JUST PAINT

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From Mark Golden

This past year I am reminded how quickly time is passing by. For over 25 years we've been publishing *Just Paint*. For 36 years Barbara and I have been graciously allowed to participate in the creative lives of so many talented artists. And to be able to call them our friends, has been a true blessing.

Last February one of our first customers, Kikuo Saito, passed away. I was just 26 when I first visited his studio on Chambers Street. He was so warm and inviting to a young, nervous kid. Over the years we had many visits where I shared the latest material we were exploring. During these conversations, Kikuo shared in our excitement, even asking for his own custom color, a brighter blue than any we had at the time. A few weeks later we made him "Saito Blue," which eventually became our Phthalo Blue (Green Shade). This past September we were joined by Kikuo's friends and family, including his wife, Mikiko, in the opening of the exhibition 'Color and Drawing,' a celebration of Kikuo's fabulous works. The paintings will remain in our Gallery (The SAGG) through March 2017 and can be viewed online at www.thesagg.org. A catalog of the exhibit is also available.

We lost another friend this past June, with the passing of Kenworth Moffett, a talented museum director, art critic, curator, and dear friend to so many artists. And in October we lost Walter Darby Bannard, an incredibly talented writer and amazing artist. It is easy to find in Darby's writing the kind of clarity of message many aspire to, but few attain. His work as a painter, immersed in the love of color, spans over six decades. We miss all these friends and their passing makes us feel just a bit older. Thankfully in their work, we are reminded of their legacies that remain and as we remember, we can smile.

Mark

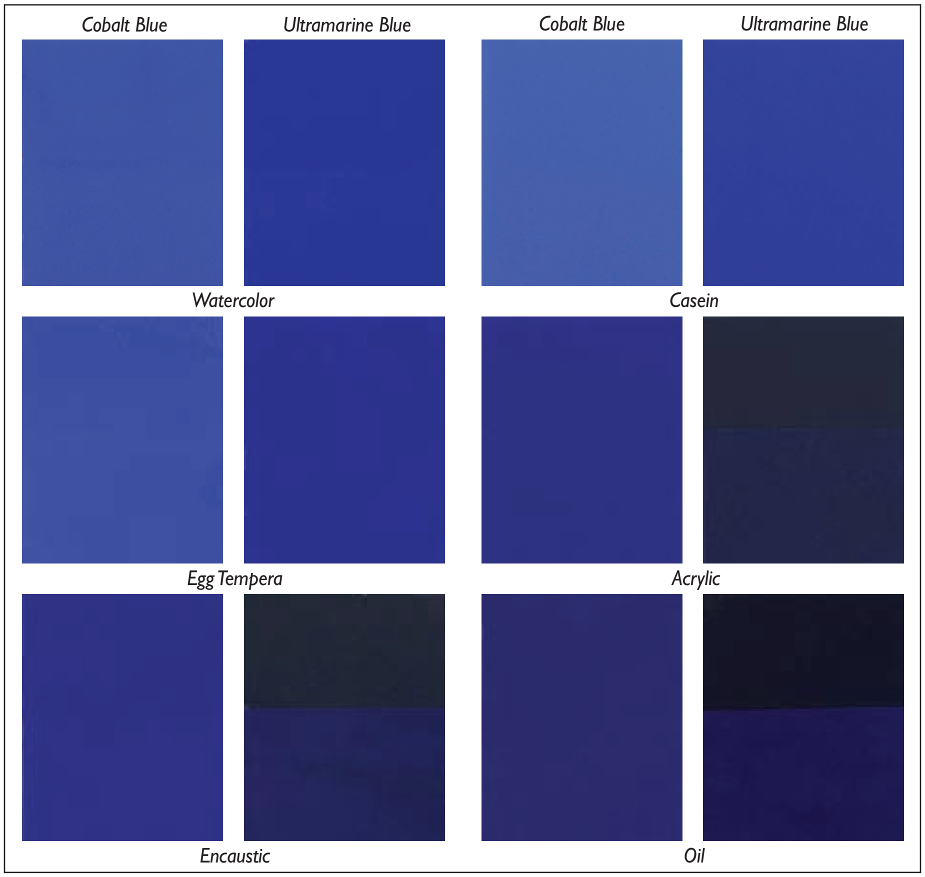

Image 1: *CAA Materials Panel Presentation Board showing Cobalt and Ultramarine Blue in watercolor, casein, egg tempera, acrylic, encaustic, and oil.*

Pigment Volume Concentration and its Role in Color

By Sarah Sands

Mention a well-known pigment like Ultramarine or Cobalt Blue, and we instantly picture a very particular and unwavering color. And why not – it is easy to think of pigments as having characteristics that remain constant as one moves between different mediums such as acrylics, oils or watercolors. Even if we accept that the handling properties or the pigment load changes, certainly the color is constant, no? In this article we explore the surprising answer to that question and examine some of the ways a pigment's color changes when used in different systems.

But first, a little background on how this theme came about. Every year Golden Artist Colors, along with other manufacturers, helps to organize and participate in a Materials Panel at the College Art Association (CAA). This last year the theme, "Pigments in a Bind(er)", looked at the impact of different binders on the appearance of pigments. Working in collaboration with R&F Encaustics, Gamblin Artist Colors, and Natural™ Pigments, samples were generated using identical pigments of Ultramarine and Cobalt Blue prepared in egg tempera, watercolor, casein, encaustic, acrylic, and oil. No fillers were used, allowing them to represent as much as possible the interaction of pigment and binder alone. These were cast on black and white drawdown cards at similar film thicknesses then cut into 2"x 3" swatches and carefully assembled on a display board (*Image 1*). What follows is adapted from our presentation, which focused on the role of pigment load in the appearance and film qualities of these very different paints.

Constants

Certain aspects of a pigment are considered constant, such as the molecular weight, refractive index, density, and chemical composition. Very little that we ever do as paint makers or artists will change any of those things. Absent from that list, however, is the one thing we almost always think of when referring to a particular pigment – its color. So the question is a simple one: why? Why do some of the swatches, all using the same pigment, look so different from each other? As we can see in *Image 1*, our panel of two pigments in six binders roughly breaks into two groupings with very distinct appearances. In one group you have watercolor, casein, and egg tempera, where the colors are brighter, higher chroma, and more opaque, especially with Ultramarine Blue. In the others (acrylic, encaustic, and oil), the colors grow deeper, redder, and with Ultramarine Blue in particular, considerably more translucent.

One would typically think that the Refractive Index (RI) of the binders would be the culprit, but while this can sometimes be a crucial factor, in this case the data simply does not support that common theory. There clearly is not a broad enough range to account for the sharp differences (*Table 1*[i]).

Binders	Refractive Index
Beeswax	1.5
Acrylic	1.475
Linseed Oil	1.475
Gum Arabic	1.476
Casein	1.54 - 1.67
Egg Yolk	1.525

Table 1: Binders and Refractive Indexes

Pigment Volume Concentration (PVC)

Looking past refractive index as a main cause, a more promising possibility is that the changes are driven by differences in the Pigment Volume Concentration (PVC), defined as the ratio of the volume of the pigment divided by the volume of both pigment and binder together:

PVC = pigment volume / (pigment volume + binder volume)

This represents the percentage of pigment in the paint layer after everything has fully dried and is what most people think of when talking about 'pigment load'. And sure enough, if we look at the paints that were made, the division we noticed between the visual appearance of casein, watercolor, and egg tempera vs. oil, acrylic, and encaustic is clearly echoed by the sharp increase in the percentage of pigment in each of the dried films (*Table 2*).

	Pigment Volume Concentration (PVC)	
Paint	Cobalt Blue (%)	Ultramarine Blue (%)
Encaustic	5	14
Acrylic	20	36
Oil	28	46
Watercolor	64	76
Casein	72	81
Egg Tempera	72	81

Table 2: Pigment Volume Concentration (PVC) Percentages for both Cobalt and Ultramarine Blue in the 6 different paint systems.

Critical Pigment Volume Concentration (CPVC)

As the ratio of binder to pigment changes, one reaches a sweet spot where the pigment is at its maximum loading while still having all the air between the particles completely filled with binder. This optimal point is known as the Critical Pigment Volume Concentration, or CPVC. While every paint system will be different, the CPVC generally falls somewhere in the 30-60% range. As one moves along this continuum (*Image 2*), and past the CPVC, one moves towards a paint film that has an increasingly large number of voids, which in turn leads to a layer that is more matte, more permeable, and increasingly fragile.

Looking at these stages more diagrammatically, if we were to peer inside a paint film at different stages, we would see something similar to the following contrast between a starting point of dry pigment alone, a paint film at CPVC, and one that is well above that level (*Image 3*).

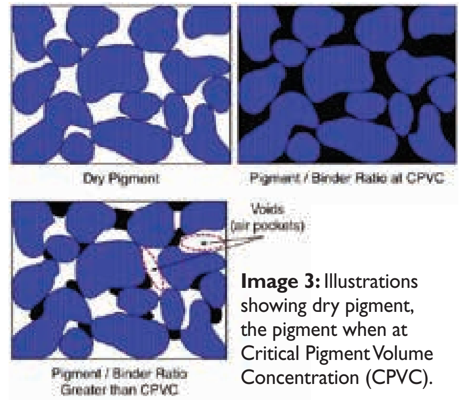

Image 3: Illustrations showing dry pigment, the pigment when at Critical Pigment Volume Concentration (CPVC).

The actual surface of a paint film above CPVC, with a 60% pigment volume ratio, is dramatically captured in the following electron micrograph (*Image 4*).

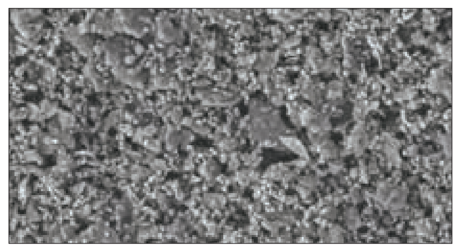

Image 4: Scanning Electron Micrograph of paint film above CPVC, with pigment volume ratio of 60%. *Gloss And Surface Structure Through A Paint PVC Ladder*, N J Elton, A Legrix. © 2008, Suroptic Ltd.

As the surface texture changes, the appearance of the paint can change dramatically as well, as we saw in the contrasting samples shown earlier.

When paints are at or below CPVC, their smoother surfaces scatter less light, allowing more of it to penetrate and be absorbed by the pigment. As a result, the color will feel more saturated and deeper in value, as well as typically appearing more transparent since the difference in the refractive index between the pigment and binder is far less than the pigment and air. A smoother, glossy surface

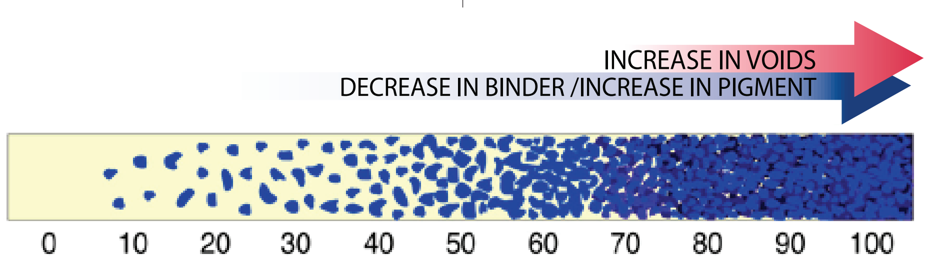

Image 2: Pigment Volume Concentration Ladder, showing increasing PVC ratios.

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also reflects light away from the viewer in a more orderly, controlled manner. While one might occasionally get a sense of a highlight or patch of glare, one almost never sees the type of diffuse scattering associated with matte surfaces (*Image 5*).

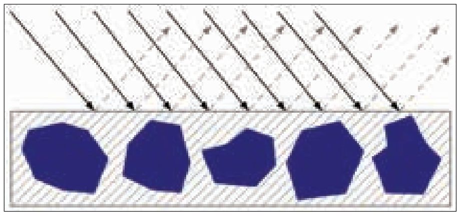

Image 5: Reflection from a glossy paint film at or below CPVC.

As a paint film climbs above CPVC it becomes increasingly matte and textured until, if pushed far enough, the pigments become underbound and only partly held in or coated by the binder. At this point the pigment scatters light to a far greater degree, since there is a much wider difference between the pigment's refractive index and that of the surrounding air. In addition, the rougher surface scatters light in a far more random pattern, and this haze of white, diffused light appears to blend with the color of the pigment, causing it to seem lighter and often chalky or washed out by comparison (*Image 6*).

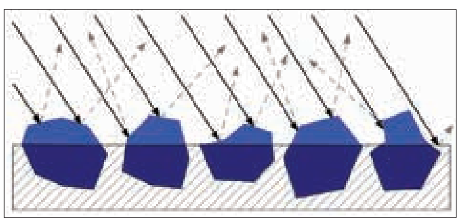

Image 6: Reflection from a matte paint film above CPVC.

Lastly, the overall scattering is affected by the number of voids or air pockets

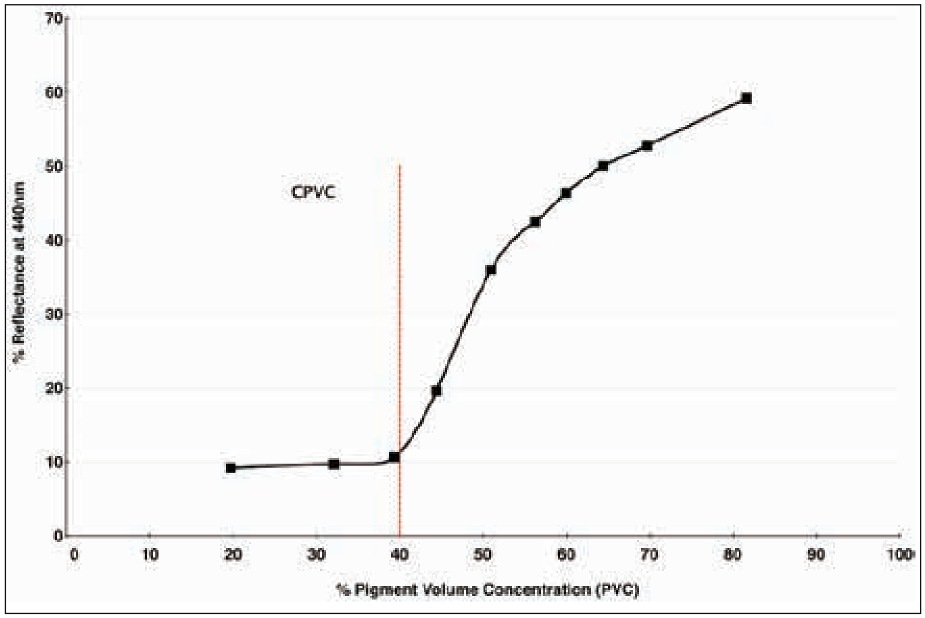

Image 7: Percent reflectance of Ultramarine Blue at various Pigment Volume Concentrations. ©American Institute for Conservation of Historic and Artistic Works (AIC). [ii]

found within the paint as these will scatter additional light that happens to penetrate below the surface, causing the color to appear quite opaque as a result; the internal haze of light acting like a form of interior fog that blocks any ability to see the surface below.

Robert Feller, a major figure in conservation science, happened to illustrate many of these changes in appearance in 1981 by measuring the surface reflectance of Ultramarine Blue paint formulated at an ever increasing PVC. Readings were taken at 440nm, which is the wavelength of maximum reflectance when this pigment is fully encased in a binder (*Image 7*).

As you can see, as the pigment volume ratio crosses the CPVC mark of 40%, there is a sudden and quite dramatic increase in the amount of light that is reflected from the surface, going from a mere 10% to nearly 60% by the time 80% PVC is reached. If we now look at the spectral reflectance curves from our six swatches of Ultramarine Blue, we see a similar uptick at the 440nm mark. Here the three paints with PVCs running from 14-46% (oil, acrylic, and encaustic) indeed top out a little above 10% reflectance, while the three systems with PVCs running from 76-81% (watercolor, egg tempera, and casein) reaches reflectance levels of 50% or more (*Image 8*).

While Cobalt Blue is clearly a different pigment, with a very different spectral reflectance and refractive index, we can still see a similar pattern, albeit not quite as dramatic (*Image 9*).

While there can be little doubt that Pigment Volume Concentration impacts

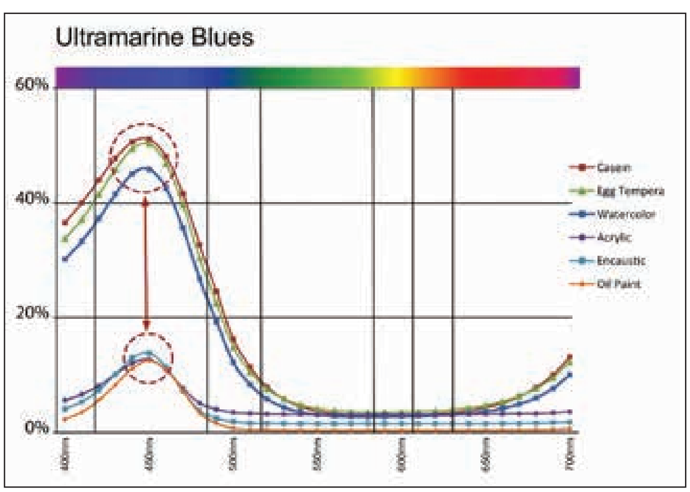

Image 8: Ultramarine Blue Spectral Reflectance Curves showing increase in reflectance at 440nm.

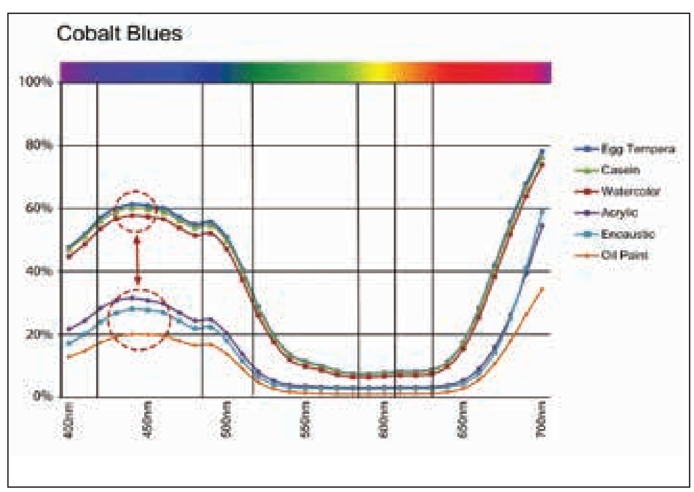

Image 9: Cobalt Blue Spectral Reflectance Curves showing increase in reflectance at 440nm.

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the ultimate appearance of a color, there are other differences that need to be looked at and which can be easily overlooked. To do that, we looked at three paints in our study – casein, acrylic and oil – and unpack the implications of their different PVC ratios, especially given their very different formulations.

Cobalt Blue

If we take the PVC ratios of dried paint films for Cobalt Blue in acrylic, oil and casein, we get the following diagram showing the relative amounts of pigment to binder for each system *(Image 10).*

In this view, acrylics and oil do not appear wildly different, even if oil does have a PVC that is 8% higher. However, when placed next to Casein, which has an incredibly high pigment load of 72%, that difference seems to pale by comparison. However, focusing on these numbers alone can give a somewhat misleading sense of the systems as a whole. To do that, we need to add back in the one large component that is missing – namely the water found in both acrylic and casein – while keeping in mind that oils, by their nature, are a 100% solids system with nothing that evaporates away. This leads to a very different picture (*Image 11*).

This is a very different type of comparison and one that points to important issues masked by the broader, simpler PVC ratios when taken in isolation. All of a sudden one can see that acrylic and casein have similar percentages of pigment when compared to their overall systems (10%), and because water is necessary in their formulations, there is no practical way they can ever match the 28% pigment load of Cobalt Blue in oils. Thus the very real and frequent sense that oils possess a density that is unique and unrivaled, and that goes directly to not only the nature of oil and pigment when milled together, and the fact that oil molecules are exceedingly small and very efficient at wetting out pigments, but the sheer fact that nothing evaporates or leaves the film. Acrylics, and other water borne media by contrast, must always contend with having to accommodate a large percentage of water in their formulations. So, even when the final pigment to binder ratios might be close, as with Cobalt Blue in acrylics and oils, the actual experience of the paint in its wet state is of something with far less pigment load and density.

In *Image 12* the only change is the removal of water, thus showing an illustration of the pigment to volume ratios after they have dried. Continuing our unpacking of how simple ratios can sometimes mask other relationships, we can see how the original PVC percentages do continue to hold true. The initial 10% pigment in the acrylic does represent 20% of the final dried film, while with casein, because we rounded numbers to make the graph easier to read, the ratio of 10/13 comes to 77% rather than the desired 72% that was reported. But still roughly correct. Also note the comparatively small percentage of binder remaining in the casein, not to mention how much thinner the resulting film is due to the extremely high percentage of water at the outset. Overall, it speaks to a film that, while being exceptionally matte and opaque, is also extremely brittle and porous and suitable only for inflexible supports. Acrylics, on the other hand, are by far the most flexible of the three systems, and have a strong enough and high enough level of binder to allow them to be reduced with as much as 1:1 with water and still produce a durable film with good adhesion, while the clarity of the acrylic binder allows for the Cobalt Blue color to retain its saturation and clarity far into the future. Oils, on the other hand, need to constantly contend with having a binder that will eventually grow yellow over time, and the 72% of oil in this color suggests why so many manufacturers will grind Cobalt and other blues in safflower or poppy oil, even though those oils produce weaker and more fragile films – a trade off one needs to be careful about.

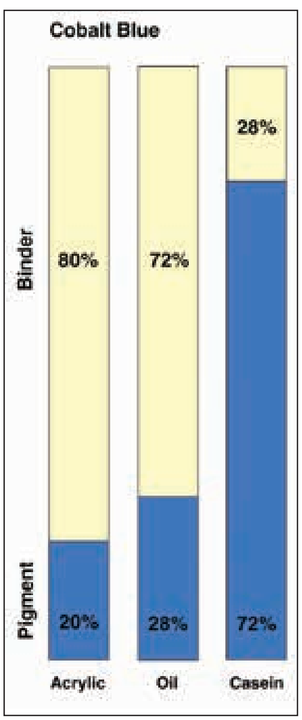

Image 10: Comparison of the PVC for Cobalt Blue in Acrylic, Oil, and Casein.

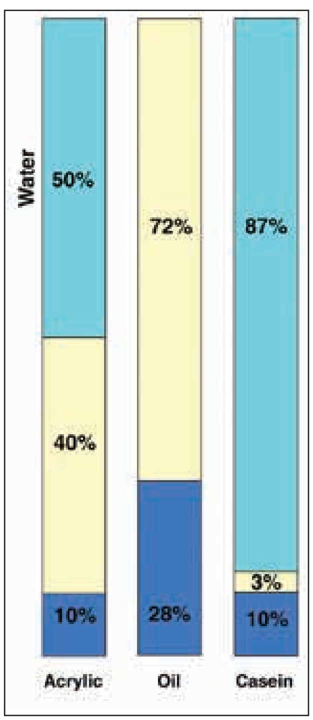

Image 11: PVC for Cobalt Blue in Acrylic, Oil, and Casein with the water component for Acrylic and Casein added back in.

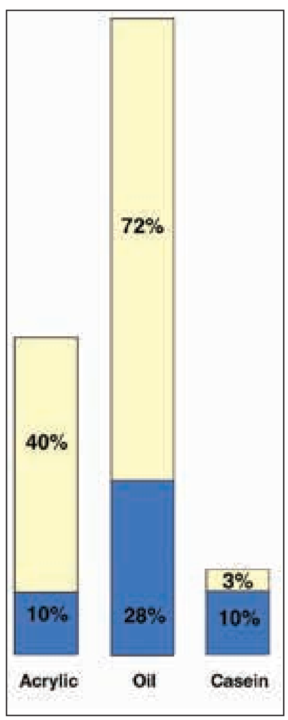

Image 12: Showing the relative PVC for Cobalt Blue in acrylic, oil and casein after drying.

[i]*A brief note is also in order on the issue of the refractive index of both casein and egg yolk. While The Science of Painting (Mayer,Taft, 2000) gives this as 1.338, which is similar to sources reporting the refractive index of milk or casein dissolved in water, most commercial references list the refractive index for dry or powdered casein as between 1.54-1.67, which is what we have decided to use here. Similar discrepancy can be found with egg yolk. In "Light: Its Interaction with Art and Antiquities" (Brill, 1980) a figure of 1.353 is given, which is a common figure given in many commercial reports on egg constituents in their liquid form, while Alan Phenix, Conservation Scientist at the Getty Museum, in his article "The Composition and Chemistry of Eggs and Egg Tempera", reports a refractive index of dried egg yolk at 1.525, which is likewise what we have chosen to report. This divide comes about as both egg yolk and casein, in their natural states, are complex emulsions where a high percentage of water plays a large role and causes the refractive index to appear to be much lower then it eventually becomes once everything has evaporated and formed a solid film. As it is this dried state that we are studying, and which ultimately shapes our perception of the paint swatches, we feel that the refractive index values given for dried egg yolk and powdered casein are more accurate.*

[ii]*Feller, Robert L. Figure 3, Percent reflectance vs. pigment volume concentration, ultramarine UB-6917 in dammar, in "The Effect of Pigment Volume Concentration on the Lightness or Darkness of Porous Paints." Preprints of Papers Presented at the Ninth Annual Meeting, Philadelphia, PA, 27–31 May 1981. Washington, DC: American Institute for Conservation of Historic and Artistic Works (AIC), 1981, pp. 66-74.*

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Painting on Metal: An Introduction

By Mark Golden

Question: How often do they repaint the steel on the iconic Golden Gate Bridge? *Answer:* Every day, non-stop, repainting areas of corrosion (28 painters). Painting metal, especially metals exposed to variable environmental conditions is not something even our most advanced coating systems can stand up to over time, measured not in decades but in just years.

Metals include any elements which have metallic properties, including the ability to conduct electricity, being able to create permanent shape and form as well as deformed at average temperatures and typically have a luster. There are also a few elements defined as 'metalloids' that in some conditions behave like metals, such as boron, carbon, germanium, silicon and antimony.

Metals are typically grouped into two categories: those containing iron (ferrous metals) and those not containing iron (non-ferrous metals). The ferrous metals range from wrought iron, cast iron and many iron compounded materials containing carbon (carbon steel) as well as alloys of various other metals such as nickel steel, tungsten steel, chrome vanadium steel, etc.

The non-ferrous group contains all the other metals including copper, magnesium, lead, nickel, molybdenum, zinc, tin, brass and most importantly, aluminum. With this enormous array of possible choices for artists, the opportunity to shed light on using metals as a support cannot be covered in one simple article. Over the next several issues we will cover best practices for painting on metal supports. Each piece will detail their particular idiosyncrasies and some simply less suitable or appropriate for use as a surface to support the application of a painting.

Although many metals have found their way into beautiful and important painting supports for artists, aluminum is by far the most consistently used support material of all the metals for paintings. For this reason it is important to start our evaluation of using metals as a support with painting on aluminum.


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San Francisco Golden Gate Bridge at sunset.

Part 1: Aluminum

The element Aluminum is the most prevalent metal in our earth's crust, but only within the last 125 years was it even feasible to work efficiently with this metal. Aluminum has become so ubiquitous in our world that it seems almost impossible to believe that previous to the mid 1800s, the pure metal was considered more precious than silver or gold.

Aluminum is now available in over 1,700 grades and finishing processes with tens of thousands of applications. While combing through much of the research in the field of coatings for aluminum and reviewing the many online 'how-to' guides it is quite a daunting task for any artist to feel confident in working with this material. Is it possible to reduce the clutter, refine our choices and define best practices when working with this material? Probably more realistic is to share good and better practices, as well as a nod for best practices for those wishing to go the extra mile in prep and / or cost.

We will first investigate choosing the most appropriate aluminum for a painting support. Next, the recommended preparation and priming of the aluminum support for subsequent painting.

Which Aluminum to Use

There are essentially 8 different grades of aluminum with a wide range of properties for working, welding, machining and corrosion resistance. The more important grades of aluminum for artists include those that have excellent corrosion resistance. These include the 1000, 5000 and 6000 series. Other grades of aluminum are used by artists, but are typically optimized for other valuable uses. Both 5000 and 6000 series are typically used for outdoor and harsh marine environments. The first number in the grading system is indicative of the primary alloy used with the aluminum to create its specific properties. In the 5000 series it is Magnesium. In the 6000 series it is Magnesium and Silicon. Commonly used grade series include 5005, 5052, 5083, 5456, 6005, 6061 and 6082. Each specific number denotes the particular levels of other alloys incorporated into the aluminum to provide specific properties of hardness, strength, workability, tensile strength, elongation, etc. For example, Aluminum 5052 contains minor quantities as well of Copper, Silicon, Iron, Magnesium, Manganese, Zinc and Chromium.

When purchasing aluminum sheets there is also typically another designation referring to its degree of tempering (most commonly an H or T followed by a number). This simply refers to the degree of processing the aluminum has undergone, whether from additional heat, strain or work hardening. For example, an aluminum sheet that has been coated with a heat treated paint system might have the designation H4 suggesting that the heat from the application of the coating has affected the properties of the metal. These designations are less critical for artists working with the substrate and much more important for fabricators working and machining the aluminum.

Aluminum sheets can be purchased in solid sheet form or laminated with inner cores of wood, solid plastic or honeycomb polyethylene plastic or aluminum thereby reducing its total weight. Many of these laminated forms can be shaped by manufacturers to conform to artist's needs. From oval to multi sided, and in a range of cut-outs as well. These panels also typically have a limited range of expansion and contraction making them quite suitable for many coatings both flexible and rigid. Depending upon the overall dimensions required, solid sheets come in various thicknesses as does the solid core or honeycomb support, with larger works best supported by increasing the thickness of the aluminum sheet or core material. A rule of thumb for composite panels for the same level of rigidity or bending stiffness as sheet aluminum is to increase the overall thickness of the composite by 30-40%. This will still provide a reduction in the overall weight of the support. For honeycomb panels, the typical thickness is ½". For larger pieces beyond 4 feet, a thicker panel may be appropriate. For solid core panels the most common thickness for smaller works (2 feet and smaller) would be 1/8" thickness. For works much larger, it would be common to use the ¼" solid core panel. Much of this depends upon the level of support provided by the framing, bracing or cradling of the work.

Aluminum supports come with a wide range of finishes, including non-treated, anodized, conversion coatings, coil coating, and painted with various systems including polyester paints, fluoropolymer resins (FEVE), polyvinylidene fluoride (PVDF) and other painted systems.

It is important that the artist is aware of how the aluminum support has been treated before preparing the aluminum or painting on the surface. The internet is full of examples of artists just going at it and painting on the raw aluminum, whatever the surface, and with great delight proclaiming, "It's been hanging around for 7 years and the painting looks just fine". This is always your prerogative as an artist but there are definitely better approaches that will be more likely to assure satisfactory results.

Uncoated aluminum is a very reactive metal that will quickly combine with oxygen in the atmosphere to begin creating an aluminum oxide layer. Eventually, as this process continues, especially in unprotected environments, it may lead to a more visible, white hydroxide layer on the surface. The aluminum oxide layer actually creates quite a corrosion resistant surface. Anodized aluminum is a process that takes advantage of the protective oxide layer and dramatically increases the thickness of this layer, making it the perfect choice for outdoor storage tanks and other structures that require greater corrosion resistance. Because it is a fairly porous layer it is also easy to chemically dye anodized aluminum. Unfortunately, an oxidized aluminum surface whether created naturally or through the anodizing process, is not the best surface for paint adhesion and will require additional measures to prepare them to successfully accept applied coatings.

Type	Decimal Inch Thick	Inch Thick	Metric mm Thick	Gauge	Approx. Weight lb/sq. ft.	Approx. Weight kg/m²
Alucore®	0.9842	~1"	25.00		1.49	7.30
Alucore®	0.7874	~3/4"	20.00		1.43	7.00
Alucore®	0.5905	~5/8"	15.00		1.37	6.70
Alucore®	0.3917	~3/8"	10.00		1.02	5.00
Alucore®	0.2362	~1/4"	6.00		0.96	4.70
Dibond®	0.2362	~1/4"	6.00		1.39	6.80
Dibond®	0.1575	~5/32"	4.00		0.97	4.75
Aluminum	0.1563	~5/32"	3.97	6	2.30	11.23
Aluminum	0.1250	1/8"	3.18	8	1.80	8.79
Dibond®	0.1181	~1/8"	3.00		0.78	3.80
Aluminum	0.0938	3/32"	2.38	11	1.30	6.35
Dibond®	0.0787	~5/64"	2.00		0.59	2.90
Aluminum	0.0625	1/16"	1.59	14	0.90	4.39
Aluminum	0.0313	1/32"	0.79	20	0.45	2.20
Aluminum	0.0156	1/64"	0.40	26	0.22	1.07

Brands include **US:** Dibond®, Alucore®, AlumaCorr™, Nu-Alum™, Signabond Lite®, Alumalite™, Omega-Bond™, LusterBoard®. **UK:** Reynobond®, Alupanel®, Alcom®, Alucobond®, Alpolic®. **Australia:** Alusign, Ulltrasign, Econ-Panel®, Alco-Panel®, ALPV-Panel®. **EU:** Aludecor®, Alupex®, Flexibond®. **Asia:** Alucomat®.

The aluminum sign industry has created quite a few prepped and pre-coated aluminum surfaces, which with proper treatment, provide a very successful option for artists wanting to work on aluminum substrates. One of the most successful and most generally available of these aluminum laminates is Dibond®. This product is fabricated with two outer aluminum panels, .3mm thick, using a corrosion resistant, 5005 grade aluminum alloy. Its inner core is a solid polyethylene plastic which is available in different thicknesses, so the overall thickness ranges from 2mm (5/64") to 6mm (1/4"). The aluminum surface is coil coated with a polyester lacquer system. Other aluminum panel systems are similarly prepped with various surface treatments and coating systems that dramatically reduce the steps required to prepare raw aluminum sheeting for painting. Although many artists simply begin painting directly on these prepared substrates, there are still several steps that most manufacturers have suggested to improve the performance of any applied paint or coating.

Preparing Aluminum Pre-primed Panel for Painting

Although some manufacturers suggest their panels don't need any preparation before painting it is important to take at least a minimum level of precaution to clean your substrate. Brands such as AlumaCorr™, Signabond Lite® recommends at least wiping down the panel with a grease remover to remove any grease from previous processing or fingerprints. This could be as simple as using a lint free cloth with an appropriate grease remover (alcohol) that does not leave a residue (remember to keep your hands off the front of the panel).

Best practice is to also lightly abrade the surface after degreasing with wet/dry sandpaper. Make sure to avoid sanding

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through the applied coating. Then wipe off any dust from the grinding process with the alcohol wipe before painting. The supplier or manufacturer of your panel would be able to provide their best advice for their coating system. Dibond® and Alucore® recommend this process for subsequent applications of coatings:

1. Pre-clean with Ethyl- or Isopropyl alcohol (apply to a lint free cloth first and not directly on surface).
2. Follow with a light buff sanding using 360 Wet/Dry sandpaper.
3. Remove dust with cloth moistened with the alcohol.
4. Allow sufficient time to dry.

GOLDEN Materials and Application Specialist Scott Bennett, has written an article in JustPaint.org about best practices for painting on DiBond® (page 14).

Preparing Unprimed Aluminum Panels for Painting

With all of the choices of prepared aluminum composite panels, if you desire to work on a pure aluminum surface and want to maintain that aesthetic of a reflective metal, you may need to prepare your own panels. If you've chosen this route because you believe you can save money in the process, you may be surprised. To properly prepare a raw aluminum stock panel there is quite a bit of work that an artist must be willing to do to create a proper, most durable surface to paint on.

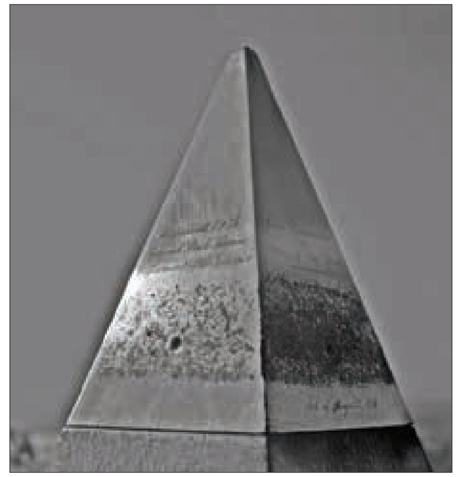
As described earlier, aluminum sheet metal of any grade will immediately start to oxidize upon contact with air. This aluminum oxide surface, although protective of the aluminum, is not a good adhesive surface for subsequent painting. Therefore, it is not best practice to paint directly on an untreated aluminum substrate.

For best practice to prepare an aluminum sheet for painting, three steps are required that will provide the most assurance that both the paint will remain attached and the metal will be less prone to continue to form disturbing oxidative products on the painting. These steps include degreasing (desmutting) the aluminum, then etching the surface by chemical or mechanical means to remove the oxide coating on the aluminum and then applying a conversion coating on the metal immediately to again reduce the level of the aluminum self-oxidizing. As much as it would be wonderful to share with artists that there are easily available commercial products that will make this work straightforward, I must share that the materials and techniques required are not typically within the reach of most artists, nor reflect how most typical studios are equipped.

Several years ago there were quite a few products in the marketplace, especially within the marine hardware universe that would both provide easy etching and coating solutions for the typical consumer. Almost all of these products are currently off the consumer market. The chemical etching solutions typically require a caustic soda or phosphoric or sulfuric acid to clean and etch the aluminum. The best coating systems required the use of the very toxic hexavalent chromium oxide (remember the film Erin Brockovich) system. Other safer systems using trivalent chromium or combinations of zirconium and titanium are not typically available within the normal consumer hardware stores. Some of these products can be found in automotive refinishing or commercial marine refinishing shops specifically for refinishing aluminum wheels and other automotive parts or aluminum hulls. Obviously these are not to be used unless one is willing to devote some time to learn how to deal with these chemicals as well as understand the appropriate disposal of these materials.

Essential First Step

If you aren't interested in the full Monty, then it is critical to wash down the aluminum surface to remove any grease or oily deposits (especially from oily hands). While acetone can be used, more professional degreasers are available. For example, AWLGRIP® makes a product that one can find in marine hardware stores called Awlprep Wipe Down Solvent or POR Metal Cleaner Degreaser. A strong alkaline cleaner will also work to degrease the aluminum, yet many will also begin to pit the metal. It is important to use one that is safe on metals. Examples of consumer products include Simple Green® Extreme. Products like Ajax®, Borax® (20 Mule Team), and Mr Clean® will also remove the aluminum oxide coating and should be used in recommended dilution and in contact with the aluminum as briefly as possible. Do not allow these materials to dry on the surface and make sure to completely clean with sufficient water (deionized preferred) after use to avoid spotting. As always, use appropriate personal safety equipment to avoid dangerous exposure to these materials. The use of appropriate gloves is necessary to avoid re-contaminating the surfaces with skin oils. This process avoids paint delamination caused by grease, dirt or oils.



The aluminum apex (9" x 5") from the Washington Monument was cast by William Frishmuth of Philadelphia, the only domestic producer of the ore. At that time, it was a rare metal more valuable than silver.

Taking it to the Next Level

The next step in best practice for preparing an untreated aluminum surface is to remove the oxidized layer. It is possible to remove the oxidized layers by mechanical methods, meaning sanding or grinding. Sanding the metal surface both removes the aluminum oxide coating as well as provides an etched profile of the surface that will aid in adhesion of subsequent coatings. If sanding, it is essential to avoid using other metal sanding materials such as steel wool which can imbed impurities into the aluminum and dramatically speed up the corrosion process. It is recommended to use a 3M Scotch-Brite™ Red Scuff pad. It is also best to avoid any sanding tools coarser than 80 grit. To remove marks created with these coarser papers, continue to sand using progressively finer and finer papers (200, 400, etc.). To remove sanding dusts it is best to use a tack cloth, blower or vacuum to pick up the particles.

Another route to etch an aluminum surface is to use a chemical etching system. There are resources, especially from marine hardware suppliers, that can provide several solutions. Alkaline etchants such as caustic soda will remove the oxidative layers. One product that will not only etch the aluminum surface but also prime the surface is AWLGRIP® Wash Primer CF Converter. It is a two component etching primer that can create an interlayer for subsequent paint

Continued on page 13

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Kikuo Saito
Color and Drawing

September 24, 2016 through March 24, 2017

Kikuo Saito, c.1990, Cape May Point, New Jersey
©William Noland

By Jim Walsh

Fortune is said to favor the bold. If so, when Kikuo Saito left Japan in 1966, at age twenty-seven, to take up residence in New York City, his bold and uncertain decision enjoyed Fortune's broad and generous smile, and continued to do so for five decades of engagement, experimentation and development.

Saito's background in painting and in experimental theater was in full effect prior to his departure from Tokyo. He was aware of the artistic powerhouse that New York City had become, and that geographically, Soho was the nexus for a burgeoning variety of expressive artistic paths. Within his first days in America, en route to New York on a Greyhound Bus from landfall in San Francisco, he made one stop to visit the Art Institute of Chicago. At the Institute, a fortunate and chance meeting occurred with Ellen Stewart, the founder of the La MaMa Experimental Theater Club. In years to come, Stewart anchored his interest in experimental theater to a vital environment that put Saito in contact with collaborators and fellow travelers for his theatrical endeavors.

After arriving in New York, Saito immediately enrolled at the Art Students League on 57th Street to study with painter Larry Poons. Saito and Poons would remain friends until Saito's death in February 2016.

'Color and Drawing' features acrylic paintings made in two blocks of time – from 1979 into the 1980's and two decades later in 2012. In the years between, Saito had painted in oil paint

© Kikuo Saito

Summerland, 2012, Acrylic on Canvas, 75 1/2" x 46 1/4"

Sam & Adele Golden Gallery, Golden Artist Colors, New Berlin, NY

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in stylistic investigations in which he challenged himself to break new ground. The departures of style in the corpus of his abstractions will be the subject of other exhibitions elsewhere in the future. But for this exhibition at the Sam & Adele Golden Gallery (The SAGG), we can observe the interplay of color and 'drawing' within an abstract painting, and the uniqueness these intermixing elements can present as they provide potentials for exploration.

The 'drawing', of course, refers not to pencil to paper, but to the vectoring and organizing of divisions, shapes, emphases, erasures and everything that brings a work compositionally to life. Color speaks for itself, but as with every other part of the painting, 'color' demands that it not be taken for granted, or 'painted' for granted. How you breathe life into the painted color, to deliver it afresh, remains a fundamental challenge, a requirement that differentiates between the art and the banal.

All of this occurs for Saito within the blank canvas as a space for improvisational painting, for uncovering portals to enable visual delight, to disclose his sense of discovery.

The works in 'Color and Drawing' comprise a series of paintings that relate to one another, expanded over a generation. In 2012, Saito looked back and reinforced the works of several decades previous. In doing so he witnessed subtle changes affirmed through years of immersion, years of studio practice.

© Kikuo Saito

Blue Ladder, 1980, Acrylic on Canvas, 64 1/2" x 46"

Left to right: Isaac AlaridPease, Bryan Wilson, Jessica Clark

Congratulations to the 2016 GOLDEN Educator Residents!

By Emma Golden

With the success of last year's GOLDEN Educator Program, we couldn't help but say YES to another year of partnership with the Alliance for Young Artists & Writers! Artists Isaac AlaridPease from Albuquerque, NM; Jessica Clark from Fairmont, NC; and Bryan Wilson from Charlotte, NC; joined us this summer for the Golden Artist Colors sponsored program. They were selected in May to attend a unique Residency Program at the Sam and Adele Golden Foundation for the Arts. Teachers, whose students received the Scholastic Arts Award for visual arts were offered an opportunity to apply for the Residency. Scholastic and the NAEA conducted the difficult task of reviewing 129 applications for the selection process.

In 2016 students in grades 7-12 from across the U.S., submitted over 320,000 works of art across 29 different categories of art and writing. The awards were presented at an inspiring ceremony at Carnegie Hall this past June by the non-profit Alliance for Young Artists & Writers. Now in its 3rd year of collaboration, Golden Artist Colors partnered with the Scholastic Art and Writing Awards to celebrate educators across America who support and encourage the creative process. In recognition of the Alliance's efforts to support the arts, Golden Artist Colors also presented 9 additional teachers whose students were awarded top honors within the Alliance program, with a $1,000 gift certificate for materials for their personal use.

Isaac, Jessica and Bryan were hosted at the Sam & Adele Golden Foundation for the Arts Residence Barn in New Berlin, N.Y. for 2 weeks. The building provides living space, 24/7 access to individual studios, and is situated right down the road from the GOLDEN paint factory. This unique program provides access to all paint materials produced by GOLDEN, including acrylics, oils, watercolor, and custom products. Over the 14 days, Material Specialists from Golden Artist Colors delivered an in-depth survey of different techniques and materials to the artists. Emphasis was placed on the importance of developing one's own artistic process, while gaining access to the most innovative processes and techniques in art making. Experimentation was encouraged.

To learn more about Scholastic, GOLDEN and the Golden Foundation:

www.artandwriting.org/news-and-events/golden-residency

www.goldenpaints.com

www.goldenfoundation.org

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GOLDEN Archival MSA Varnish Over Transparent Watercolor on Paper

By Cathy Jennings

Dirt damages the beautiful surface of watercolor on paper, and ultraviolet light fades delicate washes. Watercolor paintings need protection when on display. Acrylic sheeting and art conservation glazing options have widened the choices beyond traditional framing behind glass. However, museum-grade UV non-reflective glass and acrylic glazing can be expensive and add weight when shipping artwork. Are there alternatives that might offer equal protection against damaging UV light?

Varnishing offers one way to liberate watercolor painting from the cage of glass and frame. We have received numerous questions about varnishing watercolors, and even have an Application Information Sheet discussing the process.[1] Since GOLDEN Varnishes shield paint from UV light, they should protect against light-related fading of watercolor paint. How does our Gloss Archival MSA Varnish with UVLS[2] compare with other protection options when watercolor on paper is exposed to light? We conducted testing to find out.

Comparative Lightfastness Protection Testing

Protecting watercolor paintings from potential light-related fading can be an important display consideration. Watercolor paint has very little binder, which exposes the pigment particles more to light than if the same pigment were in acrylic or oil paint. The American Society for Testing and Materials (ASTM) provides separate lightfastness tables for pigments in each of these painting mediums, and a pigment often has less lightfastness in watercolor.

ASTM refers to a "Delta E" unit when determining how much change exposure to light creates in paint.[3] A single unit of Delta E is the minimum amount of change noticeable to an average viewer. For lightfastness of artists' paints, ASTM designates from 0 to 4 Delta E units of color change as Lightfastness I (Excellent), over 4 to 8 as II (Very Good), over 8 to 16 as III (Fair, Not Permanent), over 16 to 24 as IV (Poor, Fugitive), and a Delta E greater than 24 units as V (Very Poor, Fugitive). High quality artist-grade paints are Lightfastness I or II.

For comparative lightfast protection testing, we measured Delta E in light and medium watercolor washes from three different colorants: 1) PR255 or QoR Pyrrole Red Light, rated Excellent (Lightfastness I) in watercolor by ASTM; 2) a fugitive fluorescent pink dye; and 3) PR83 or true Alizarin Crimson. Alizarin Crimson was one of the pigments first tested when ASTM developed lightfastness testing procedures for artists' paints, and ASTM rates paints made with this pigment as having Poor (IV) lightfastness in watercolor.[4] Since QoR® Modern Watercolor does not contain paint with PR83 or fluorescent dye, our formulators created these two watercolors for our test. The dominance of fugitive paints in our investigation created a 'worst case scenario' to push the limits of the coating's ability to provide protection against light exposure.

Diluting each of the paints with distilled water, we painted multiple medium and light intensity washes (mw, lw) on Arches® Natural White 140 lb. (300 gsm) Cold Press Watercolor Paper. The dilution ratio and wash intensity were judged by eye. We evaluated dry washes for evenness and similarity in value, and then flattened those selected. Squares of each wash would be kept as unexposed controls or protected by the coatings to be tested for lightfast protection.

Before exposing the swatches to light, we needed a starting point reading against which to compare potential changes to color. We used an X-Rite VS450 spectrophotometer with CIE L*a*b* color space (CIE 1976) to read and record color in five spots on each watercolor wash square. Averaging these readings provided a pre-exposure control analysis of the color on that particular square.

We employed a QUV booth to subject the swatches and their protective coatings to light using accelerated UV exposure testing. The QUV's UVA fluorescent ultraviolet bulbs provided a UV spectrum similar to sunlight through window glass.[5] Each 400-hour cycle of accelerated exposure provided the rough equivalent of about 33 years of museum lighting. Three separate sets of swatches were exposed for 400, 800, and 1200 hours in the QUV, which created comparative readings for approximately 33 years, 66 years, and 99 years of illumination. Moisture levels in the chamber fluctuated with the ambient low humidity of a New York winter, and testing temperature was set to 60° C.

Painted swatches in the QUV were either bare or covered with a potential protectant, as our test targeted the following coating options:

No Coating: Not covering the watercolor on paper at all would be a worst-case scenario.

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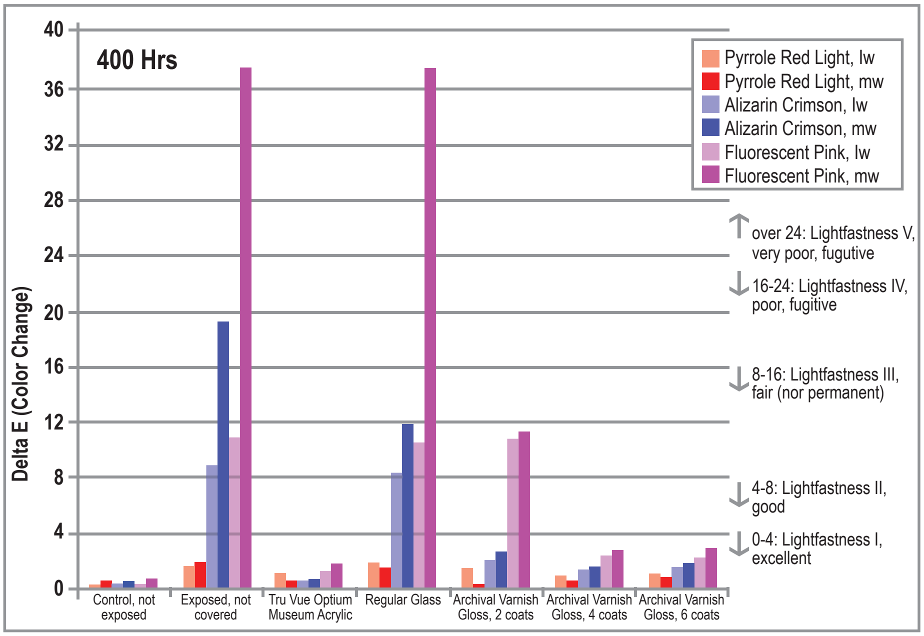

Table 1

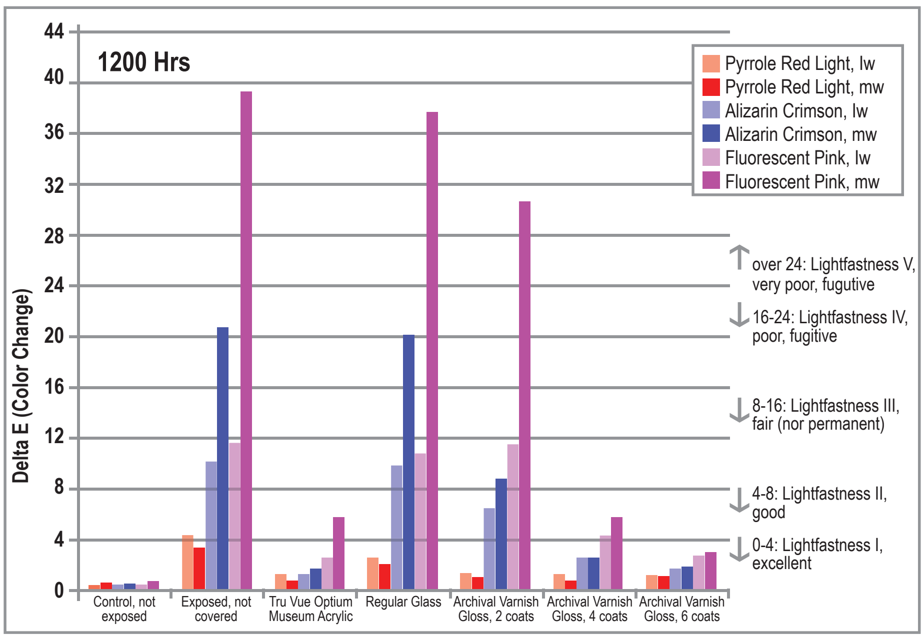

Table 3

Regular Glass: This was the original option when framing a watercolor, and many artists continue to use it.

Tru Vue® Optium Museum Acrylic®:[6] Described as an Art Conservation option, this blocks up to 99% of UV, providing a gold standard of lightfast protection when framing a watercolor. It also resists abrasion, will not shatter, is anti-static, and non-reflective.[7]

GOLDEN Gloss Archival Varnish with UVLS in two, four, and six sprayed layers: This is the aerosol version of our MSA Varnish. What protection does Archival Varnish offer, and how do the results compare to the other options being tested?

This range of coatings allowed us to test possibilities in use by artists today. The potential differences between Delta E readings of swatches exposed through regular window glass, Tru Vue Optium Museum Acrylic, and GOLDEN Archival Varnish with UVLS were especially important.

After exposure, we read each square again in five spots and averaged the readings into a post-exposure analysis of the color on that square. Again using the spectrophotometer, we compared the pre- and post-exposure readings to determine the amount of change for that particular square. This change is its Delta E number. Each square represents a specific combination of watercolor paper and watercolor paint used, wash applied, protective coating (if any), and exposure hours. In all, each of the 342 squares was read 10 times for a total of 3,420 spectral readings. We averaged the three swatches for each test option into a single Delta E representing that test combination.

Lightfast Testing Results

Tables 1 and 3 present the averaged results of 400 and 1200 hour exposures. As can be seen in these tables, even the non-exposed control swatches show a small variance between their comparative averages. This may be attributed to inconsistencies in hand-painted washes and slight differences in placement when being measured. Although the chart is not included here due to space limitations, the 800 hour Delta E readings (*Table 2*) can be found in the JustPaint.org version of this article. It should be noted that while our results provide information on behaviors within the strict parameters of this test, watercolor and UV protectants might interact differently in other applications or over time in real-world lighting situations.

At 400 hours, protection provided by Tru Vue, four coats, or six coats of Gloss Archival Varnish provided excellent protection for the watercolor test swatches. All of their painted samples remained under Delta E 4 and within the ASTM Lightfast I (LF I) range, with Tru Vue providing slightly better protection. All Pyrrole Red Light washes in the 400 hour exposure stayed LF I. In comparison, while two coats of Gloss Archival Varnish protected the other washes, Fluorescent Pink earned LF III ratings for both washes. With glass, both of the Alizarin Crimson washes and the light Fluorescent Pink wash earned LF III, and the medium Fluorescent Pink fell to LF V. After 400 hours of exposure, the unprotected Alizarin Crimson and Fluorescent Pink light washes both earned a LF IV. Unprotected medium washes fell to LF IV for Alizarin Crimson and LF V for Fluorescent Pink.

At 1200 hours, all of the washes remained in LF I when protected by six coats of Gloss Archival Varnish. Tru Vue kept all but the Fluorescent Pink (FP) medium wash in LF I, with this wash falling to LF II. With four coats of Gloss Archival Varnish, both Fluorescent Pink washes were in LF II and the other washes remained in LF I. Under two coats of Archival Varnish, a light wash

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Figure 1: Light and medium washes of QoR Pyrrole Red Light with (left to right) no varnish, 2 layers, 4 layers, and 6 layers of Archival Varnish (Gloss).

of Alizarin Crimson (AC) rated LF II and a medium wash LF III; a light wash of Fluorescent Pink fell to LF III and a medium wash to LF V. Regular Glass and 'exposed not covered' readings for light washes of Fluorescent Pink and Alizarin Crimson were LF III. Both of their medium Alizarin Crimson washes came in at LF IV, and the medium Fluorescent Pink earned LF V.

In keeping with its ASTM rating, Pyrrole Red Light remained in the LF I category for all but the 'exposed not covered' light wash at 1200 hours, which earned Delta E 4.23. This is slightly over the border into LF II. Since this pale wash had less pigment than the 40% reflectance wash used for ASTM lightfast testing, this rating is not surprising.

Varnishing changes the aesthetics and nature of watercolor on paper (*Figure 1*). However, because the current testing only focused on lightfastness vs aesthetics, this issue was compounded by our choice to only apply Gloss varnish since it allowed for the best color measurements. The downside is the fact that multiple layers of Gloss varnish in particular can create an almost laminated look. Because of that, we hope to show in a future article some of the ways to minimize this by using a combination of Gloss and Matte varnishes. Looking at current results, six coats of Gloss Archival Varnish did an excellent job with lightfast protection. However, six coats also filled in the paper texture and created an extremely glossy acrylic surface. From certain viewing angles, light reflecting off this coating obscures the painting. With four sprayed varnish coats, the surface is less glossy, the paper texture still has a presence, and reflective light is broken rather than continual. With two coats, there is more texture and less varnish, which results in a very slight glistening quality with reflected light. Varnishing also can create permanent changes to color and light-dark values within the work. It is always good to test to be sure the changes are acceptable.

In contrast, the almost invisible and removable protection offered by Tru Vue® offers very little change to the aesthetics of the watercolor, and allows the surface of the paper to maintain its unique and subtle interplay with light. When taking into account lightfastness protection, preservation of a watercolor on paper's unique surface, and the traditional aesthetics of a watercolor painting, Tru Vue® provides an excellent option.

Conclusions

Our investigation used a majority of paints with poor lightfastness, which provided a harsh test of protection against the damage created by ultraviolet light. Regular glass and two coats of Archival Varnish (Gloss) did not prove effective against fading of fugitive paints due to UV light. Protection increased with more layers of varnish. Although four coats of Varnish provided some protection, six layers of Archival Varnish (Gloss) kept all of the test squares within a Lightfast I category when exposed to the equivalent of about 99 years of museum lighting. Except for the Fluorescent Pink medium wash, Tru Vue® Optium Museum Acrylic® also kept all colors to Lightfastness I with 1200 hours of exposure. Regular glass did not provide this protection. Pale washes of even LF I paints may fade with a century of exposure to ultraviolet light, and our testing suggests that the protection of as few as two layers of varnish can help prevent those color changes. For artists who embrace the aesthetic changes created by varnishing and are interested in pushing the boundaries of traditional watercolor, GOLDEN Archival MSA Varnish offers a valuable option for lightfastness protection of transparent watercolor on paper.

[1]Golden Artist Colors, "Application Information Sheet: Varnishing Watercolors with GOLDEN Products," http://www.goldenpaints.com/technicalinfo_varnwatercolor (accessed 4/4/2016).

[2]UVLS stands for Ultraviolet Light Stabilizers and is the component in the varnish that provides lightfastness protection to the artworks over which they are applied.

[3]For more information, see Sarah Sands, "Delta E: A Key to Understanding Lightfastness Readings," Just Paint, http://www.justpaint.org/delta-e/ (accessed 3/30/2016). According to ASTM D4303-03 "Standard Test Methods for Lightfastness of Colorants Used in Artists' Materials," a spectrophotometer and the CIE L*a*b* color space (CIE 1976) are to be used to determine Delta E. This analysis of color change is based upon comparing pre-exposure spectrophotometer readings and post-exposure readings of a paint's color. Larger numbers represent more damage from light and greater change to the color.

[4]ASTM D5067 "Standard Specification for Artists' Watercolor Paints," p. 2, 6.

[5]"Sunlight, Weathering & Light Stability Testing," Q-Lab Technical Bulletin LU-0822, rev. 2007, p. 6, Q-Lab.com. http://www.q-lab.com/, http://www.q-lab.com/documents/public/cd131122-c252-4142-86ce-5ba366a12759.pdf (accessed 4/12/2016).

[6]"Tru Vue® Optium Museum Acrylic®," Tru-Vue.com, http://Tru-Vue.com/solution/optium-museum-acrylic/ (accessed 3/30/2016).

[7]"Product Comparison for High Performance Acrylic and Glass Solutions," Tru-Vue.com, http://Tru-Vue.com/wp-content/uploads/2015/12/TRU_5954_AcrylicSellSheet_V2.pdf and "Acrylic Collection Fact Sheet (English)," http://Tru-Vue.com/wp-content/uploads/2016/01/TRU_5763 FactSheet_9_11x17.pdf accessible via "Technical Info and Resources," "Tru Vue® Optium Museum Acrylic®," Tru-Vue.com, http://Tru-Vue.com/solution/optium-museum-acrylic/ (accessed 4/11/2016).

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Continued from page 7

applications. Other available etching primers typically have opaque finishes. POR® Metal Prep, TRANSTAR® 1K Self-Etching Primer, U-Pol® 1K Acid #8 Etch Primer or SEM® Self Etching Primers come in black, gray and green. Rust-Oleum® Self Etching Primer is a gray coat and is typically available at your local hardware paint supplier. All of these coatings require personal protective gear including gloves, eye protection, ventilation and manufacturer recommended respirators.

Clear Coatings

We recognize that many artists using the aluminum as a support are attracted to the reflective metal surface of bare aluminum. This is probably something you shouldn't be preparing yourself. The most permanent surface for painting on aluminum that will leave a fairly bare aluminum look requires the application of a conversion coating. A conversion coating is a chemical finish that reacts with the surface of the aluminum to create a natural oxide coating that inhibits and slows further oxidation and when combined with the other processes, creates a better bonding surface for subsequent applications of paint. The most preferred material for this process is a chromic conversion coating. This is a process that requires both appropriate personal as well as environmental and industrial safe guards. It is a process that requires practice and timing to get this right and must proceed right after all the other processes are complete to assure that the surface of the aluminum has not begun to oxidize. There are several sites that will give advice as to how to complete this process. Although the information above provides a brief survey of products and a brief explanation of the process, I advise our customers wanting to work on aluminum, to have your materials surfaced by a professional aluminum converter or to use factory prepared aluminum panels.

Anodized Aluminum

Anodising is an electrolytic process that is used to increase the thickness of the surface oxide films on aluminium. The resultant films are hard, durable and inert and have better corrosion resistance and strength compared to finishes produced by chemical processes. The anodic films are normally between 5 and 25 microns thick depending on the end use, in particular, how aggressive the end-use environment is. Anodized aluminum can be a great surface for using dyes to color the aluminum. Unfortunately they are not the best surfaces for adhering a paint layer as the aluminum oxide creates a matrix that creates a fairly hard glassy surface. There is a variety of opinions, and artists have shared that they've been successful with painting on anodized aluminum. This is not our advice, as most professionals involved in preparing anodized aluminum recommend removing the oxide coating and starting the process as if it was bare metal.

Aluminum is a beautiful reflective and stable surface. Using the proper aluminum support will dramatically increase the lifespan of your artwork.

UNIVERSITY *of* DELAWARE
Department of Art Conservation

Materials Information & Technical Resources for Artists

By Mark Golden

When Mark Gottsegen, a well-known educator and expert in artist materials, passed away in the Fall of 2013, an unbelievable amount was lost. Not least among them was AMIEN, the much beloved discussion forum on art materials that he founded. For Mark, AMIEN was his dream. From his desire to educate and provide real information to the arts community, this independent artist resource was created. When his death was announced, and later the website closed, we commented that his passion and leadership could not be replaced, but we looked forward to finding a new independent home for this remarkable service for artists who care about their work.

The AMIEN Board, including Robert Gamblin and myself tried for several years to see if an educational institution, museum or conservation program might be willing to take on this important work. In conversations with Debra Hess Norris, Chair of the Department of Art Conservation of the University of Delaware, we hoped that Brian Baade, Assistant Professor at UD and his partner, Kristin DeGhetaldi, MA in Conservation and PhD in Preservation Studies might be willing to take on this effort, especially after seeing the attractive site they developed for art conservators through auspices of UD and the Kress Foundation. Kristin and Brian were certainly aware of the value this resource could be for artists and agreed to both create and moderate the site with the support of the University. We offered to help seek funding from several art material industry manufacturers, distributors and retailers.

We are delighted to announce the launch of MITRA, a new resource for artists developed under the auspices of the Department of Art Conservation at the University of Delaware. This independent online forum and website provides information and education on art materials and techniques to practicing artists and educators around the world. The site will share both best practices and cutting-edge scientific research, while an important aspect of the forum will be its absolute objectivity. You can find the MITRA website at www.artcons.udel.edu/mitra.

While MITRA has taken the late Mark Gottsegen's AMIEN forum as its inspiration, it has also expanded it in scope. It will cover subjects as traditional as oil paint, gilding, and watercolors, as well as more modern, experimental art materials. Brian and Kristin have pulled together an impressive list of experts in the fields of art materials, art conservation, and materials science to serve as website moderators and informational resources.

GOLDEN was always deeply involved and supportive of AMIEN, and likewise we are proud to be equally involved as MITRA takes shape. We are also especially proud that so many members of our arts material industry have stood together to help provide the support in conjunction with the University of Delaware to make this possible, including: Blick Art Materials, Derivan Pty Ltd, Jerry's Artarama, MacPherson's, Royal Talens, Ampersand Art Supply, ARCH Drafting Supplies, Art Spectrum, C2F, Fredrix Artist Canvas, Gamblin Artist Colors Co., Grafix, Grimstad Comerford Group, Hyatt's –All Things Creative, OPUS Framing and Art Supplies, Plaza Artist Materials, R&F Handmade Paints, Artisan, Binders Art Supplies & Frames, Dakota Art Store, and Lenz Arts, Inc.

We look forward to helping make this a valuable resource for all and encourage you to participate in the conversations that take place there.

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Painting on Dibond® Panels

By Scott Bennett

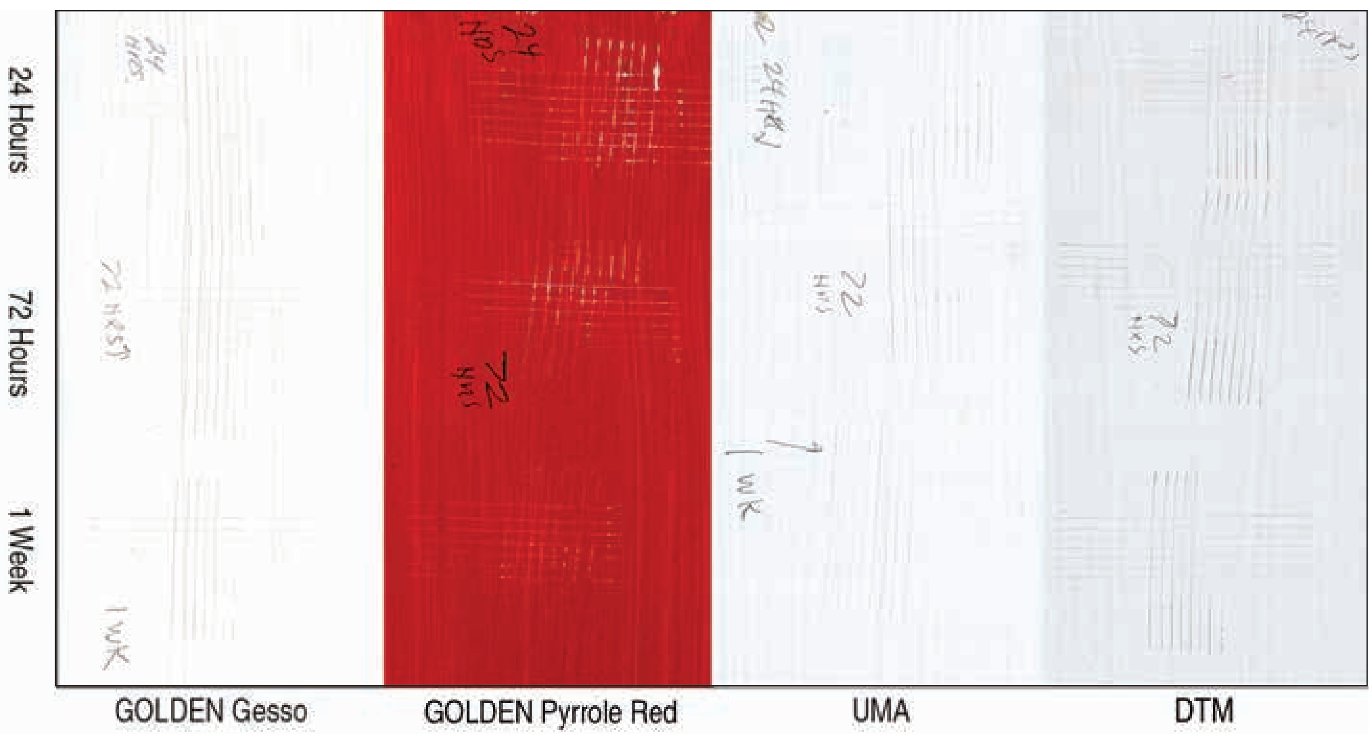
Reprinted from Justpaint.org February 2016

Dibond is a trade name for a type of painted aluminum composite panel made by Alcan Composites. There are other brands and types of Aluminum Composite Panels that may have a bare aluminum side or different types of coatings, which may require different surface preparation.

Dibond panels are made with two lightweight sheets of .012 aluminum with a solid thermoplastic core. Both sides of the aluminum are coated with a polyester paint. The advantages of this type of panel are:

- Dimensional stability
- Very lightweight
- Relatively inexpensive
- Available in large sizes
- Long term durability

The current information from the Fabrication Manual from Alcan/3A Composites says that the best direct adhesion occurs after lightly scuff-sanding the painted polyester surface followed by wiping with isopropyl alcohol, and then application of properly selected paints. They also caution not to sand through the coating to the aluminum surface. Acrylics are mentioned among the list of "suitable paints", and this suggests that many of our Acrylic Mediums, Gels, Gessoes and other waterborne acrylic products should have similar adhesion. With some higher viscosity products, however, an effect called "hold out" is a possibility, and variations in a formula could alter adhesion, so we always encourage testing.



Tests for adhesion *using the* cross hatch adhesion test at 24 hour, 3 day and 1 week intervals.

Results were good to excellent with all the products, with no squares coming off at any of the time intervals. At 24 hours our Gesso and Heavy Body Acrylic had good adhesion with some minor failure as tiny bits of product were pulled off with the tape, primarily on the subtly thicker ridges produced by the brush. Both of the commercial primers had excellent adhesion after 24 hours. At both 72 hours and one week, the Gesso showed some very minor flecks of paint still lifting, while the Heavy Body paint was now performing quite well.

It is interesting to note that while both of the bonding primers worked equally well, they have very different colors and surfaces. The DTM primer has a pale greenish gray color and is quite toothy, almost like our Acrylic Ground for Pastels, and could easily take pastel and various dry drawing media very well. The UMA primer was much smoother and a pale warm white color. However, it is important to point out that these primers were made to be covered with paint so we cannot assume there would not be changes to their color, as they are not fine art grade products. Also, whenever using commercial products, please remember that they can often change without notice, so testing and reading the company tech sheets is always strongly recommended.

Finally, while a simple light sanding and degreasing with alcohol allowed painting directly on Dibond with our Heavy Body paint, and this should be true for our other acrylic paint lines and products, our test obviously did not cover all the possible materials, applications, and environments you might be working in. So it is always important to test. If for any reason you need increased adhesion, then the bonding primers we tested could be an alternative to look into.

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Adhesion Test Products

It is very important not to touch the cleaned surface with your fingers as this can leave oils that will interfere with adhesion. They also recommend always testing the paint system you are using for adhesion and suggest a cross hatch adhesion test, which is something we also often recommend. The following are adapted from both their guidelines and the testing we do:

- Apply the paint or ground and let dry for a minimum of 24 hrs. As both sides of the Dibond panel are the same, you can use the backside for testing if desired, leaving the front untouched for now.
- Over a 2" square area, using a razor blade or X-Acto® knife, cut a series of parallel lines 1/8" apart. Then cut another series perpendicular to these, to form a crosshatch pattern.
- Make sure to only cut through the paint and not through the Polyester coating.
- Apply a piece of strong masking tape to the center and burnish.
- Peel the tape straight back at a 180 degree angle in one rapid movement.
- For best adhesion, no paint squares should come up.
- If any parts of the squares do come up, the test can be repeated after 3 days, 1 week, and even 2 weeks. It is not unusual for some coatings to improve in adhesion over time, depending on application and environmental conditions.

If there is need for increased adhesion, or for an exterior application, we recommend applying a suitable commercial primer to the prepared surface. These are often called "bonding primers" and are made for hard, non-porous surfaces. Two that are widely recommended are included below in our testing. While Alcan does not mention oil paints as one of the "suitable paints" for use directly on Dibond, once you have a suitable primer applied, then oil paints or an oil ground can be used.

Here is a link to the Fabrication Manual for 3A Composites' graphics display products:

http://graphicdisplayusa.com/downloads/Dibond%20Fabrication%20Manual_May%202011.pdf

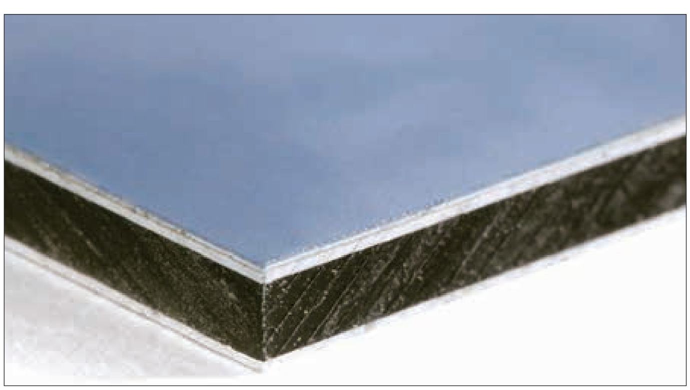
We selected four products to test for adhesion to the sanded Dibond surface:

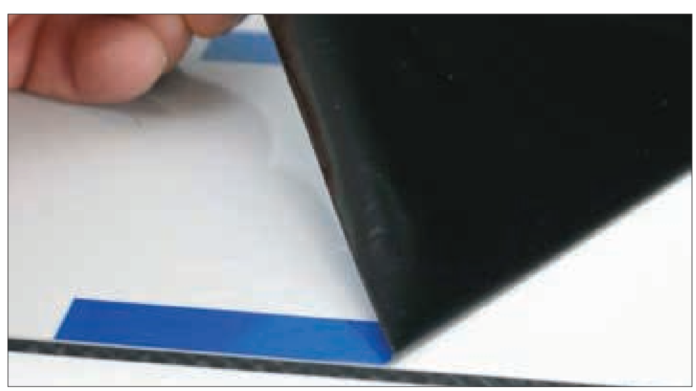
1. Sherwin Williams DTM Bonding Primer
2. XIM's UMA (Urethane Modified Acrylic) Bonder Primer (White)
3. GOLDEN Gesso
4. GOLDEN Heavy Body Pyrrole Red

We determined that DTM Bonding Primer and UMA Bonder Primer would be the best two commercially available primers since both specify use on polyester coatings and other hard-to-coat surfaces, and we have seen successful applications with these products in the past. This does not mean that other similar primers could not work as well. PLEASE NOTE: While all the products we tested can be used for interior applications, we DO NOT recommend our Gesso for exterior use.

As a first step, we lightly sanded the polyester painted surface on a piece of Dibond using 150 grit (fine) sandpaper, making sure not to sand through to the aluminum, and then degreased it with isopropyl alcohol, wiping enough to remove all of the fine white powder from the surface.

We then divided the Dibond panel into 4 sections and applied the coatings using a white bristle brush in one relatively thin layer. The coatings were tested for adhesion using the cross hatch adhesion test at 24 hour, 3 day and 1 week intervals. We use a standardized adhesion test kit that contains a special type of tape, a burnishing tool and an 8 blade knife to make the cross hatch cut pattern, which creates 49 small squares on the test area. For maximum adhesion, no pieces of any of the squares should come off. This is always the ideal to aim for. If any squares come off entirely, then one has complete adhesion failure. If small bits come off, retest after several days or a week has passed and see if there is improvement.


Close up of Dibond® panel


Peeling backer off Dibond®

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Made In Paint 2016

By Emma Golden

The doors of the Sam and Adele Golden Gallery opened on April 9th for the 4th annual Made in Paint exhibition, highlighting the works of last year's artists-in-residence. Over 300 people attended the opening night with many more visitors stopping by to see the exhibition before it came down in August. Several of the artists came back for the opening as well as past residents.

Made in Paint is about color, acrylic objects, and paint on surfaces ranging from canvas, linen and hand woven fabric, to aluminum, paper, panel, and tarp. Paint has been poured, sewn, piped, and layered, depicting portraits, but also with a more contemporary feel, using lines, shapes, and symbols, along with the more traditional use of the materials.

Each year, The Golden Foundation provides a unique 4 week residency program for over 20 artists, providing opportunities to explore modern technology and to experiment with the latest materials, all while continuing a tradition which has spanned thousands of years…painting.

Viewers can learn about the 2015 artists and more, by visiting www.goldenfoundation.org. A catalog is available by contacting Emma Golden at contact@goldenfoundation.org.

This program is made possible with public funds administered by the Chenango Arts Council, and is made possible by the New York State Council on the Arts (NYSCA) with support from Governor Andrew M. Cuomo and the NYS Legislature.