FEATURED INTERVIEW:

JON CONE

Master Printer, Cone Editions Press

"We are constantly inventing and reinventing, developing and redeveloping. We do not have a single printer with OEM ink in our studio. We rarely use the OEM drivers or the popular QuadTone RIP. We produce our own printer drivers which we manipulate to our needs."

Could you please tell us how you started in printing?

I had a darkroom when I was 14 years old. I was quite serious about photography and I took adult classes at a local community college. Before I was out of high school, I was earning money as a photographer and producing most of my silver prints. But I also worked with a custom lab which made silver prints at a much higher standard than I could so I was aware there was a craft involved and that it was worth studying.

I learned to print at Ohio University. I was enrolled in the School of Art and dual majored in photography and printmaking.

My main teacher in photography was Arnold Gassan. I learned the view camera, the zone system, chemistry of developers, densitometry, and gelatin silver print repeatability. I loved that it's technical nature but all our critiques with Gassan involved looking at our work when it was upside down. Arnold could see our use of light better that way, and he claimed that no one our age had anything interesting to express.

In the Printmaking Department, especially under Mary Manusos who was my mentor, technology was something we were expected to invent for ourselves along the path of self-expression. Mary encouraged me to join the Trisolini Print Program where students have an opportunity to print for visiting artists. I was an undergraduate and everyone else in the program was a graduate student. At that point I knew others thought I had the ability to print, perhaps more than I did.

My final project at Ohio U was a photograph I silkscreened by using five layers of tonal separations I made with a room-sized contact camera using silkscreen ink I made myself from powdered graphite on a vacuum table I had to build myself. I think that is when I really started printing on my own and it defined my method of printmaking: experiential, conceptual, and technical.

College last project silkscreen

Where did the idea of Cone Editions come from and why did you decide to start the company?

When I graduated from college I was recommended by Mary Manusos for a position as head printer at Twitchell-Nichols Printmakers in Soho, NYC. It was 1980, and Soho was becoming the centre of the art universe. There were tons of painters living in Soho and Tribeca. I wanted to collaborate with painters and sculptors. I grew up around painters and sculptors. Taking a position in a top studio would be my steppingstone to opening my own studio and printing in the way I wanted to. I just needed some experience and some editioning with artists of the day.

I began silkscreen printing for a wide array of New York artists including Nassos Daphnis, Charles Ross, Chuck Magistro, and even Andy Warhol for small projects that we then delivered to "The Factory" which was just up above us near Union Square at the time. Union Square was posh compared to SoHo then. No one chased you for your lunch bag. SoHo was scary and just a few galleries had opened but they were very hot. It was an exciting time to be a printmaker and I was in an exciting place to be a printmaker.

There was so much work around. I had established a wide enough reputation as a printer to open my own studio a year later. Cathy and I could afford a $400 a month two-storey 4,000 square foot loft in Port Chester, NY. We also lived in it. We had few savings at that point so we started on a shoestring budget but with print projects in hand for a year or two. I bought a 64" x 84" manual silkscreen table and an 80" x 120" vacuum exposing unit for it. In 1980, that was a requirement in order to work with top artists who were making very large prints.

When I began Cone Editions, I had a conversation with master printer Tatanya Grossman. She was the ideal collaborative printmaker. I have a lithograph of her handkerchief in my office that Rauschenberg inked up and transferred to a litho stone and printed. She founded Universal Limited Art Editions across the Sound in West Islip and it was quite a journey. She was very old at the time and very sweet to give me the time of day. She thought I would figure out the printing bits on my own and her advice to me was spot on. She said that no matter whether I could pay my bills or not, make sure I fed the artists well, and give them everything they desired, and that I should leave nothing out of a print even if I or the artist couldn't afford it.

So, we bought this old run-down lobster boat that was for sale in the harbour and Cathy and I became licensed lobster fisher-people at dawn. In the beginning we were happy just to be able to eat. I was putting more time and materials into the projects than we were being paid for and money was scarce. We got good at lobstering and we always had tons of lobsters to feed the artists who were printing with us. We even had enough to feed their entourage if they showed up. The lobsters gave the appearance we were very successful. The reality was that it was all we could afford to eat or feed anyone. We soon began printing for super successful painters. They paid us well and we could afford to begin publishing works of the younger painters I wanted to collaborate with. So Cone Editions began publishing original prints and multiples.

By 1987, we opened the Cone Editions Gallery at 560 Broadway in SoHo. It was a premiere art space building, and we showed the Norman Bluhm and John Yau *Poem Prints*. We showed Archie Rand's monumental *Potato Print Series* which made the cover of the New York Times Sunday Art section. We showed original prints and multiples by Carole Seborovski, Willy Heeks, Lydia Dona, David Humphrey, Emily Cheng, David Kapp, Lester Johnson, Wolf Kahn, and Stanley Boxer. We also had the first show in NYC of computer-generated, original printmaking which I had been doing with David Humphrey and Joel Fisher since 1985.

Archie Rand and Jon Cone as Potato Printers, 1987

Could you tell us about your early days, your early experiments with printing and what you have learned?

In 1980, at Cone Editions I began printing with painters using the silkscreen method. I had developed a method of printing in which I made oil-based screen drawing crayons and used an acid resist on calendared 500-line polyester fabric stretched screens. I was able to print continuous tone that way and the artists were able to draw naturally directly on the fabric. I made very painterly screen prints in the early years from 1980 to about 1984 and I worked extensively with the painter Wolf Kahn whose work I'd grown up with.

Then I turned to copperplate photogravure. I was still working only with painters. I would give them sheets of prepared mylar on which they could paint or draw or make marks however they wanted. These would become the film positives for making photogravures. I used the aquatint method and had built a very large air-powered aquatint chamber.

Cone Editions became known as an experimental printmaking studio. I invented or re-invented every method I used. For the Stanley Boxer woodcuts project I gave Stanley large sheets of birch plywood and air carving tools, but rather than ink up the woodcuts with a roller brayer I inked them with intaglio inks and I intaglio printed them. Our idea was to print what he removed rather than what he left behind. He was new to woodcut and after I rolled up the first block and printed it, he asked, "What about what I carved out of the block? Is that to be garbage you sweep up and throw away?" He got angry and told me to figure it out before he returned the following week. I came up with a way of thinning down the intaglio ink and using rags to wipe it into all the nooks and crannies he had carved. Stanley was a sculptor so his carving of the woodblocks was really his work, not what was left untouched which is what was usually printed in the medium. We had to use tremendous pressure and turning the wheel took the strength of both me and my printing assistant. Those were gorgeous prints.

With Archie Rand we decided to do an experiential printmaking project in which we agreed to work non-stop for 96 hours at a go, four times. Each time was a few weeks apart so we could physically recover. It was partly an experiential project in which we wanted to embrace the creativity experienced during exhaustion. The medium was the potato print chosen because potatoes would dry out so quickly and 96 hours was a perfect time for such a medium. Some of these prints grew to 54" x 80" involving huge beds of conjoined potatoes which we reduction-relief printed. The collaboration was amazing. The sleep deprivation and the creativity magnified as the hours went by. We ate a lot of burgers and drank a lot of cold coffee as day slipped into night into day. Four of those in a row in each working session.

The computer came into my studio in 1984. I saw that fantastic Apple commercial which was so disruptive at the time. It's worth googling that to see how Apple presented their first Mac. It had a huge impact on me both in its value to be disruptive plus the potential to be inventive. I wanted to upset the applecart no doubt. I mean by that the print establishment that I had become part of. It was so early in digital that I had to learn programming in order to do anything graphic with it. There was no commercial software yet. I did some conventional bit mapping with artists, but also more conceptual works where I programmed the computer to collaborate with me to design and create its own print. I also worked with sound as a means of editing visual images. In this case the painters edited the sound that scans of their drawings produced. Then the altered sounds were converted back into bitmapped images. It was a great collaborative tool especially with the younger painters of my generation.

So, I had to find my own way in computer printmaking for the first two or three years until I began working on a very early beta of a greyscale imaging software called Display. I had soldered additional memory to my Mac in order to do anything significant with it. Display eventually became Photoshop maybe around 1988. So some of the prints I exhibited in the 1987 show called "The Proof" in NYC were produced with either my own software or with Display. Everything was bit-mapped in those days. LVT film output was how I produced the silkscreens and photogravures.

In 1989, after I moved the studio from NYC to Vermont, I turned to a number of strange printing technologies that I could partner with to get the equipment to produce work on and discover for the manufacturer if it had graphics potential. I had a giant beta vertical XY machine that could draw with anything I adapted to it. I had a machine that ejected small dots of hot coloured wax and could effectively print with a topography. And inkjet which very early on had progressed into a complex variable dot-sized inkjet printer called the IRIS 3047. I acquired one at the end of 1990 and the sheet size was 34 x 46" although I could print 35 x 47" watercolour paper on it.

IRIS 3047 printer from 1991

We secured some investment funding from a group of supportive collectors who had purchased work from Cone Editions Gallery in New York. Their return was to be nothing more than prints we would begin publishing.

The technology was so expensive at the time that I had to develop my own hardware interface in order to use it with a Macintosh. The IRIS didn't have a useful port in the conventional sense, but it had a very well published interface. My early experiments with the printer led to my developing a method where an inexpensive Macintosh II could produce a file that could be printed directly to it. I then developed a visual layout program which was the first of its kind. Its code went directly into some prominent early commercial RIP releases. But I actually operated the printer from Microsoft DOS as it was the most stable environment to execute printer code from.

I got my first drum scanner in 1990. I learned to program in Basic and C. I could take a computer apart and I understood how to solder RAM. I had no fear of digital technology and I didn't separate it from my traditional printmaking so I effortlessly intermixed them. I was still silk-screening and producing photogravures, but I suddenly became very ill from the solvents and the pigments that had infiltrated my body. So the first ten years of printmaking, those early years, had literally made me sick and my recovery centred around my ability to adopt clean printmaking which is what I would spend the next decade focusing on.

What printing techniques do you use that are unique to Cone Editions?

We still disseminate much of the technology we invent here at Cone Editions through InkjetMall in the USA and Taos Photographic in Europe. Anyone can buy our unique archival alternative ink sets and software and the crazy industrial strength UV exposure systems I design and build. But I think you are asking what unique printing techniques are only available by printing at Cone Editions.

We are constantly inventing and reinventing, developing and redeveloping. We do not have a single printer with OEM ink in our studio. We rarely use the OEM drivers or the popular QuadTone RIP. We produce our own printer drivers which we manipulate to our needs.

I have always been able to train staff to have the same yearning and curiosity to adopt advancements. There are a few things on the front burner. Literally this week, we are just finishing up an entirely new ink set for making 10 ink direct-to-plate photopolymer photogravure plates.

This is our 6th iteration of this printing technique and the photo-gravures coming off our press are now as smooth as platinum prints.

We will not release this version to others via our workshops as we do now but instead will make photogravure plates for other studios as a service and of course use it for our own printmaking services.

We have a unique new colour inkjet printing method, and we will probably not release this through InkjetMall. At least not yet. It's a new ink set and we believe we can do for colour printing what Piezography did for black & white printing. We have already begun using it to print customer images.

We have a new all-carbon ink set for Piezography which is more neutral than our previous ones but we haven't released it. The way we pair platinum/palladium printing with an in-house version of the PiezoDN software is unique although the derivatives of this that we teach are better than anything available.

We specialize in tightly registered platinum or photogravure over colour pigment inkjet. I think still that we are the only studio offering such hybrid prints on a contractual basis.

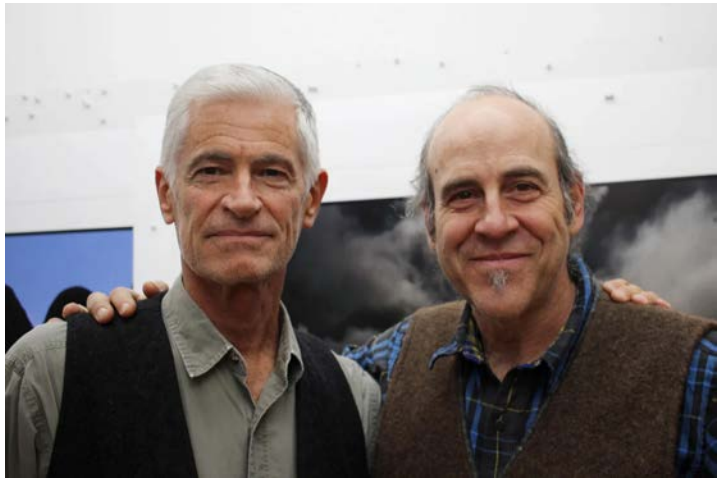
I am talking about degrees better at Cone Editions only because our products or offerings linger behind what we are currently doing. Developing new techniques or new formulas is simple for us but productizing them is complex. Productizing them so we can sell them through InkjetMall involves time-consuming documentation, time-consuming packaging, and producing a time-consuming support system. And time is what we have the least of. I adhere to the Nordic concept of a four-day work week so that we and our staff can have time for our lives away from work.

Cone Editions, 1997

You work with the most prominent and demanding photographers in the world. Could you share one story of such a collaboration?

I feel blessed to have worked with them and to be able to still. It helps me to grow continuously and find new motivations. There have been so many over the past four decades. Two photographers come to mind as it's hard to just choose one, and for two completely different reasons.

My collaboration with **James Nachtwey** felt as though I went to war with him in the sense that I had his back. He knew it. He could trust what I did. It was one of the most difficult experiential collaborations I have ever had. The commitment to completing this project in which absolute perfection was expected, as well as the honour that surrounds doing that, and the unwavering allegiance to the truth of his photos was a gargantuan task that technology was constantly infiltrating. James is probably the most famous war photographer. His work can be horrific and yet at the same time it is unforgivingly beautiful and poetic.



James Nachtwey and Jon Cone, 2015

He is a true master photographer and he has been a witness to the human experience that few of us will ever experience other than through his work. We imaged side-by-side often for 12 hours a day and often five days a week for two years. We only made full-sized 40 x 60" proofs. This type of work was demanding in spirit in that I was constantly subject to the imagery that has burned a place in my soul. I can only imagine what it's like for him to carry around these memories for the 40 or 50 years he has been photographing war-torn areas.

His expectations of me as his printer were without compromise. It was a two-year collaboration to make 30 prints. When we completed it he said I was the only printer who had ever seen a project through to the end with him. I felt honoured to be able to produce the exhibition for the Currier Museum of Art. It opened in 2015. These are perhaps the most masterful prints I have crafted, which is a direct result of the massive amount of proofing we did to present his work without any distraction from the truth. That is the commitment I made to his work.

A collaboration in 1995-1998 with **Richard Avedon** was one of the most far-reaching because what I accomplished with Avedon helped to ignite the fine art and photographic inkjet industry. My reputation in printing was beginning to attract photographers. I was just inventing quad black printing. Richard Avedon called me to ask if I would come in and make a studio presentation to him and his staff. We had a good meeting, and I was eventually given a colour copy 4 x 5" transparency that he also gave to several other printers who were considered to be the best at C-Print, Cibachrome, Dye Transfer and Colour Carbon printing. He said it would come down to who ever could hit this impossible-to-render orange dress in the transparency.

I tried printing with all the available ink sets from IRIS Graphics, American Inkjet, and Lyson but there was no way I could hit that type of orange without resorting to a dye ink that fades rapidly. There was no colour inkjet solution at the time that was both fade resistant and high colour gamut.

I had just become IRIS Graphics Development and Marketing Partner for Fine Arts and it was my position to develop solutions for the photographic market. Steve Boulter who was my liaison at IRIS gave me all of the technical documentations of the hardware, software and consumables. And in this treasure trove was the chemical recipe for IRIS Graphics ink and the specifications which IRIS had determined should not be exceeded when formulating ink.

I setup a small ink lab at Cone Editions and begin learning to formulate inkjet ink. I began experimenting with some salt-free, light-resistant dyes that were not intended for inkjet. I ended up producing my own ink specifications as I found that that there was actually a much higher limitation to what the delicate jets could sustain although I discovered that only after destroying many nozzles and many of the printer's pumps and other components.

I found that by producing better software to operate the printer and formulating much more saturated dye inks using these more lightfast components, I hit that orange dress perfectly and received a longevity rating from Henry Wilhelm that was even higher than C-Print and Cibachrome.

So, besides collaborating with Avedon for two years to produce his last living portfolio, *In Memory of the Late Mr. and Mrs. Comfort*, this is literally how and why I developed the first archival dye ink set for IRIS Graphics printers. It would lead to setting up the first 50 fine-art inkjet printers in the USA. I trained them all on ConeTech IRIS printers, software, and inks.

I printed an Edition of 18 of 24 different images. Avedon was very demanding as a colour photographer so I learned a lot from him and withstood constant rejection and re-proofing. He once even demanded I leave his studio with my proofs. He brought one of my assistants to tears at that moment until I realized that his studio lighting had turned orange and was possibly burning out. The proofs looked absolutely horrible in comparison to his viewing box with the transparencies.

So I got his studio manager to find some orange transparency gels of the right density to compensate for the overhead lighting. I was determined to get it right after Richard cancelled the entire project yelled at me to get out. We made a perfect match that way! Suddenly, Richard appeared again to get something to drink and yelled I told you to leave and take your prints with you. Then he saw the perfect match and said, "Why didn't you show me this set first?" He complimented me on the proofs and said he was glad I had stayed. I am not certain to this day whether anyone told him what had happened.

It was a stunning portfolio. And besides paying me very well he gifted me two signed portfolios as printer's proofs. I gave one to my printing assistant whom he had made teary that day. I thought Avedon was incredibly demanding and at times a bit harsh, but he was likewise appreciative and generous.

If I was pressed for a third it would probably be **Gordon Parks** who let me into his personal space in such an unexpected way. He might have liked a young person visiting him, but he would let me watch him paint the watercolours behind his *Arias in Silence*, and he would talk to me about courage and failure, which I found inspiring. I never knew who I might meet at his apartment like a struggling-to-speak Muhammad Ali who was totally there under his diminishing outward appearance. I had photographed Ali in his prime on South Beach when I was 19.

Gordon, who must have been near 80 at the time, had such a spirit of creativity burning in him which he shared so freely with me. One day when I arrived with new proofs he was at the piano and he said he was composing an opera and he was serious! There was nothing he was afraid to attempt and it was the biggest lesson I ever learned from an artist. "Don't be afraid to fail," he told me. I printed his exhibition for the Corcoran Gallery of Art in Washington, DC. It was just a wonderful and lovely experience from the beginning.

What was the most challenging print you ever created?

The most challenging print was a series of work made for Gregory Colbert called the *Ashes and Snow Nomadic Museum* which I began in 2005 and ended in 2008. It was seen by more than 13 million people in NYC, Santa Monica, Tokyo, and Mexico City. The work was really magical and the scale started at 44 x 84" and ended up about 8 x 14 feet. Prints at that scale on handmade papers weigh some 20lb a piece. Just handling the paper took a team as well as elaborate mechanical lifting devices.

It was the ultimate printmaking gig because I was tasked at failing by trying. The photographer gave me an unlimited budget and I was to try things I'd never attempted over and over again after each failure until I came up with something that no one had ever done before. It was to be the ultimate secretive printmaking process.

I eventually turned to some Roland printers that unfortunately have long been discontinued. They were solvent ink printers that used EPSON print heads that had a pair of ink channels. Roland had two sets of six ink slots that fed the same colour into each pair of ink channels. But they shared the firmware instruction codes and I was able to make 12 colour inkjet printers. At the time I had not yet really formulated colour pigment inks and my Piezography inks were limited to six shades.

The challenge or as I saw it, the opportunity, was to design a 12-ink system. That ink system was the most elaborate Piezography ink system ever designed and it was purely autographic for this project. The printing took place on uncoated handmade papers that were up to 8 x 14 feet, weighing 20lb a sheet, and I was told cost $5,000 each. There was no warning to me about ruining paper. I had the green light to ruin as many sheets as I needed to perfect my process.

Jon Cone at Roland 110 inch printer, 2006

The Roland printers had to be modified to use this paper. I raised the print heads by making new mounts. I strengthened the paper feed mechanisms to transport the sheets and we had low stiction tables produced 20 feet long behind and 20 feet long in front to smoothly feed this heavy paper. I designed deckle protection guides on the printer's platen, and I preheated the paper so that a heavier ink load could be printed.

There was no software that would allow me to image with such an esoteric ink set. These were colourful monochromatic prints and all the calibration and linearization I had to devise mathematically in an Excel spreadsheet attached to an x-Rite table spectrophotometer. I had to imagine how a greyscale image could be divided into 12 inks and be able to split tone the image into very warm and very cool and calculate how these colour-pigment-toned inks contributed to tonal scale, hue, and total inks density. Essentially it was 12 spot colours each individually calculated and converted to a type of HPGL that the Roland printer could understand as individual ink-channel instructions.

These giant prints took 18 hours from beginning to end and if the printheads paused to clean, it would leave a pale mark on the paper when it started back up. I had to eliminate head cleaning and therefore I had to figure out how to make an inkjet ink that was non-clogging. Colbert provided me with an accelerated testing chamber to shorten the development time of the inks. I was able to purchase top-quality lab mixing equipment. Colbert even employed a scientist/archivist to oversee the fade resistance of my inks.

We ended up encapsulating tiny pigment particles in an acrylic co-polymer so they would not statically attract one another. We filtered in a unique process to narrow the distribution of particle sizes. Colbert's ink set was always unique to his process, but out of this came the ink technology that produced the Piezography and ConeColour inks we sell through InkjetMall and why they are so non-clogging.

Of course the prints didn't reflect all that technology; they just looked like gigantic photographs. They cannot be called inkjet prints no more than coq au vin can be called chicken. How the prints were finished has never been revealed either. There was a team of artisans who worked on each one for several weeks to build the patina. The whole operation resembled a Renaissance painter's studio. We were about to begin on an entirely new phase of the project. Gregory had let me build a development studio in the room adjacent to my bedroom in his complex so I could develop the next generation more rapidly. It all ended instantly in the month that Bear Stearns imploded in 2008.

What are the characteristics of a great print?

Obviously content is important and requisite. But what makes it a great print is when the print supports the content. When we look at the work we not only see and react to the content, but we notice the printmaking itself has added a certain quality. By that I don't necessarily mean a high quality as it could be a quality that is rudimentary or crude but supports the work.

For example, sometimes it is possible to tune a photograph while we are proofing it when we think we can sense something that seems to be outside the content itself. The print will emote. It's not a technique or anything that you can apply to the process – it is merely an attunement with the work and a sort of divining into the process of printing, paying attention to everything that's presented.

It is time consuming and expensive to proof and reproof and reproof again and again. But that tuning eliminates all distractions that do not support the image. Some of these may be tonal and others may be slight file defects or surface qualities that we can change through how much ink is used.

Obvious things include noticing how sharp the print is. It is a terrible distraction when it is over-sharpened to the point it is unnatural. Anything that catches your attention and does not support the content is unwanted, if not intentional. Sometimes a hot spot appears in the print because tonally that bit is too bright and it catches the eye too long or moves the eye away from where the photographer wants the eye to travel. Eliminating the hot spot by printing it down may then reveal other areas that are now too hot and are becoming the eye stopper. Sometimes an eye stopper is necessary and can be balanced triangularly to move the viewer's attention. Or a shadow is just too dark to be natural. Our brain questions it and the content suffers as a result of that loss of attention when we are distracted.

Slowly the master print emerges. None of these aspects reveal themselves during imaging because of the faults in human perception when looking at images through transmissive light displays or we would all turn out master prints.

How has print-making changed since you first started?

Oddly enough, I am returning to my roots. I started making copper plate photogravures and am now using inkjet to print direct to photopolymer photogravures. We have a large format darkroom again but we use digital negatives instead of in-camera negatives. I have been using inkjet in one form or another since 1985 so I spent only about five years of my 44 years as a printmaker without inkjet.

What has changed is how fast everything moves today. In the 1980s I would approach a painter with some techniques I'd invented or developed exclusively for them. That would take me weeks or months. I would visit them in their studio and show only some printed mark making that I thought would interest them in collaborating with me. They would then come to my studio for a trial run. They would not bring any original work with them. They would create the original works directly through my printing what they painted or drew on the printing plates. If they liked the beginning, they would return many times over many months. That type of printmaking took a lot of time. There would be days when the artist and I would just sit and stare at a colour proof, trying to figure out what it needed either to progress or feel finished. Then the editioning of the prints took place and more than likely six months or a year would have passed from the first contact to the signing of the editions. That was normal for Cone Editions. It was normal for all professional printmakers to some degree or other.

But today we rarely meet the artists and photographers we print for. The other reality is that we are often on very tight deadlines of just days or perhaps weeks if we are lucky. It can be overnight for some. That is how printmaking has evolved but in a sense it is printing rather than printmaking.

We have artists who come to work with us for a week or two, or sometimes longer. There are three and sometimes four of us working with the artist or the photographer. We have an idea of what we might do, but we approach it in an experimental fashion. If we're in the darkroom, we begin with chemistry formulas and humidity combinations and begin looking at what colour tone the platinum prints could be. If we're in the photogravure studio, we begin by mixing inks and trial proofing to get an idea of a beginning. In that sense it is very much like it used to be but it is still many times faster.

Jon Cone at sink, 2022

With inkjet we might print ahead so they arrive, can look at the initial prints, and then begin changing their imaging to reflect what their intentions are in print, and that is again a bit similar to the old days.

The studio's calibration in all our various process is absolutely spot on for any of our calibrator displays. We have a dozen displays which anyone can plug their laptop into and see how their work will print. What is odd, I think, is that this was more often the personal practice for inkjet printers in the 1990s and 2000s than it is when the LCD display replaced the CRT display. So today, there are fewer photographers at home who can predict their own output as a match to their displays. When photographers come to work with us they are mystified by how our displays are so close to what they are printing. This is a massive change in comparison to just a decade or so ago.

What is the greatest challenge when working with digital files submitted by photographers?

What we mostly see now from our clients are 16-bit files from large sensor sizes. Tiny image files with the intention of the photographer to print big are long gone.

We've attracted a lot of Leica users because of our Piezography printing. Their work really benefits from it and the cameras are widespread. Lately, we're seeing more and more of the big Fuji GFX, Hasselblad, and Phase One images. Our process is the only inkjet that can resolve that level of acuity. In the last two years we've been able to make platinum prints and photogravures from these types of high resolution, high acuity images. That's been a real treat for us and partly why we continue to develop Piezography.

The only challenges we get are from files we believe have been over-imaged, which lowers the print quality. It's hard for the photographers to see this on their displays. In this case, we just ask if there is a raw file available and we examine all the layers and see if we can't achieve the same look but with less invasive adjusting. This supports both the photographer's and our work.

We would never print a sub-standard image file and return a print that way. We always interject one way or another.

Could you tell us briefly about which kind of image is suited to a particular kind of paper? How do you judge an image and decide on the paper to bring out the best in it?

We rarely do this image by image. Our studio selects paper first. Most of our clients think this way also. However, the process of selection differs depending upon client type or which medium we are using to print the work. The decision may be functional in terms of handling or presentation as for our archive customers in which we make prints on the same paper for the entire image collection. In our platinum and photogravure we need to choose a paper that is best suited to the process yet resolves aesthetic issues.

We may trial different papers for individual clients but we are not looking for images to match these papers. It's the other way around. We try to find one paper that will be best suited to the suite of images or for a photographer who reprints and wants to maintain consistency in his offerings. So we will look for dMax when dMax is critical, or the colour of the white to support the type of image rather than compete with it. Texture is important (or lack of it) depending on the type of image. Sometimes the smoothest paper works best for high acuity but if a large format exposure of endless detail is printed, texture often gives the eye a resting point as it passes over a large field of detail. With customers for whom we print review portfolios we choose a paper that can be handled 10 or more times a day. It needs to be beautiful but mar resistant, which is important as the portfolio needs to look as fresh at the last review as it does in the first review. Choosing a paper that is less resistant to handling could ruin the portfolio from the first showing.

I think that occurs only during our workshops when photographers experience matching images to a paper and they try out any and everything from our extensive paper library. So the final showing might be a kaleidoscope of paper tones and textures. But presenting a portfolio or an exhibition usually comes down to a single grade of paper just for the sake of visual continuity. Of course it could also be effective in presenting each image quite differently if you chooses that as appropriate in the context of the work.

Do you use the same type of paper for the Certificate of Authenticity?

I've been printmaking professionally since 1980 and I have never been asked for a Certificate of Authenticity for anything I have printed. I know these certificates exist because I was aware when Innova first introduced it and then was followed by Hahnemühle.

Every print we produce is authentic, so we do not need to certify it, as it would suggest that some prints we produce are *not* authentic.

Janet Fish and Jon Cone silkscreen printing, Vermont, 1991

Please discuss the digital negative and how it fits in with the printing you offer. How do you calibrate the system to each customer's screen?

A digital negative is not a new concept. They've been around for a long time. I think of the IRIS negatives that were once produced for platinum printers back in the mid-1990s by the American Platinotype Company.

Digital negatives came later to prosumer inkjet in the mid-2000s. We found an opportunity in 2010 to offer the first Piezography digital negative system that overcame the defects of the more popular methods. Then again in 2016, I designed a system for David Chow, a well-known platinum printer in England, which leapfrogged past the then-current generations. And we continue to develop the highest standard systems today. We are in our fifth generation which we sell through InkjetMall and our sixth generation which we use exclusively to print film for other studios and photographers who have their own studios.

For those photographers or studios we make digital negatives for, we first calibrate their darkroom so that our film produces a perfect linearization to their darkroom processes. We send them targets to print which they send back to us for measurement. When we find out which monitor they have and/or calibration process they use we can apply an algorithm which takes that into consideration when one of their digital images is converted when we are printing the negative.

For those who are using hardware-calibrated displays designed for printing we can produce our longest dynamic range negatives as they can see this level of shadow detail or most of it on their displays. But those who are using laptops or the new superbright displays that are better suited for video than print, they cannot see as long a range of tone as we can print in the shadows and to some extent in their highlights.

They could choose for the film with more fidelity than they can see on their display or a film which produces a print that matches their display.

If we are printing the platinum prints for them, a conversation informs us if we should print linear to maximize the dynamic range or print in a way that will replicate the image they see on their non-calibrated display. For us at this point it is all transparent and effortless and we meet everyone's expectations rather than wasting any precious metals. It makes our platinum palladium printmaking most productive.

How does a photographer prepare images for the Platinum Palladium printing you do? Could you describe the process and how these prints look? The toning of these prints is very interesting. What are the six expressions you offer?

They can choose, if they like, to image the way they usually image. Although platinum palladium printing is known for a lower dynamic range with darker highlights and lighter shadows, with most of the tonal information located in the mid-tones, our digital negatives can produce prints that have an extremely wide dynamic range as I just discussed.

They can image to make their work look more historical. They would need to reduce the dynamic range of the images to bring the highlights down and move the shadows up. But most our clients have us print the way they would image for any medium and they like the way we have redefined what platinum printing can be.

We use a very expressive form of platinum palladium printing called Malde-Ware even as Pradip Malde and Dr. Mike Ware, its inventors, like to call the Ammonium Printing Out System. It is stable and its repeatability is extremely consistent. It can produce different colour tones in the final prints. So we need to limit the choices to what we call six impressions. But if a photographer were to come and work with us in the darkroom they could go in many directions.

Our best-selling expression is one that is very near neutral yet it is a 50-50 mixture of platinum and palladium just as our warmest mixture is. The controller of the colour is the iron solution and how we formulate it, and the exact relative humidity ratio. It sounds a bit daunting but our PiezoDN digital negative and the Malde-Ware process are a perfect marriage of technology and historical process.

Please give us a sense of your PIEZOGRAPHY monochrome ink and high quality monochrome inkjet printing.

Piezography is a process I invented back in the early 1990s for IRIS Graphics printers. It was originally called Digital Platinum for IRIS because the ink set and software I wrote imitated my impression of what platinum printing looked like. I had been given access to the George Eastman House collection to view well-preserved examples of platinum printing down through the ages and although I did not photo reproduce any of the examples, I retained an impression of them and set about formulating an ink set and software to control it so it could replicate that impression. In 1999 I was recognized as the PDN/PIX Digital Innovator of the Year for this invention when I introduced it at the PMA Convention.

It brought a lot of attention to quad black printing and that year I began developing my first quad black solution for the EPSON Photo Stylus 3000 printer which cost a few thousand dollars compared to $123,000 for an IRIS 3047.

My first black & white EPSON product was actually powered by an ICC profile. ICC was just beginning and it was too much technology to expect new EPSON users to understand it. It was too early although we had a lot of early adopters of that ConeTech system for EPSON printers.

Piezography was introduced in 2000 as a trademarked name for my process which used its own printer driver and monochromatic inkset. Piezography began to evolve rapidly, especially after we took over control of the formulation of pigment inks, which ended our status as an EPSON Developer. But it was the best thing to become solely independent. I introduced a 100% pigment inkjet formulation to EPSON printers long before they did, and we developed our way to a highly refined formulation of encapsulated carbon particles well ahead of our time. So, Piezography inks remain even to this day the absolute highest standard of ink you can use in an EPSON printer.

For a photographer that adopts our system, Piezography is a system of gradated shades of carbon-based monochromatic ink that are part of a system that includes specialized software which replaces the OEM printer driver and includes either a method to produce their own media profiles or includes an extensive library of printer profiles that we have produced.

Mathematically, an EPSON printhead with the most advanced OEM ink set can only produce a few hundred grey steps due to limitations in dithering divided into the few light blacks that EPSON offers. What Piezography does is to increase that number of grey levels to tens of thousands. And while the human eye can only separate at any one time just over 100 grey levels, it can shift to separate another set of 100 grey levels. Therefore, tens of thousands of grey levels is not actually unnecessary or a marketing ploy. The human visual system can easily discern between a Piezography print and an EPSON ABW print even when the EPSON ABW print was good enough.

Piezography increases the perceived resolution by three times, produces much more shadow and highlight detail, produces a much higher acuity of visual detail, and much smoother and longer tonal transitions. The fine art matte prints that it produces have been likened to the dust that is on a butterfly's wings and it really is that beautiful. Our UltraHD Matte Black is the darkest MK on Earth so a matte Piezography print will be about one full stop darker than an EPSON ABW print. The non-matte prints do not show any gloss differential between ink and the paper so they replicate the silver print experience. They are also absent of any metamerism. Side-by-side with a silver gelatin print, a Piezography print is hard at first to differentiate until one sees there is far more shadow and highlight detail and much more local contrast in the ¼ tones, mid-tones, and ¾ tones. Piezography has the longest dynamic range of any printing method.

This superlatizing of the EPSON printer carries over to digital negative making and to direct-to-plate photopolymer platemaking. Piezography Pro ink set can do all of this in one printer, and it can also imitate a huge array of colour tone expressions. So photographers who use our digital negative to make platinum prints, for example, will make platinum prints that have an unusually wide dynamic range as well as exhibit greater shadow and highlight detail.

No matter what type of file is printed with the system, the Piezography process beautifies it. Iphone pics are wonderful to print this way. But what we are seeing lately with the Fuji GFX, Hasselblad and Phase One files are cameras that can finally produce files that actually require Piezography to reveal all that they can capture. Leica users discovered Piezography many years ago when the monochrome versions came out. We have tons of Leica customers but now we are getting, more often than not, Phase One owners who have discovered that Piezography is literally three times the resolution of their EPSON-powered printers.

Unfortunately, a lot of these folks have purchased the EPSON 9570 which cannot be used with Piezography and some have sold them and bought the P9000 to convert to Piezography. A lot of these 100mb and higher photographers are printing with us now. There is something to be said about not having to deal with an EPSON printer so we are now getting 1GB files uploaded to our server for printing.

I have a dear friend, Michael Trupiano, who used to help me teach workshops in Santa Fe and he once told the class that Piezography will kick your butt. What he meant by that is it has so much resolution and acuity that any substandard imaging work will show up like a sore thumb. So, it makes a photographer become a really high standard imager because it reveals poor imaging defects that the EPSON printer does not have enough ink dots to reveal. Piezograhy prints the information that the EPSON printer loses between its dots of ink. Piezography makes an EPSON printer create an absolutely continuous tone.

Jon Cone at etching press, 2018

Which printers (currently available) can be converted to Piezo Printers?

We're still supporting older printer models way back to the 4000, 7600 and 9600. But what currently available printer models now depends upon which region the EPSON printer is sold into. It is more difficult in the USA because EPSON locks out third-party inks with many of their latest printer models while the same models sold in Europe or in China can still be used. For example, the European distributor for our products is Taos Photographic and they can sell Piezography in the EPSON P700 and P900 printers but these models cannot be used in North and South America. They have a different printer main board that detects a third party and will not operate.

Unfortunately, Covid and other factors shut down the Piezography Experience Centre in Shanghai but we still have a growing user base in China because China enforces consumer protection laws and they have the right to use whichever ink they want and the printer OEMs must comply if they wish to sell to China. So we tend to import new EPSON printer models from Hong Kong to develop on them and then hope for a third-party solution to be made as a work-around for the North and South American-sold printer models.

Right now in the USA, only the SureColor P6000, P7000, P8000 and P9000 printers can be used with a third party. EPSON recently succumbed to the worldwide shortage of chips and these printer models have now become a bit chipless as it regards EPSON cartridges but EPSON can offer a firmware upgrade that will knock out our chips supply for these printers. So we are very cautious and telling our customers NEVER to upgrade their firmware. We acquired a very large chip supply prior to Covid and the shutdown of the semiconductor plants. But our serial numbers are not a mystery and I would not advise any photographer who uses an inkjet printer to EVER update their firmware.

On the other hand, many of our customers find EPSON 7900 and 9900 printers with one or two missing channels and convert them to Piezography Pro printers. We support 9 inks or 11 inks in those printers. Our inks are much easier on the print heads than the OEM. And most colour ink users when they lose a single channel would rather buy a new printer than a new print head. Therefore, a lot of these printers get picked up for a few hundred dollars and are often free just for moving them. We provide software that will map out bad channels and organize the Piezography ink set around which channels are working.

We formulate a printer maintenance fluid we call Piezo-Flush which can bring back print heads that are thought to be dead. Time and patience and correct use of the fluid can often recover bad channels. A lot of our customers tell us they started off with a printer with missing channels and eventually recovered full use of the print head. So InkjetMall supports folks who choose to buy second-hand.

What is one thing that would make the biggest difference in printing when photographers prepare their files for printing?

I think proofing them first. Proofing is when you make a print without the intention that it might be the final. Proofing allows the photographer to see what their image first looks like. Seeing it in print reveals things in a very different way from staring endlessly at it via transmissive light. The idea of proofing is printing without the expectation that the print should be right from the start and that the print has a say in ultimately how it should be printed.

Without this process, a photographer will never have the opportunity to react to something unplanned or unseen in the print which is a fundamental part of printmaking.

Yet most photographers will spend the majority of their editing time in front of a display. Then they hastily make a print. Then they hastily return to the display to try and change the image so that it looks different in print.

If they slow down and really look at the print and intuit what the print needs to be when completed, they will change the way they make prints and how they end up preparing their files. This is the way of printmaking.

If a photographer would like to work with you, what would you advise them?

Most of the photographers we print with we never meet face to face. They upload their files to us. We take a look at the work and we make suggestions to make any obvious (to us) corrections or we send them a set of proofs to look at and consider. It doesn't take long for to understand the needs of the other. If you are asking practically, a photographer can email me, or they can contact the studio through our website, or they can upload to our upload page and start a conversation about our processes while we look at their work.

If technically, I would advise them to keep their image files in their native resolution rather than resize them in any way. Our printing processes increase the perceived resolution of the printers we use so they will benefit by having higher resolution files than they might have been advised by others. They should probably image in the AdobeRGB 1998 colour space rather than in Pro Photo space and this is because Pro Photo is future insulated but does not take into any consideration the limits of printing as AdobeRGB 1998 does. With Pro Photo they are better suited to imaging for the new brighter generation of high contrast and high gamut colour displays. But when it comes to print, they would do better by reducing their working colour space to one that is closer to what can be obtained in ink.

Ultimately, if a photographer has the resources in terms of time and expense, coming to work with us for a week can be work-changing. The benefits of being in-house and hands-on and immersed in all the printing possibilities we offer will influence the way they make photographs in the future, at least in how it relates to printmaking.

What is the future of photographic printing?

What I have learned across the board is that ultimately inkjet is a profit centre for the OEMs which have a huge shareholders' responsibility. No inkjet printer OEM is passionate about photography and fine art unless it generates fabulous profit opportunities. We know there is much less photographic printing going on in the 2020s than there was in the 2010s. This is evident in the year-end reports from Canon, HP, and EPSON in the photo sector. Their profit centres have now become photobook printing, web newspaper printing, and small office printing respectively.

This is mostly due to how photographers now share their work. A few decades ago, the only way was to print and now it is easier for photographers to reach a greater audience by sharing their photos online. The big disruptor to inkjet did not come from some new printing technology, but rather from Mark Zuckerberg and his Instagram and Facebook. AI is a more recent disruptor that is probably the greatest threat to light-based photographic capture, as it might affect the profit centre of camera and sensor makers.

Alternative process printmaking is rapidly growing. Photographers are discovering or returning to platinum/palladium printing, to gum printing, cyanotype and all kinds of historical process printmaking. But they are increasingly dependent upon inkjet to make their film. Others are returning to film and especially large format even as it is becoming more difficult to secure some of the larger format films.

Ultimately, in order to have a future, photographic printmaking is going to have to become dependent upon photographers who insulate themselves against obsolescence. We are only a couple of decades from when folks were freezing the last packages of Portriga Rapid and the last bricks of Panatomic-X film. I was. I loved Pan-X. It was so creamy and fine grained. It is now long-gone. But photography marches on in any form it will take. Cone Editions happens to stockpile new EPSON printers so we have unopened cartons containing 3880s and P9000s. I even squirrelled away one of the grand format printers from the 2000s which I did the Ashes and Snow projects with. That is my answer to the future as I see it.

I don't fear AI as a means to create photography, as anything in art making is valid as a means of expression. We are already making prints for photographers who are using it to generate their work. People are still collecting photographic prints and museums are still displaying photographic prints. But, whether the ultimate depository for photographic expression will be printed or online, we will need to wait for history to tell us. The Apple computer commercial of 1984, that Orwellian moment when a technology comes around that can be so disruptive has in some ways propelled the history of photographic printmaking to a perilous moment, hasn't it?

Please tell us about your workshops.

We have always taught workshops. Our first workshops were in Port Chester, NY in the 1980s when we taught silkscreen, intaglio, carborundum etching, and monoprinting. In the early 1990s we began teaching digital print workshops mostly on the IRIS printers which we would temporarily instal at a university and then organize a community workshop around the technology that was almost unheard of. In that way, we were able to get a lot of folks to begin thinking about digital and art making. In the mid-1990s I organized workshops at the MacWorld conferences in which 100s of folks were able to make prints on IRIS printers and gain access to the latest software. The idea was to bring inkjet and digital art making to the masses and I had unlimited support from the manufacturers for these presentations.

When ink became the financial lifeline of printer manufacturers, their support for my efforts began to reverse. We couldn't use their inks because they were not state of the art for art. It took a long time for them to catch up to my formulations. So I could have a relationship with an OEM when we provided them ink to private label, but they would not support my efforts in education. But this type of tolerance was okay with me because financially it supported my efforts and privatized the digital workshops, and that is what we did.

Since the mid-2000s, all these workshops have taken place at Cone Editions Press in Vermont. They are well attended and folks come literally from all around the world for a four-day print journey. We get folks who come back time and time again. One of our attendees is returning this summer for his eighth workshop.

Why they are so successful is because we focus solely on printing and the attendees leave with everything they need to know about printing. It's not just a box full of amazing prints, but the knowledge to print at the level we can. They even learn printer maintenance which is an essential item. The training they get in software is not about making images look amazing on screen, but how they look amazing in print. It is a workflow we want them to begin to master and by week's end they are actually running the studios themselves. So we know our system of teaching works when a neophyte can arrive and leave able to do a process from beginning to end with the print evidence to show that.

We teach digital negative making and calibration for any alternative process along with alternative process printmaking. We teach how we are able to make consistent results in an alternative print process such as platinum palladium print. We teach our methods of direct-to-plate photogravure along with how to best produce the prints on an intaglio press. They work on software we instal on their own laptops and they begin learning on their own system. We teach how to use Piezography and the best practices in that field. These are not workshops in which someone prints for them. They are printing solely for themselves.

We also have private workshops where an attendee comes to work with us for a week, presenting their own needs to us and we design an experience for them. Some will come for two weeks. They come from the professional lab sector, often from universities via grants, but more often than not we have folks who are retiring from their professional life and now want to ignite their photography passion into something tangible for themselves.

Jon Cone

www.cone-editions.com