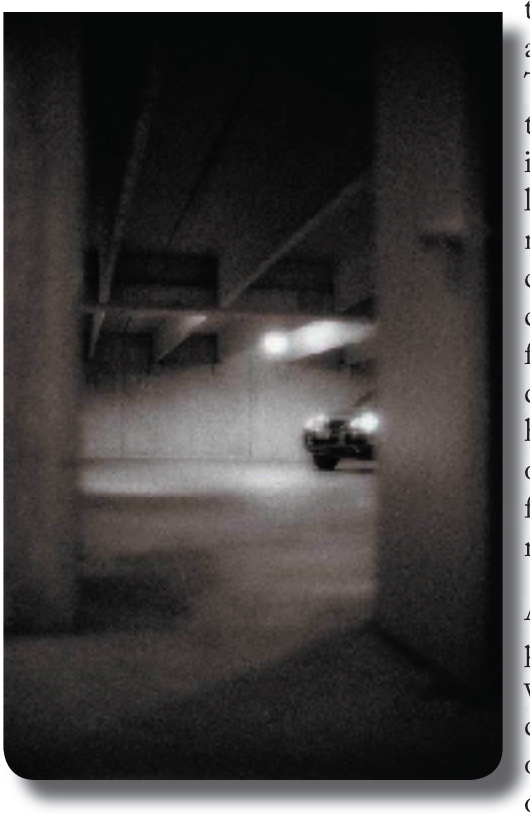
Introduction

This manual is designed to serve as an outline of the techniques presented in a two or three day course covering the basics of the Pt/Pd printing process. It is not intended to be a comprehensive overview of the current practice of this process, but rather is a personal and perhaps idiosyncratic description of the procedures that I currently use in my own work. The methods I will show you are certainly not the only ones that will work, and there are other practitioners who work using different techniques yet also achieve fine results.

I encourage you to use this guide a starting point to eventually develop your own unique method of working. Read the books listed in the appendix for different views on how to make the process work. Try the different techniques that the authors of these books and resources illustrate. Make many prints. Each print you make will teach you a little more. Eventually, you will get to the point where you have integrated a whole host of information and knowledge into your own personal workflow. When you reach that point, you really can begin to use the process to produce your own art.



Your first prints from this workshop will be an object of amazement and pride to you. You will have stepped beyond a boundary that few cross. Pt/Pd printing allows you to get rid of the middleman. No longer will you have to depend on Kodak or Ilford to supply you with the materials you need to make truly beautiful photographs. With the advent of digital printing and the gradual disappearance of traditional silver-gelatin papers, Pt/Pd printing allows you to truly get back to the future and use a 19th century technique to produce stunning 21st century photographs. At the same time, the newer digital techniques offer an amazing tool to allow you to easily make the negatives needed to make your prints.

I will finish this introduction with one suggestion. If this process is one that grabs your imagination and seems that it will be something you want to pursue further, be sure and save your first prints from this workshop. Pull them out after printing for a year or two and compare them to your current work. You will be amazed at how your technique will improve with just simple practice.

Overview of the process

The basics of the process are simple. You will coat a piece of watercolor paper with a solution that combines a light sensitive compound called ferric oxalate with a solution of platinum or palladium metal. After drying the solution and allowing the metal and ferric oxalate to soak into the fibers of the paper, you will put a negative in firm contact with the paper and expose it to ultraviolet light. This ultraviolet (UV) light converts the ferric oxalate to ferrous oxalate in proportion to the amount of UV light it receives. Clear areas of the negative (i.e. the shadow areas) receive the most light and therefore convert the most ferric oxalate to ferrous oxalate. Conversely, the dense areas of the negative (i.e. the highlights) receive the least amount of light and thus very little of the ferric oxalate is converted to ferrous oxalate.

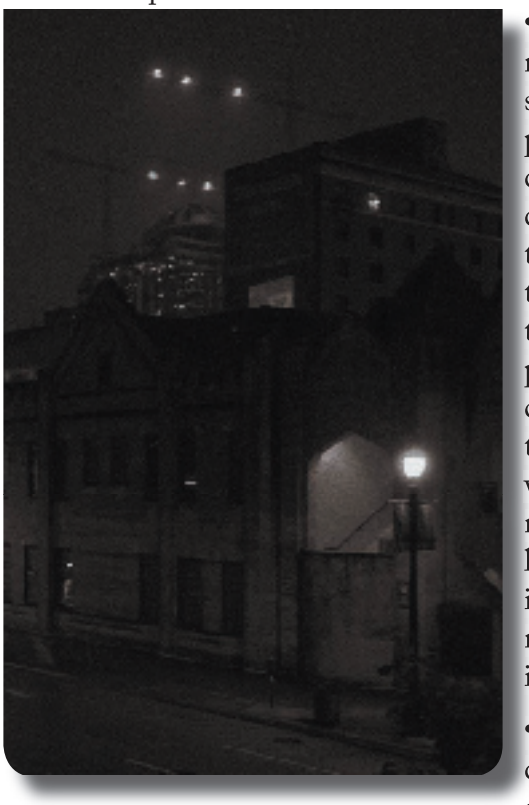
After exposure, you will put the print into a tray and pour a developer over the print. The print develops instantly as the ferrous oxalate is converted back to ferric oxalate by the chemical action of the developer. But the magic occurs with this chemical reaction, because the conversion of ferrous oxalate back to ferric oxalate also causes the platinum or palladium metal to precipitate out of solution and create a deposit of pure metallic particles in the fibers of the paper. These particles form the platinum or palladium image. At this point, all that remains is for you to put the print through a series of clearing baths that will remove the unused ferric oxalate from the fibers of the paper. Once the clearing is accomplished, all that remains is the original watercolor paper with an image formed by inert, extremely archival platinum or palladium particles. Since platinum and palladium are noble metals, they are extremely non-reactive to subsequent exposure to

©2005 - all rights reserved

other chemical compounds. This feature is what makes the platinum palladium print one of the more archival photographic processes.

Very brief history of the process

Platinum/palladium printing is an old photographic process that represented the sine qua non of photographic printing practice at the end of the 19th Century and the beginning of the 20th century. It was considered to be one of the most elegant of the sharper photo-realistic processes available at the time, the others being albumen, carbon and photogravure. Platinum paper was commercially manufactured until World War I, when platinum became a strategic metal used as a component in the trigger mechanisms of artillery shells and other munitions. Another factor in its relatively sudden disappearance as a printing process was the fact that the only sources of platinum bearing ore were found in mines in Russia. The chaos surrounding the communist revolution in November 1917 made the cost of platinum metal skyrocket. The subsequent loss of readily available platinum papers gave an added push to the just-then-emerging silver gelatin 'gaslight' papers, which could be exposed with the artificial lights that were simultaneously beginning to change the character of the night in the major cities of the world.



The modern platinum revival in the United States began in the early 1970s when George Tice, Irving Penn and a few others researched the historical literature on the platinum process and began to print their work again in platinum (and palladium). Since that revival, the skill and quality of the platinum work has advanced to a point that equals and (in my opinion) occasionally surpasses the work from a hundred years ago.

Strengths and weaknesses of the process

Like anything in life, the Pt/Pd process has advantages and drawbacks. Many of the traditional disadvantages have recently become moot with the advent of digital photographic techniques.

Strengths

• **Long scale process.** The Pt/Pd print is naturally a very low contrast printing process, and thus requires a correspondingly high contrast negative. When using large in-camera negatives, this means that platinum printers can photograph with impunity very high contrast scenes without getting blocked up shadows and blown-out highlights. Making photographs directly into the sun or photographing dark interiors with exterior views through windows is much less of a technical dilemma than with the traditional silver gelatin process, where photographers wrestle with many techniques designed to reduce the contrast of the negative in order to achieve a 'printable' result.

• **Beautiful process** – This is admittedly a biased opinion from someone who clearly loves the process, but the platinum palladium print has a velvety richness, depth and tactility to the print that is unmatched in the world of traditional silver gelatin. I believe this is because in the silver gelatin print, the image forming metal is contained in a thin layer of gelatin that is on top of the paper base, while in the platinum print, the metal particles are absorbed deeply into the paper fibers, resulting in a depth and richness that is more akin to a watercolor painting or ink-on-paper lithograph.

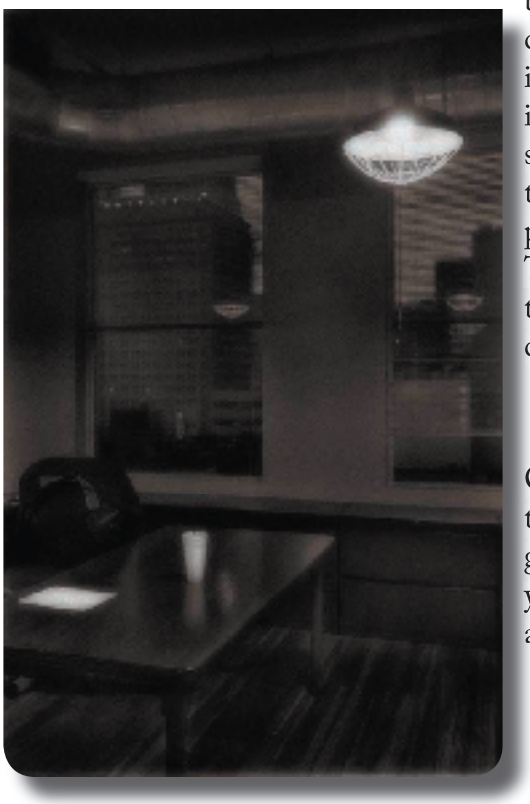
• **Archival process** – This has been discussed earlier, but the properly processed Pt/Pd print consists only of paper with particles of chemically inert metal embedded in the paper fibers. This is in contrast to the silver gelatin print, which contains a chemically reactive layer of silver embedded in a layer of gelatin. The gelatin is an organic compound that can be attacked by mold, while the silver particles can react quite easily with atmospheric pollutants.

Weaknesses

• **Low Dmax or 'Not as black as silver'.** The Pt/Pd print generally has a so-called 'maximum black' that has a measured reflection density of about 1.4 LogD as compared to 1.9-2.1 for a glossy silver gelatin print. This criticism is accurate, but in my opinion not par-

©2005 - all rights reserved

ticularly relevant. To my eye, a good platinum print is black enough to convince me. A platinum print simply does not look like a silver gelatin print. If it did, we would be idiots for going to the trouble to make one. The reason for this is not because of the process itself, but rather is due to the fact that we make our prints on watercolor paper with a surface texture as opposed to the glossy surface of a silver gelatin print. Indeed, the maximum black of a Pt/Pd print is about the same as a silver gelatin print made on a non-reflective matte surface paper. Some practitioners have made platinum prints on 'fixed out' glossy photo paper and achieved maximum black values that exceed those of silver gelatin. But if your photographic goal is to achieve the blackest of blacks, then platinum is probably not for you.



• **Shadow contrast is low.** This is also a somewhat accurate criticism. The Pt/Pd process generally has what is called a pronounced 'shoulder' on the print response curve. What this means is that in general, the shadow contrast will be lower than a comparable silver gelatin print. I will be teaching a few techniques to minimize this effect during the printing process. With the advent of digital negative making techniques, we can now easily negate this effect by creating a negative that has higher shadow contrast *built into the negative* that will compensate for the lower shadow contrast that can occur while printing.

• **Sharpness**. Sometimes people point out that a platinum print is not as sharp as a silver gelatin print of the same size. This is really a function of the paper you choose when you make the print. Some of the watercolor papers we use have a fair amount of surface texture and they will not yield as sharp a print as a silver gelatin print. On the other hand, a vellum can be used for making a platinum print, and can yield a very sharp print. This perceived lack of sharpness is normally not an issue except to an inveterate 'print-sniffer', and it has been my experience that they find something wrong with damn near anything printed by someone else. The texture can also serve as an advantage in that it can make small defects in the negative effectively invisible. Some of this concern is really image dependent. An image that requires super high resolution of fine detail to 'work' may not be an ideal candidate for printing in platinum-palladium. In other words, if you gotta have super sharp prints, then this process may not be your cup of tea.

• **Time consuming and costly.** Again, these are somewhat accurate criticisms. However, if materials are bought in quantity, the per-print cost can be quite comparable with silver gelatin. Remarkably, with digital negative making techniques, I find that I can make a negative that prints perfectly the first time, which saves a tremendous amount of time in the darkroom. Anyone who has struggled to make the perfect silver print in the wet darkroom can appreciate this. It is not uncommon for me to go into the darkroom with six or seven digital negatives and emerge two hours later with six or seven prints that are exhibition quality. There is no way I can ever achieve this sort of productivity in traditional silver gelatin printing.

Clearly, I am an enthusiastic practitioner and an unabashed apologist for the Pt/Pd process. I hope you will end up loving this process as much as I do.

©2005 - all rights reserved

Getting Ready to Print

Consumable Materials list

- Quality watercolor paper
- Ferric oxalate sensitizer compound
- Palladium and/or platinum metal solution compound
- Na2 contrast 'enhancer' (sodium chloroplatinate)
- Potassium oxalate or Ammonium citrate developer
- EDTA tetrasodium
- Citric acid
- Oxalic acid
- Hypoclear
- Ivory Black Winsor and Newton watercolor tube
- Burnt Umber Winsor and Newton watercolor tube
- Paper cupcake tin liners
- Basket style coffee filters

Equipment list

- Richeson 9010 brush
- Small shot glass
- Dropper bottles for solution
- Droppers and/or pipettes and pump
- 4 trays
- Washing tray or print washer
- UV light source
- Contact printing frame
- #000 fine spotting brush
- #11 X-acto knife and blades
- Dedicated hair dryer with temperature control
- Electric fan
- Large pyrex measuring cup – 8 cup model with lid is ideal
- Inexpensive microwave oven for heating water and developer
- Some small mixing beakers
- Stir rods for mixing solutions
- Small scale – the 200g models that measure to 0.1g accuracy are ideal
- Plastic gallon jugs with watertight tops to use to store the developer

©2005 - all rights reserved

Paper selection

Today, there are a huge number of papers that can be used to make platinum prints. The discovery a few years ago of the usefulness of oxalic acid has made many previously unusable papers amenable to the platinum printing process. Even so, I will be using only a few papers that I have personally found to give superior results with the least amount of special treatment.

Because the Pt/Pd process uses a chemical solution that is acidic, it works better when used on papers that are at the very least pH neutral, and ideally slightly acidic. Unfortunately, this requirement is at odds with the move toward archival papers that are buffered with high pH compounds to make them less susceptible to acidic atmospheric pollutants that can cause papers to yellow with time and exposure to these compounds. About twenty years ago, the few platinum printers of the time ran straight into this problem when manufacturers silently changed their paper formulations and began manufacturing many of their papers with carbonate buffers. Papers that had previously yielded beautiful platinum prints became useless overnight. By the middle part of the 1990's, there remained only a handful of papers on which one could make a decent platinum print.

The resolution to this problem began to be circulated around the small world of platinum printers in the late 1990s. The solution was a solution: a 1% solution of oxalic acid to be precise. Printers found that by soaking a paper in a weak solution of oxalic acid, the buffering compounds could be neutralized and the paper made conducive to the Pt/Pd printing process.

The ability to alter the pH of the paper by neutralizing the buffers with oxalic acid opens up a whole world of potential papers to use in the Pt/Pd process. In looking at new papers, I find that in general, a hot-press watercolor paper with internal sizing to be the most amenable to this process. The internally sized papers tend to have better wet strength than a paper with just a layer of external sizing. There is nothing more frustrating than making a print only to have it fall apart while washing it after all the processing steps are complete. Unfortunately, the only way to test this with certainty is to buy a sheet and just let it soak in a tray of water for 20 minutes or so. If the corner tears off when you try to lift it out of the tray, it would not be my first pick for a painless paper to use in this process.

One other trick that I will mention in regard to paper characteristics is an easy test to determine what will probably be the best way of coating and drying the paper. If you put a piece of the paper in a deep tray of water, and it sinks to the bottom in a short amount of time, it is what I refer to as 'a sinker', and will most likely need to be coated and dried with a hairdryer pretty quickly afterward. On the other hand, if it stays on the top of the water and is thus 'a floater', it likely has a significant amount of internal sizing, and the coating solution will need some extra time to soak in. These 'floater' papers are usually best coated then dried using a window fan with no additional heat added to speed up the drying.

Here is a list of the papers we will be using in this workshop:

• **Arches Platine** – this paper was specially formulated for the Pt/Pd process by custom platinum printer Martin Axon. It is a fairly heavy paper with good wet strength. It does not have to be pre-treated in oxalic acid to make a good print, but it tends to yield better results if double coated. It is heavily sized, and performs much better if allowed to air-dry naturally under a fan rather than being forced-air dryed with a hair dryer. This paper yields beautiful results, yet has been plagued with manufacturing inconsistencies. Some batches of this paper appear to have large amounts of impurities that cause small black specks to appear randomly in the final print. As Murphy's Law would indicate, these specks tend to predominate only in the most critical lighter toned areas of your image. It has a smooth surface texture and generally a warm image tone. It can be difficult to clear properly, and you will need to pay special attention to clearing this paper.

• **COT 320** – this paper is a special version of the basic Arches Platine formula that has a smoother surface and is much less prone to the notorious black speckle problem often seen with Platine. It has a smooth surface texture and a neutral to slightly warm image tone. This paper can have the same clearing issues as Platine.

• **Fabriano Extra White Hot Press** – this paper is an example of one of the highly buffered papers that was previously unusable in the Pt/Pd process. A five minute soak in 1% oxalic acid solution makes this paper a wonderful addition to the platinum printing world. It has a very smooth surface, and a very nice warm and smooth

©2005 - all rights reserved

image tone. Additionally, it has very high dimensional stability, which makes it the best paper to use if you want to advance into the world of gum over platinum printing. This is a multiple pass printing process that requires you to expose the print multiple times with the same negative, thus making the lack of shrinkage in this paper a definite advantage.

• **Whatman's Watercolor 280 # Hot Press** – This paper is one that requires a brief dip in a 1% oxalic acid solution and yields a beautiful warmed toned print. The only downside to this paper is that the surface texture is more pronounced than the previously mentioned papers, and therefore it may not be appropriate for all images. It clears very easily and has a wonderful 'hand' or softness in the finished print. This paper does not need to be forced-air dried with a hair dryer and performs well if allowed to dry under a cool stream of air from a fan.

• **Clearprint Vellum 10 pt** – This is one of the few vellums that are somewhat easy to work with. Most curl into satanic potato chips the minute they get liquid on them. Clearprint does not exhibit this frustrating property to the same degree as many other vellums. It requires double coating to achieve deep blacks, and can be a little tricky to work with. The paper should be coated with two lighter coats of solution (about 75% of the normal volume) and dried shortly after coating with a warm stream of air from a hair dryer. It is helpful to tape the corners of the paper to the worksurface prior to coating. It is also advantageous to use a piece of paper quite a bit larger than the print. This will allow you to trim of the crinkled edge of the paper between the first and second coats.

Vellum prints have a translucency and depth that can be quite spectacular. Because they are translucent, ambient light actually penetrates through the paper and reflects from the backing paper on which they are mounted. This gives the printer the ability to alter the image tone simply by changing the color of the backing. They are also among the sharpest of the Pt/Pd printing papers.

Workspace requirements

Unlike a traditional darkroom environment, the Pt/Pd printing workroom only needs to be shielded from strong UV radiation – i.e. sunlight. A few incandescent bulbs will give plenty of light to work and will not fog the paper as it is being coated.

While it is certainly possible to use the sun as a source of UV light necessary for this process, a controllable artificial light source is infinitely easier to manage. Many people use a fluorescent UV exposure units either fabricated at home or bought ready-made from some of the suppliers listed in the appendix. These units are essentially like a small tanning bed for your printing needs. They use the same UV emitting fluorescent tubes as the now ubiquitous tanning salons. These units have the benefit of being reasonably inexpensive, especially if they are homemade. The downside to these fluorescent units are that the light output will only stabilize after the unit has been on about 10 minutes and had a chance to warm up. In order to acheive consistent exposures using a timer, the unit must be left on during the entire printing session. Naturally, this means that some sort of method for shielding the light from this unit from the rest of the work area is necessary to prevent the paper from fogging during the coating step.

Another fine choice, and the one I prefer to work with, is a dedicated plateburner such as used in the graphic arts industry. One of the easiest to use plateburners is manufactured by NuArc Industries of Chicago. The NuArc 26-1K is a totally self contained unit that consists of a high intensity mercury vapor lamp, a built-in vacuum frame and a controller called a light integrator. The light integrator is a measurement device that allows the unit to precisely measure the quantity of UV light that has been emitted by the unit, and once this quantity is reached, the unit automatically shuts itself off. This is a tremendous aid in achieving consistent exposures between printing sessions.

Beyond that, all that is needed is a sink or counter area large enough to handle the four trays needed for processing: one developer tray and three clearing trays. You will also want to have an area dedicated to coating the paper that can be covered in order to keep stray drops of the coating solution from staining the surrounding walls or countertop.

©2005 - all rights reserved

Mixing the chemistry

Most of the chemicals can be bought already mixed. I find it useful to mix my own chemistry both to ensure maximum 'freshness' and to minimize the costs.

Ferric Oxalate

I generally mix up 100ml at a time. I try not to use any ferric oxalate that is older than about three months, because it will gradually convert to ferrous oxalate with time and cause minor fogging problems when printing. You can temporarily rescue an old batch of ferric oxalate with a few drops of hydrogen peroxide, but I find this technique to be somewhat hit or miss, and not worth the effort, especially when you consider that the cost of the metal solution is several times greater than the cost of the ferric oxalate. Here is the recipe for mixing it:

- **Ferric oxalate powder – 27g**
- **Distilled water at 120 degrees 70ml**
- **Oxalic acid 4g**
- **EDTA tetra – 2g**
- **Distilled water to make 100ml**

Heat the water and add it to the 27 g of ferric oxalate in your clean glass mixing vessel. Add the oxalic acid and the EDTA and then the additional water to make a total solution volume of 100ml. Stir vigorously for 10 minutes, and then let it rest for 10 minutes. You will see the solution gradually clear to a dark olive green, and a load of sediment in the bottom will settle out. Stir again for 5-10 minutes. You may want to heat the solution slightly with short ten second bursts in the microwave. DO NOT overheat the solution. Let it sit again. I generally do this maybe three times, and then I give it one good last stir and let it sit overnight. In the morning, I heat it gently and stir one last time. Generally, all of the solids will now be in solution and it will have a clear dark green color. Ferric oxalate is by far the most stubborn chemical you will have to mix. It just takes some time and patience.

Potassium oxalate

This is the developer you will be using. My formula is as follows:

- **330g potassium oxalate**
- **1 liter of distilled water at 120 degrees**

Add the potassium oxalate to the warm water and stir until it all goes into solution. This will occur usually within a few minutes. This recipe yields about 1.3 liters of developer. The developer can be re-used. It will pick up a lot of unused ferric oxalate and metal over time and become quite discolored. I usually decant it from my storage container into the pyrex measuring cup before each printing session and discard the sediment that is on the bottom of the storage container. I keep a gallon of fresh unused developer to 'top-off' the developer volume to make up for the developer carried off in each print and during the decanting process.

Safety

All the chemicals used in this process are harmful if ingested. So do not drink or eat in the work area. Fortunately, none of the chemicals are any more dangerous than standard photo chemistry. Just use good laboratory habits and common sense:

1. Wear gloves when you have your hands in the chemicals for any length of time. A thumb and index finger to pluck a print out of the EDTA/hypoclear clearing bath is okay, since it is very dilute and not toxic. The potassium oxalate developer, however, should not be handled carelessly. My procedure with this chemical is to pour it into and out of trays using the pyrex beaker. My hands never touch the chemistry. When the print is finished developing, I pour the developer out of the tray into the pyrex container and put it back in to the microwave for heating. By using this technique, I can process the entire print without having to put on gloves, yet I still avoid all contact with any potentially harmful chemical agent. A final admonition about the potassium oxalate developer is to be aware that when heated, it does give off vapors that you should avoid inhaling. You can either use it at room temperature (See the coldbath developer formula) or make sure your developer is covered when not being used and that an exhaust fan is running when you pour the developer in the tray. This is just good lab practice.

2. Wear eye protection. If you wear glasses, that is great. If you don't, get some clear glasses to wear. You do not want to get any chemical in your eye.

3. Be very aware of UV radiation when using the light box or plate burner. Just as you would never look directly at the sun, NEVER look directly at the light source

©2005 - all rights reserved

of either of these pieces of equipment. Invest in a good pair of UV blocking safety glasses, and ideally, put your light box or plate burner in a closet or shield it with light tight screening. UV radiation is the main cause of cataracts, and this is the reason that the incidence of cataracts is so much higher in high altitude areas where the UV intensity from the sun is very high.

Attributes of the pt/pd negative

Platinum printing is a contact printing process. This means that you will need a negative that is the same size as the final print you intend to make. The Pt/Pd process also requires a negative with a higher contrast (technically, a longer negative density range) than would be appropriate for a negative to be printed on silver gelatin paper. These two requirements previously left only two fairly difficult options for the photographer wanting to make Pt/Pd prints.

The first option was to make very large in-camera negatives using very large view cameras. This is still probably the best option for certain types of subject matter. Static subject matter such as still lifes and landscapes and some type of portraiture lend themselves to the necessarily measured pace involved in using large view cameras. Many practitioners, myself included, still use these ultra-large format cameras to make negatives as large a 12x20 inches in size. Naturally these cameras are enormous, and using them is quite impractical in many circumstances.

The second option was to make an enlarged negative in the wet darkroom using an enlarger to project an image from a small camera negative onto a piece of film of the size needed for the final print. This process was quite laborious and was not easily mastered by those without a high degree of knowledge and experience.

Recently, however, a third option has become available with the advent of digital imaging techniques. It is now quite possible to use photoshop to create an image from a digital file, and then subsequently output this image as a negative using either a service bureau to create an imagesetter negative, or a desktop inkjet printer to create a negative on clear overhead transparency film.

In-camera vs. enlarged negative

I firmly believe that the negative you have is always superior to the negative you do not have, and possession will always trump provenance. The in-camera negative will almost always be sharper – that is, wherever you were able to get the image in focus. One of the challenges when working with ultra large format cameras is that the long focal length lenses required to cover such a huge negative have very limited depth of field. This means that I rarely use a lens with an aperture opening larger than f/32. This in turn means that exposure times with fast film in daylight are often 1/15 of a second or slower, and can often be as long as 10 minutes at dusk or dawn. So, it can be quite true in certain circumstances (dim light, wind blowing the foliage) that a smaller negative can yield a sharper print than a larger negative.

With proper technique, an enlarged negative can yield a tremendously satisfying Pt/Pd print.

The digital negative

The digital enlarged negative has really made the Pt/Pd process accessible to the mainstream practitioner in the photographic world. Dan Burkholder was perhaps the main pioneer in making this a reality. There are two primary methods for creating the final negative. One involves sending the digital image file to a service bureau and letting them create an imagesetter negative on a piece of half-tone film, and the other method involves using a inkjet printer to print the negative on a piece of overhead transparency film. The rapid increase in the quality of inkjet printers makes the creation of high quality negatives on a home printer a reality. We will cover all of the steps in the creation of digital negative later in this book.

©2005 - all rights reserved

Steps in making the print

Paper preparation

The paper needs to be cut to size and treated with oxalic acid if necessary. I find it generally beneficial to cut the paper large enough to have approximately a 1-1/2 to 2 inch border around the image area. This will allow you to handle the wet print without being concerned with damaging the image.

To treat the paper with oxalic acid, follow these steps:

1. Measure out 20g of oxalic acid on your scale in a paper cupcake liner.

2. Add the oxalic acid to 2 liters of warm tap water and stir until dissolved.

3. Pour the solution into a tray large enough to accommodate your paper, and immerse the paper one sheet at a time in the liquid. I always wear gloves for this step, as oxalic acid is moderately toxic.

4. For COT 320, Platine or Whatman's, just briefly leave the paper in the tray and then pull it out, allowing the excess water to drain back into the tray. Hang the paper and allow it to dry thoroughly. When treating Fabriano Extra White, allow the paper to soak at least for five minutes. A longer soak will not hurt.

Contrast Control Methods

There are several methods available to the platinum printer to control the contrast of the print being made. These contrast control methods will allow the printer to tailor the print contrast to perfectly match the negative being used to make the print. In this sense, it is very similar to the control available to a silver-gelatin printer using variable contrast paper.

As mentioned earlier, the ideal negative for Pt/Pd printing is quite a bit higher in contrast than would be typically used for silver gelatin printing. The standard way of talking about negative contrast is *density range*, (hereafter to be abbreviated as DR) a term that refers to the difference in transmission density between the dense highlight areas of the negative and the less dense shadow areas. These measurements are a small part of the whole subject area called densitometry, something that is more involved than we need for the purposes of this class.

Suffice to say that when one measures the transmission density of the thinnest detailed shadow area of the negative and subtracts this value from the transmission density of the most dense highlight area in which you want to preserve detail, the result is DR. A good target DR for a silver gelatin negative to be printed on grade#2 paper would be about 1.1. The ideal DR for a negative intended to be printed in pure palladium would be about 1.9. So it is approximately twice as contrasty as a silver gelatin negative.

Fortunately, the contrast controls available to the platinum printer will allow a good print to be made with a negative with quite a bit less DR than 1.9. That being said, as one adds more and more contrast increasing agents to a Pt/Pd print, there is a gradual loss in print quality along with a loss of some of the unique tonal aspects that make these prints so beautiful. The beautiful long-toed 'highlights that go on forever' qualities of a palladium print can be lost if too much contrast agent is added to the printing process.

There are basically four commonly used methods for controlling contrast in Pt/Pd printing, and they all work in basically the same way: they reduce the sensitivity of the ferric oxalate sensitizer. But since the negative allows the shadow areas of the print to receive so much more UV light than the highlight areas of the print, the reduction in sensitivity has a much greater effect on the highlights than the shadows. The following table shows you why this is the case. In this example, the contrast control agent has reduced the sensitivity of the ferric oxalate by 4 units of light. Realize that each .3 density units is equal to 1 stop of light (i.e. either doubling or halving the amount of light, depending on which direction you are moving), and look at the effect of a reduction in sensitivity of the sensitizer:

©2005 - all rights reserved

Negative Density	Units of light	Reduction in Light Sensitivity	Difference
0	256	4	252
0.3	128	4	124
0.6	64	4	60
0.9	32	4	28
1.2	16	4	12
1.5	8	4	4
1.8	4	4	0
2.1	2	4	0

Notice how the 1.5 negative density now results in the same print density that previously occurred at the 1.8 density part of the negative. So now the range of negative densities that can be represented by print tone has been reduced from 1.8 to 1.5!

This is a very brief, and really not that important an illustration of what is occurring when we adjust our process for contrast.

The four commonly used methods for contrast control are:

Hydrogen peroxide drops added to the sensitizer mix. This method does work, but it is somewhat inexact because hydrogen peroxide (H2O2) is in an unstable state, and will gradually convert to just water (H2O) over time. So when you use this method, you really do not know what the concentration of the hydrogen peroxide really is at a given point in time. It can be useful for salvaging some older ferric oxalate that has begun to fog with age, however. Adding a few drops of this powerful oxidizer will convert the ferrous oxalate back to ferric and allow you to finish using a bottle of the sensitizer.

Ferric Oxalate #2 - a separate bottle of ferric oxalate that has had the addition of an oxidizer called potassium chlorate added to it. With this method, the printer can substitute drops of the 'doctored' ferric oxalate for drops of the pure ferric oxalate, and thus control the contrast in very fine increments. The main disadvantage of this technique is that once you get beyond a ratio of about 4:1 of pure ferric oxalate vs 'doctored' ferric oxalate, the print quality begins to suffer and you will notice an effect called 'graining' that causes the metal to begin to accumulate in lumps on the final print and gives it an unattractive salt and pepper appearance that is particularly objectionable in highlight areas of the print.

Restrainer in the developer, a method that adds an oxidizer to the developer solution. For workers who must contend with a wide range of negative density ranges, this method has the disadvantage of requiring quite a few jugs of potassium oxalate developer to be kept on hand. On the other hand, this technique does not cause the same 'graining' effect mentioned above. This method involves adding a certain number of drops of sodium dichromate to a given volume of developer. Below is a table of how the developer would be mixed:

Developer Number	Drops of 50% Sodium dichromate per 200ml of developer	Negative DR
0	0	1.9
1	1	1.8
2	2	1.7
3	4	1.6
4	8	1.5
5	16	1.4
6	32	1.3

Na2 (sodium chloroplatinite), which involves adding minute quantities of sodium chloroplatinate to the solution. This form of platinum metal is tetravalent, and consumes twice as much ferric oxalate during the develop process as the palladium solution, and results in a net increase in print contrast. The realization by some workers a few years ago that very dilute mixtures of this metal salt could be prepared and added to the sensitizer mix allowed a very fine degree of control over print contrast to be achieved.

This metal salt is commonly available at a solution strength of 20%. But it can be diluted with distilled water to smaller, more useful solution strengths. Take a 25 ml bottle, and leave 15mls in it at 20%, dilute the removed 10ml with 10ml of distilled water, and then set aside 10mls of this new dilution in its own bottle

©2005 - all rights reserved

(10% solution strength). Dilute the remaining 10mls with another 10mls of distilled water, again setting aside 10mls in its own bottle (a 5% solution strength). Dilute the remaining 10mls with yet another 10mls of distilled water, and set aside another 10mls (2.5% solution strength). Finally add 10mls of distilled water to the remainder for a 1.25% solution. Clearly label all of these bottles.

The pros of this method are that it is quick and effective, and causes no print graining. The downside is that it only works with pure palladium prints, since the addition of any platinum metal to the sensitizer mix will cause the Na2 to convert to its more common bivalent form. It also will cause a considerable cooling of image tone if used in any quantity. This makes getting matching print tones on a body of work from in-camera negatives with varying negative density ranges quite difficult.

In this workshop, I will be illustrating the Na2 method and the oxidizer in the developer method. Since we will be using primarily digital negatives that have the very nice quality of all having the exact same density range, it makes any trade-offs in the methods very minimal (Thank you Photoshop!). While it is possible to create negatives that require no contrast control agent at all, most workers find it beneficial to have some contrast agent present in their process to help minimize the effects of any fogging caused by aging ferric oxalate.

Mixing the sensitizer and metal

In your shot glass, mix equal amounts of ferric oxalate and platinum and palladium metal solution. If you are using droppers, mix 12 drops of ferric oxalate with 12 drops of palladium. If you want to make a Pt/Pd print, substitute drops of platinum solution for palladium solution. For example, you could use 10 drops palladium, 2 drops of platinum combined with 12 drops of ferric oxalate. Using platinum in quantities greater than 50/50 (e.g. 6 drops each of platinum and palladium for the previous example) is not recommended.

The ratio of platinum to palladium will have an effect on the final image color. The more platinum that is added, the colder the tone will be in the final image. Conversely, the more palladium that is present in the mix, the warmer the tone. Some workers find that adding a small amount of platinum helps produce a smoother image gradation. Like so many things involved in Pt/Pd printing, other variables in each individual's process makes this observation one that should be investigated on your own, but not necessarily relied upon for your own work.

If you are adding Na2 contrast control agent to your sensitizer, add that now. (Note: will not work if any platinum metal is in your mix!)

Finally, swirl the two solutions together in the shot glass, and make sure they are thoroughly mixed.

Coating the paper

Put your paper on a piece of flat newsprint and tape the paper down if necessary to hold it flat. Many people purchase a sheet of thick plate glass to use as a coating surface. If you want a clean edge to your coat, mask off the area to be coated with 3M Safe Release Extra Sensitive surface painters masking tape.

Prepare your Richeson brush by thoroughly immersing it in a beaker of distilled water, then give the brush 4 quick shakes in each direction to remove excess water from the brush. Be careful not to let fall any stray drops of water onto the paper. If you do get a drop on the paper, use another sheet to coat and let the 'damaged' sheet dry thoroughly.

In one smooth motion, pour an even bead of the solution along the left edge of the paper being coated. It takes a little practice to cleanly empty the shot glass of all its solution without leaving a puddle or having any left over in the shot glass. Quickly pass your brush from left to right returning to the initial bead of solution at the beginning of each pass. Then make passes of the brush in a top to bottom motion at right angles to your first brushing pass. Next go from left to right, and then from bottom to top, always keeping the brush in motion. The trick to this technique is to 'hurry slowly'. Do not linger, but do not get wild and sloppy either. I will show you how this is done, and it is much easier to demonstrate than to describe. Continue the motion of the brush until the coat is smooth and even, and there are no puddles of liquid being moved about by the brush.

Drying the paper

The drying method to be used is paper dependent. I find that papers such as COT 320, Whatmans, and Arches Platine, which have heavy internal sizing, are

©2005 - all rights reserved

best dried under a cool fan and allowed to dry without any heat. This gives the solution time to absorb deeply into the paper fibers. On the other hand, papers such as Fabriano Extra White and Clearprint Vellum are best dried using a blow dryer set to a medium heat setting. These papers are 'thirstier' and tend to absorb the sensitizer too deeply if it is allowed to sit too long before the water has evaporated from the solution. If the paper needs to be double coated, you will simply repeat the coating and drying sequence.

Exposing the paper

The coated and dried paper will now be exposed with the chosen UV light source. In our workshop, we will use either a plateburner or a UV light box. I will show you how to calibrate the light source and find the correct time for your exposure in the class. This is much more simple to demonstrate than to discuss, and you will be able to go back to your own work environment and calibrate your own process after this workshop.

In either case, you need to put your negative on the dried paper, with the emulsion side of the negative against the coated surface of the paper you have just coated. Position the negative –paper sandwich in the printing frame of the plate maker and lower the glass cover. Or if using a contact printing frame, put it in and close the back. Expose the paper with the UV light source for the appropriate time using either a watch or the built in light measurement unit in the platemaker.

Development of the print

After the print has been exposed, remove the negative and paper from the contact printing frame or the vacuum frame of the plateburner. Place the negative in a safe protected envelope, and take the time now to write down the specific coating and exposure information you have just used on the print border or back. I cannot emphasize enough the need to develop this habit early in your Pt/Pd printing education. You will never remember precisely the exact amounts of metal and sensitizer, exposure time, and developer temperature if you do not write it down on the print before you get it wet with developer.

Put the print face up in the developer tray, and quickly pour the developer solution onto the print. The developer must come in contact with the entire print within a second or two to avoid the appearance of 'tidal' lines on the print. As you begin to make larger prints, the technique necessary to quickly immerse the entire print in developer becomes somewhat tricky. For large prints, I will simultaneously pour the developer with one hand and rock the tray with the other. This can become quite a feat when working with a 24x28 inch tray. That is one reason it is best to start with prints that are 8x10 or smaller.

The temperature of the developer is another creative variable that can be used in the printing process. The potassium oxalate developer we will be using can be heated up to 160 degrees in the microwave oven. As the developer temperature increases, the warmth of the print tone increases and the print contrast decreases. If I am making a pure palladium print that I want to have a very warm image tone, I will often heat the developer to 160 degrees in the microwave. Some papers cannot stand developer temperatures this hot, and the internal sizing of the paper becomes destroyed and a blotchy print will result. The maximum temperature for a given paper will have to be determined by trial and error, and is normally discovered by going too far on a beautiful print that will then have to be redone. Such is the charm of this process.

As a starting point, do not exceed about 150 degrees with Platine, 160 degrees with COT320 and Clearprint Vellum or 165 degrees with the Whatmans. I generally use the Fabriano Extra White only for gumover work where all the image tone will be created by the gum coats, and I rarely use developer hotter than 100 degrees with this paper.

After the print is allowed to develop for about 3 minutes or so, the used developer is poured back into your pyrex beaker.

Clearing of the print

The rest of the printing process involves getting rid of the unexposed ferric oxalate from the fibers of the paper. Failure to completely remove the ferric oxalate will result in a print that will eventually turn brown over time. Naturally this is not a desirable result.

I find it beneficial to fill the developing tray with warm tap water and allow the print to soak for about five minutes before beginning the chemical clearing steps. You will see the water turn yellow with the unused ferric oxalate that is coming out of the paper fibers.

©2005 - all rights reserved

Next, place the print in the first clearing bath. This is normally an acidic clearing bath of either citric acid at 2-3% solution strength (20-30g/liter of water), or a 1% solution of muriatic acid. I do not recommend muriatic acid for beginners because it is quite noxious and will corrode any metal in sight if it is not properly disposed of. Some papers (none of which we will be using in this workshop) require muriatic to be properly cleared.

Place the print in the next two clearing baths, keeping the print in each bath for five minutes. Too much time in the baths can begin to bleach the print, so it is important to use a timer and not be too sloppy with these steps. I recommend using Kodak hypoclear mixed to normal working strength with the addition of 1 heaping tablespoon of EDTA tetrasodium per liter of clearing solution. Keep an eye on the third clearing bath, and the moment you notice that it is getting even slightly yellow, promote this bath to the second bath, discard the second bath and mix a fresh third clearing bath. I generally replace the first clearing bath after every four prints or so.

After the third bath, carefully inspect the print to see if there are any residual ferric oxalate stains in the masked-off border areas or the highlight areas of the prints. If you notice that there seems to be some residual stain, mix a fresh double strength bath of hot hypoclear and EDTA and give it an additional five minute clearing bath.

After the print is completely cleared, wash the print in running water for 10 to 20 minutes to remove any residual clearing agent from the paper fibers.

Drying

Hang the print from some clothespins on a drying line until it is just barely damp. Then place the print face-up on a drying rack and allow the print to dry naturally. Since there is no emulsion layer in a Pt/Pd print, the print will dry flat and will need only a brief visit to a dry mount press to flatten the print for good.

Spotting, etching, and waxing

Since the Pt/Pd print is made on watercolor paper, watercolor pigments can be used to spot out 'white' imperfections in the print that are due to dust spots on the negative. The trick to doing this is to start out light, and gradually work your way to the spots in the darker areas. I find that it is better to gradually build up tone through the application of several layers of lighter pigment than to try to match the tone exactly on the first pass. You will also notice that with spotting, less is certainly more. Often you can just put a small dab of tone in the middle of a white spot, and it disappears to the eye from a normal viewing distance.

Dark spots due to the black speckle paper problem are more difficult to handle, but can often be etched out with a very sharp X-acto knife. You will need a 10X loupe and a steady hand to do this effectively. Downing six shots of espresso before starting the etching process is definitely not a good idea. The secret is to use the very tip of the blade to gently remove small flecks of black platinum metal until the tone matches the surrounding areas.

I will demonstrate both spotting and etching techniques in the workshop. Neither is particularly easy, but with enough practice on discarded prints, one can become reasonably proficient.

After the print has been completely finished and is a bona fide piece of art, you may want to either wax the print with Gamblin cold wax medium, or soak the print briefly in a Liquitex Gloss medium diluted 1:8 with distilled water. Both techniques will increase the shadow contrast slightly and give a just-perceptible 'pop' to the image. Waxing is the most difficult of the two techniques and is more prone to disaster, which is not something that most people want to deal with at the last step of a print process. I will demonstrate waxing technique with the understanding that you should experiment with this carefully on a few discarded prints before committing to waxing a 20x24 print from a negative that has just been burned up in a fire, along with the computer that contained the image file.

As mentioned earlier, a platinum print has no emulsion layer, so it will not have the tendency to curl when the print is dried. Usually all that is required is a very brief visit to a dry mount press set at 150 degrees or so for a few minutes, and the print will be flat forever. This makes corner mounting the prints under a hinged mat the preferred method for mounting the print, as opposed to the need to use dry mount tissue when mounting traditional silver gelatin prints.

©2005 - all rights reserved

Resources

General Information

Alt-photo mail list – commentary, hints, flames
http://www.usask.ca/lists/alt-photo-process/about.htm

Photo.net alternative photography message board
http://www.photo.net/bboard/forum?topic_id=1564

Digital negatives information ala' Burkholder
http://www.danburkholder.com/Pages/main_pages/book_info_main_page1.htm

Galleries and short articles on alt-processes – gum, bromoil, Pt/Pd, van dyke, the works
http://www.alternativephotography.com/

General photo information, articles on many alternative processes

http://www.unblinkingeye.com/

Supplies

Most alternative processes are supported by the friendly folks at B & S
http://www.bostick-sullivan.com/

The Photographer's Formulary have almost any chemical you might need, and give great workshops in beautiful Montana
http://www.photoformulary.com

Mike is a great source for chemicals and his service and prices are great!
http://www.artcraftchemicals.com/

Bulk precious metals - palladium chloride, platinum chloride, etc:
http://www.engelhard-clal.com/index.html

Pt/Pd photographers websites

- http://www.kerik.com/
- http://www.dickarentz.com/
- http://www.carlweese.com/
- http://www.jkschreiber.com/
- http://www.davidmichaelkennedy.com/
- http://www.sallopes.com/

Books

Platinum and Palladium Printing – Dick Arentz - 2nd Edition is now out. This is really the modern bible of platinum printing - exhaustive, thorough, somewhat technical description of the process as it is being practiced today - from soup to nuts.

The New Platinum Print – Sullivan and Weese
This book is available through Bostick and Sullivan, and is a good, somewhat less technical treatment of the process. The coverage of the printing out process called Ziatype is particularly good in this book.

Keepers of Light - William Crawford
This book is a classsic compendium of many of the so-called alternative processes. Not especially thorough or modern in its treatment of platinum printing, it is nonetheless a classic treatise, although a bit dated now.

Coming into Focus - John Barnier et al
This book is another tour-de-force of the the alternative process world. Covers everything from salt print to albumen to tri-color gum. Good articles on each process written by experts in that particular discipline.

Alternative Photographic Techniques - Christopher James
Another compendium of alternative techniques. The information is comprehensive, if not always 100% correct. James is a little more of a shoot from the hip practitioner compared to some of the more - well, anal - authors that tend to congregate in the platinum printing world. Nice refreshing approach.

©2005 - all rights reserved

Platinum Palladium Recipes

Ferric Oxalate

27 g ferric oxalate powder

70ml distilled water at 120 degrees

4 g oxalic acid

2g EDTA tetrasodium

distilled water to make 100ml

Stir, heat, stir, wait, stir, stir, wait....

Potassium Oxalate Developer

330g potassium oxalate

1000ml distilled water at 120 degrees

Stir until dissolved

Lithium Palladium

XXg lithium chloride

XXg palladium chloride

XXml distilled water

Stir until dissolved. Filter through high grade filter paper before putting in bottle. Careful with this solution, as it stains permanently!

Citric Acid Clearing Bath #1

dissolve 3 heaping tablespoons of citric acid in 3 liters of water

EDTA di-sodium Clearing Bath #1

dissolve 3 tablespoons EDTA di-sodium in 3 liters of water

HypoClear + EDTA Clearing Bath #2 & #3

Mix hypoclear 1:4 from stock solution. Add 3 tablespoons of EDTA tetrasodium. Stir until dissolved. Discard bath #2 and promote bath#3 to bath #2 whenever you notice any coloration in bath #3. Bath #3 should always be clear!

Oxalic Acid pre-soak for paper

Add 10-15g of oxalic per liter of water. Dip or soak paper as needed then hang to dry.

Liquitex Print 'Enhancer'

Add 100ml of Liquitex Gloss Medium to 800ml of distilled water. Stir thoroughly to mix and pour into a flat bottomed tray. Pass the print through the mix and then hang the print to dry. One corner of the print should hang slightly lower so that any excess will drip off without leaving a line on the bottom of your print.

©2005 - all rights reserved