTE: The only strange result is that the area of the RED + TALC stone that had been sponged, rolled up considerably LIGHTER than the non sponged area. It wasn't streaky, or anything else that shows signs of any interference in the wash, just that it rolled up noticeably lighter and it seemed to definitely correspond with the sponging. I would not have been surprised if it had rolled up darker than the non-sponged side, but the fact that it was lighter was surprising and I'm not sure why this happened.

I gave each stone a 2nd etch which was considerably stronger than the 1st etch. I gave them 8 drops nitric/1oz gum over the whole stone. The one area I etched hotter was the "darker" side of the stone that was sponged down the middle. I gave this darker side a stronger etch of 12drops nitric/1oz gum.

Sometime later

I pulled some prints of these stones to have examples to include in my report of what I was seeing.

March 6, 2020

I made a drawing on an aluminum plate. The plate was 18x24in and was punched for registration. I laid out the drawing to be printed on 22x15in paper and allowed 2in to be torn off the punch side, and then 1in border around the image. Image size was therefore 13x18in.
I made the drawing using Korn's stick and Trilobite Paste tusche mixture, and Korn's #3 crayon, and Korn's #3 tablet
I etched the plate, rolled it up, and etched it again.

March 9, 2020

Using 3 additional aluminum plates, I tested various papers and dusting techniques.

First test was printed on MOHAWK TXT WEIGHT, dusted with RED IRON OXIDE, and BLOWN OFF using pressurized air. The transfer was GOOD: light lines and tones were all transferred well.

Second test was printed on PLike®, dusted with RED IRON OXIDE AND TALC, and BLOWN OFF using pressurized air. The transfer was GOOD: same as previous, slightly darker
Third test was printed on MATTE MYLAR, dusted with RED IRON OXIDE AND TALC, and was SPONGED OFF WITH DAMP SPONGE. I wanted to test sponging instead of blowing off the oxide for studios that did not have pressurized air. Sponging was a little tricky and I had to practice. You need to swipe in one direction and then the other direction, rinsing out the sponge often, and repeat each direction several times. I believe too much was removed. The transfer was OK, however some ink was also transferred and I think the sponging removed too much oxide and revealed some ink.

Next I drew on the the three plates. The First test I used gum arabic stop outs directly over the heaviest areas of transferred marks. I wanted to test to see if the oxide would stop the etch in any way. I also used crayon and tried to carefully register to the initial drawing, after etching and rolling up I did not see any interference from the oxide on the gum etch or on the crayon.

The second test I used tusche was over the heaviest areas of transfer to see if the oxide would interfere with the tusche. I also used great care to register perfectly with the first drawing. After etching and rolling up I did not see any intererence from the oxide with the tusche.

The third test I simply laid a light tone using the drawing tablet over the entire plate. I wanted to see very clearly if the transfer affected the tone at all. After etching and rolling up it appeared that the transfer marks were visible as a positive "stain" on the plate, but were not blocking or interfering with the crayon. I printed this plate and saw that indeed some of the original image had transferred and was printing. This leads me to believe, as I suspected after the transfer, that the sponging of the mylar removed too much oxide and that some ink transferred. This create a positive mark making from the original drawing. This, however, was extremely faint, and would not necessarily impact the artists work, and only because I used such a delicate tone over this plate was it so visible. It did nonetheless transfer some of the original drawing.