Finish Notes™

The newsletter of architectural finishes investigation from Frank S. Welsh company

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WELCOME TO OUR SECOND NEWSLETTER

We received many positive reviews and comments from our readers following the premier issue and are very encouraged. We appreciate your comments and invite your continued participation. In this issue we have our first product review. We also have expanded the format to include a supplement to cover our changeover to the CIE LAB color system to better serve the accuracy of color communication.

More Exact & Flexible Color System Now In Use

Changing color systems

In the premiere issue of our newsletter ***Finish Notes***™ we mentioned an alternate color system we were developing. It is now ready as a client service. The system offers more exact color references and formulation assistance any paint manufacturer can use.

As many of you know the Frank S. Welsh Company has used and supported the Munsell Color System for years. It is by far the best visual color systems in the world. It is useful to many people in the art and graphic arts fields because the system is supported by sales of physical color samples through the Munsell Color Company which is owned by Macbeth Corporation. Last year the company restructured and made the decision to eliminate color samples smaller than $8\frac{1}{2}$" x 11" and at the same time increased the cost. Because our field is dependent on color samples, the restructuring made us concerned about what we would do if we were unable to buy any Munsell color paper for reasons of cost and/or availability.

We began an inquiry to find an alternative. We found that the CIE LAB color system, which is a mathematical color system linked to the spectrophotometer, suited our needs. We are now using it in addition to the Munsell system. Our applications combine the best of both.

Changes enhance our services

- With our "new" system we now use a spectrophotometer and get precise numerical (L*a*b*) reference values for the original color of a paint sample. Our values can be stated in L*a*b*, in Munsell, or in both.
- We now have an exact color sample to place in client reports because we have built a new library of more than 16,000 samples in addition to Munsell's 2,700.
- We can provide reference values that any paint manufacturer can use along with the color sample against which to measure their color matching.
- We make it easier to assess and certify all of your color matching attempts. Simply submit contractor draw-downs to us for final review. In this way, clients can achieve superior quality control in the color matching and evaluation process.
- We now can supply the typical small color samples of any color including all Munsell paper.
- And this all costs less!

Quality control in color matching

We have samples of any color match which can be placed into a report to give to clients, and we have precise numerical reference values that any paint manufacturer can use along with the color sample to measure their color matching attempt against. This is because virtually all paint companies today use the CIE LAB color system and have spectrophotometers in their technical labs. Then, with computer formulation software, they provide fast and efficient responses and more accurate color matching for their products.

With this system we now have a way to offer our clients superior quality control in the color matching and evaluation process before the painter gets the OK to use the paint. All that our clients have to do is have the contractors submit their draw-downs to us for final color assessment and we can easily certify all their color matches. It is a terrific quality control application to guarantee the accurate interpretation of our precise and detailed color matching efforts for our clients.

Now purchase all your color samples directly from us.

In a cooperative agreement with Munsell Color of Macbeth, a division of Kollmorgen Instruments Corp., the Frank S. Welsh Co. is now an authorized agent to sell Munsell Color Standards in full size sheets and all the small sizes.

We will supply all sizes in all colors from our vast inventory of more than 16,000 color samples including the more than 2,700 colors in the Munsell system. Our smallest size is $\frac{3}{4}$" x $1\frac{1}{4}$". This size is just large enough for any spectrophotometer to measure. The small size sample comes with a tab on which is identified the color's reference value in L*a*b* or in Munsell.

If you have or are preparing a report where your colors are matched to either the Munsell system or to the CIE LAB color system and you need samples of those colors, call us and we will quickly fill your order.

Buying smaller samples is significantly less expensive— for instance, five small samples cost under $50. We will also offer quantity discounts.

For additional information...

The supplement included in this issue of ***Finish Notes***™ titled: "Color in Respect to Architectural Finishes" has the technical details of the CIE LAB color system and how we use it in our lab and in our reports. Additional copies are available on request.

MONTICELLO: It's Jefferson's 250th Birthday

On April 13, the Thomas Jefferson Memorial Foundation celebrated Thomas Jefferson's 250th birthday by opening a specially designed exhibit throughout Monticello. It brings together almost all of the known pieces that Jefferson owned and used in the house. For the exhibit, the Entrance Hall was repainted after we re-analyzed the ocher-colored distemper paint on the plaster wainscot and green oil paint on the flooring.

Entrance Hall Wainscot

"...[I] went over to Monticello; I think the hall, with its gravel colored border is the most beautiful room I ever was in, without excepting the Drawing rooms at Washington." (Ellen Wayles Randolph; April 14, 1808 Massachusetts Historical Society).

Traces of this gravel color survived behind the day-of-the-week plaque attached to the chair rail. Microanalysis disclosed that it was a traditionally formulated distemper paint made with calcium carbonate tinted with yellow ocher, raw sienna and red iron oxide. The paint was restored using a modern latex to imitate the original appearance in color, gloss and texture. "The key thing was to formulate a modern imitation of distemper paint that was durable enough to withstand the crowds," explained Monticello's architectural conservator, Andy Johnson. "It had to be cleanable and it had to have the same characteristics and appearance of the original."

Andy said he would be happy to answer any questions that any reader of ***Finish Notes***™ might have about the latex paint he used to imitate the original distemper. Call him at Monticello at (804) 295-7301 and leave a message on his voice mail.

Entrance Hall Floor

Thomas Jefferson's letters document how carefully he supervised the painting of the flooring. On June 8, 1805, he wrote to his carpenter, James Dinsmore (the builder at Monticello),

"Dear Sir: after writing to you yesterday, I was at the painting room of Mr. Stewart [the celebrated portrait painter] who had first suggested to me the painting a floor green, which he had himself tried with fine effect. He observed that care should be taken to hit the true grass-green."

Later, April 18, 1807, Jefferson wrote to his painter at Monticello, Richard Barry...

"...the most important work you have to do here is to finish the floor of the hall and to paint the floor of the Dome room exactly in the same way."

Years after Jefferson's death, this color was stripped from the floors of both rooms but enough survived to analyze for color and composition. Found were white lead, calcium carbonate, verdigris, Prussian blue, yellow ocher and bone black dispersed in an oil medium along with some varnish.

Again Andy Johnson elected to use a latex paint on the wood flooring and on the large reproduction floor cloth. Jefferson's true grass green floor and the gravel color wainscot are beautifully illustrated on page 69 of the July 1993 issue of ***Antiques***.

Are you interested in the microchemical analysis of the paints at Monticello? We still have a few off-prints remaining of Frank Welsh's article published in ***The Microscope***, 1990, pages 247 to 257, titled: "Microchemical Analysis of Old Housepaints with a Case Study of Monticello." Send $3 and we will mail you a copy.

Paint in America To Be Published In Spring

Curiosity about authentic American Colonial paint colors can be cured. ***Paint in America***, coming out soon will chronicle American architectural paints from the Colonial period through the early 20th century. Five years in the making, it presents a variety of experts, each discussing one aspect of house paints. It's a must-read for anyone interested in the history and use of American paints. I was pleased to participate by contributing a chapter discussing early American paint colors and the pigments used to make them. It summarizes the results of my Charles E. Peterson Research Fellowship study, with several pages of charts showing 35 popular colors from mid-to-late 18th-century and early 19th-century sites from New England through the mid-Atlantic to the South.

The book's editor, Roger W. Moss, Ph.D., Executive Director of the Athenaeum of Philadelphia, writes to us:

"It gives me great pleasure to report that the Preservation Press of the National Trust for Historic Preservation has agreed to publish ***Paint in America*** next spring.

Paint in America is an outgrowth of a symposium on architectural and decorative paints sponsored by The Society for the Preservation of New England Antiquities with funding provided by The Barra Foundation, Inc., in 1989.

Sixteen authors from many disciplines have submitted articles under four broadly defined topics:

- technical information necessary to understand the nature of paints;
- the history of architectural coatings in America from the seventeenth through the twentieth centuries;
- techniques for investigation and interpretation of evidence from various sources, both documentary and physical examination; and, finally,
- information on paint selection, surface preparation, and application.

The book will also contain an extensive bibliography and an appendix of pigments known to have been used in America.

Due to generous subvention by The Barra Foundation, the book will be well illustrated with color plates of restored structures, historic documents illustrating original color use, and a palette of early American colors. The cost of the volume is estimated to be under $30.00.

This book will be of use to laymen and specialists alike and is likely to be the standard work on the subject for many years to come."

Look for an update in our next issue. We'll tell you where you can buy a copy, discuss the authors and their contributions.

Recommended Reading

Carl Lounsbury, ***A Glossary of Early Southern Architecture and Landscape***, Oxford University Press, 1993.

This new book covers the full range of building in the early South from 1607 to the 1820s. Lounsbury, an architectural historian at Colonial Williamsburg, provides a rich compilation of architectural terms. ISBN #0-19-507992-2; $75.00. You can reach the publisher at 800-451-7556.

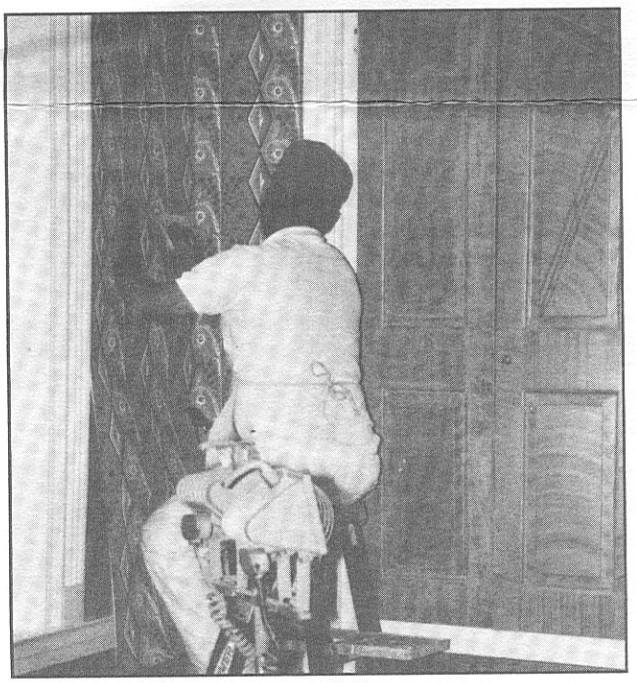
Robert M. Kelly, ***Wallpaper Reproduction News***, Lee, Massachusetts. Call Bob at (413) 243-3489 to get on his mailing list for this very informative newsletter on historic wallpapers.

Re-opened House Museums And Historic Sites

Often when house museums and historic sites are closed for renovations their historic finishes are investigated, microanalyzed and restored. Here we highlight some we know of. If you would like us to mention any that you are working on or are aware of please let us know.

CONNER HOUSE, Fischers, Indiana

The William Conner House at Conner Prairie (a 55-acre 19th-century living history museum affiliated with Earlham College) near Indianapolis, is a two-story, five-bay brick structure with a one-and-a-half story brick kitchen ell attached on the rear. It was constructed in 1823 by William Conner, a trader, land speculator and state representative. It was the first brick residence built in central Indiana's Hamilton County.



Reproduction wallpaper being installed in the restored first-floor Parlor/Bedroom of the Conner House. Note the white wood trim and the "fancy—maple colored" grained doors of the cupboards. Notice the two cupboard doors. The one on the right is newly grained—copying the original graining on the left door which was re-exposed after removal of all later over-paints in this detailed conservation effort.

White trim and glue size

A comprehensive on-site investigation and microanalysis disclosed that all of the exterior trim was painted white. However, since no original window shutters survived we recommended a medium green as an appropriate color for the new ones which were made and restored to the house.

On the interior the original treatments were typical of American interior decoration of the 1820s. All the plaster walls originally were papered. Although we found no remaining shreds of rag paper, we were able to document a dirt layer on the bare plaster along with evidence of a glue size that was confirmed with a micro-chemical test for protein. Most of the interior wood trim was painted white and some was fancifully grained to suggest maple. We suggested ways to re-expose it so as to copy it exactly.

Quality control

To guarantee quality control for the restoration of the finishes, Philadelphia architect George Skarmeas, from the Vitetta Group, asked us to take part in all phases of the restoration. We reviewed and amended painting specifications, made repeated visits to the site before and during construction to help instruct the painting contractor and to monitor the progress.

The hardest part—paint removal

The most difficult and time consuming part of the project was surface preparation of the wood trim. The big problem: excessive paint build-up. Approximately 15 layers had been applied to the moldings over the past 170 years and were disguising the details. Since total paint removal destroys all evidence of the historic finishes we instructed the painters in techniques to remove all but the first three layers. The method involved careful application, timing, and scraping of a liquid paint stripper.

We supplied all of the paints for the job, custom made and color matched by the paint company that works with us here in Philadelphia. We checked for color and gloss during preparation and provided on-site instruction and supervision during application.

The grand opening was held earlier this summer and has already received two awards— from the AASLH and the MMC.

LINCOLN THEATRE: Washington, D.C.

1921 African-American vaudeville theatre. Our contact was the Washington, D.C. architectural firm of Sorg and Associates.

Unique aspects: A remarkable array of decorative and brightly colored finishes, including two different shades of "bronze powder" paints—deep gold and natural copper*, along with medium gray, medium brown, dark brown, grayish pink, brownish pink, pink, and purple all used in a striking polychrome scheme on the ornamental plaster ceiling and walls.

*If anyone is interested in learning more about metallic finishes we have copies of Frank Welsh's article on "Architectural Metallic Finishes in the Late 19th and Early 20th Centuries: The Great Imitators: Aluminum and Bronze," which was printed in the proceedings of the Historic Interiors Meeting of 1988 in Philadelphia. Cost: $3.

GEORGE WYTHE HOUSE: Williamsburg, Virginia

Home of George Wythe (ca. 1750s) who taught law to student Thomas Jefferson at the College of William and Mary. Director of restoration project concerning architectural research: Edward A. Chappell.

Unique aspects: By 1770 most rooms in the house had a light yellow ocher color on their wood trim. Doors and baseboards were painted a rich dark brown. The first-floor rear room was painted a medium blue with dark brown baseboards. The blue paint originally was glazed, which enhanced the gloss and durability of the paint—a typical painting practice of the period. This medium blue paint color was matched exactly and was restored to the room. To replicate the original oil glaze, we recommended using an acrylic varnish marketed as SOLUVAR® made by Liquitex®. This product is available in both a matte and a gloss finish at most art supply stores. Experiments by the paint shop demonstrated that the gloss finish provided the exact appearance desired.

Lead Paint Update

Lead paint is an issue with many professionals in historic preservation: architects, painters, museum staff, etc. They not only have to deal with protection but also professional liability.

Most oil paints used on buildings from the 18th through the mid-20th century were lead based. White lead and red lead were used as hiding pigments, colorants and rust inhibitors until 1977, when the federal government banned their use in household paints for safety reasons. Any paint containing white or red lead is called lead paint. Today, lead paint still can be found on virtually any painted surface, including the interior and exterior of surfaces of all types of buildings, furniture, and toys.

Lead pigments are poisonous

When lead paint starts to deteriorate and flake, the risk of lead poisoning increases and can become a dangerous health threat to children as well as adults. To prevent lead poisoning, the first step is identification of hazardous paint. All painted surfaces should be tested for lead content.

One layer of lead paint considered hazardous

According to Federal guidelines for identifying lead in public housing, an amount of 0.7 mg/cm² is considered hazardous. By my experiments, one layer of lead paint contains approximately 1.0 mg/cm². So, take precautions when lead paint is being sanded or scraped nearby to avoid ingesting or inhaling.

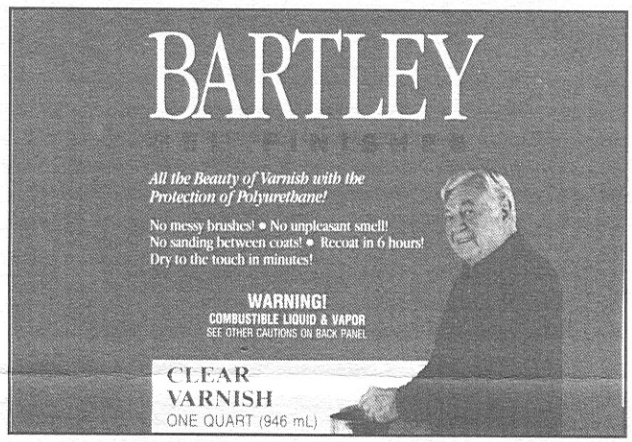
A 2.5 N solution of sodium sulfide can be used as an effective way to detect lead in paints with quick, on-site results. Crossectional analysis of a sample can quickly identify a high lead content in layers of paint which turn pitch black on contact with sodium sulfide as well as a lower lead content in layers of paint which only turn gray. This is the standard lead paint test that we use in the microanalysis of historic house paints.

If you remember that one layer of lead-based paint is all you need to exceed the limits established by HUD and EPA, then multiplying that by the number of layers you know contain lead paint will quickly and roughly tell you a gross quantification of the amount of lead paint you have.

Product Review

To help spread the word about products we use and about products you have used and like, we initiate a section to highlight them. Please let us know your own favorites.

Bartley's Gel Finishes: varnish and stain



One of the best paint chemists in the business: A. Richard Fitch is the man responsible for the best gel varnish and stain on the market—manufactured by the Bartley Collection.

This is a gelled, solvent-based product invented by paint chemist and formulator A. Richard Fitch and manufactured now by The Bartley Collection in Easton, Maryland. Originally called paste varnish and paste stain (which come in a variety of colors) it is applied with a soft rag, spread thinly and evenly and buffed quickly afterwards with a clean dry rag. It dries within four hours and is very easy to use. The clear gel varnish has a soft sheen but can, with many coats, yield a gloss appearance almost like a lacquer.

Great for graining

We have used it as an additive to graining glazes to help retard the flow of the oil glazes so they can appear more striated (and so imitate more closely some of the historic graining finishes). It is also a wonderful top coat to graining because it can be applied in very thin coats. This avoids the wet and gloppy varnish look you get with traditional, out-of-the-can, brush applied varnishes. It is easy to use.

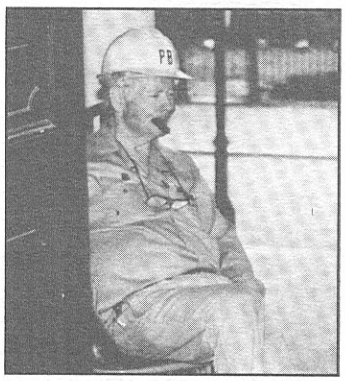
The power behind the product is Dick Fitch. He has been in the paint and varnish business since before he was born. His family owned and operated Turco Paint and Varnish Co. of Philadelphia. From Turco, Dick moved to Easton, Maryland on the Eastern Shore to the factory of The Bartley Collection—a very high quality reproduction, mail order, furniture kit manufacturer. Bartley had been using Dick's paste stain and varnish for years. When they finally got the chance to acquire his expertise right at the factory, he headed south.

For information about this useful gel finish either in the clear varnish or the many shades of stain which are also produced call the company direct at their toll-free number: 1-800-BARTLEY. Dick has written a good synopsis of the product line titled: "Finishing wood need not finish a woodworker." Ask for a copy plus one of the Bartley furniture catalogs, too.

In Memory Of...

Paul Buchanan

Paul Buchanan of Williamsburg, Director of Architectural Research of the Colonial Williamsburg Foundation from 1968 to 1982, died June 25. He also served as historic architectural advisor to Stratford Hall since 1984. Known as PB by his friends, I had the good fortune to know and work with him.



Paul Buchanan rests for a moment during one of his many visits to the Wickham House, Richmond, in the late 1980s.

In our next issue:

- Using the CIE LAB color system: applications for the spectrophotometer in paint analysis and repainting projects
- Whitewash recipes! HELP! One of early America's most commonly used coatings. How many formulas can we find? Send us yours and we'll publish them.
- A quick way to identify a latex paint.

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SUPPLEMENT #1

Color in respect to Architectural Finishes

Technical details of the CIE LAB Color System as used by the Frank S. Welsh Co.

Color

Color is what we see as the result of combining white and/or colored pigments into paints or stains.

For finishes:

- color is physical—how colorants are blended together to make a finished material.
- color is also perceptual—how the brain interprets the reflected light from that finished material.

Traditionally an observer's eye perceives and brain interprets the stimulus from an illuminated object. (For example: there is no color in a dark room.)

Illumination and Spectrophotometry

In our work, the sources of light we have to be aware of are natural sunlight (daylight), tungsten light which is the typical light bulb and fluorescent lamps. Each of these light sources has a different amount of energy which physicists refer to as spectral power.

Light sources are quantified by Kelvin (K) temperature. For instance, a standard tungsten light bulb has a color temperature of about 2900K while standard daylight is about 6500K.

A spectrophotometer is an instrument which can provide a quantified light source and then collect and measure the spectral reflectance from the object and then compute and quantify those values mathematically. The spectrophotometer communicates in a language called color-order systems.

Color-order Systems

There are two types of systems which identify colors.

- Visual: Munsell is a visual color system. The visual color systems use actual physical color samples presented in a precise order or in a specific arrangement.
- Mathematical: these color systems are related to precise descriptions of light source, object and a standard observer. There are no color samples that make up these systems. A spectrophotometer is used with these systems.

An example of how we use our new system

Let us assume that I am in the lab and analyzing a gray oil paint with the stereomicroscope. For the visual color matching I refer to the Munsell Color books and select both a 7.5 YR 6/2 and a 10 YR 7/1 color chip. I hold them up to the original paint sample under the microscope which is illuminated with halogen tungsten light at 3200K. I find that neither of the Munsell color chips match the gray color of my paint sample but it looks like the match is somewhere between them. (With the Munsell system original paint colors do not always exactly match a color sample in their collection.)

Next I refer to our expanded collection of more than 16,000 color samples and visually compare all of the grays we have until I locate the one that is a precise visual match for the original paint color on the sample. Then, I place our portable spectrophotometer on the color card and take an average reading. I use a sample of that color, with its reference values identified, to illustrate the report of our findings and conclusions.

CIE...International Commission on Illumination

The spectrophotometer communicates in one of many and widely used color-order systems. To help in this regard an international organization was established years ago to evaluate and to set standards for the scientific community involved with color research and application. This body is called the Commission International de l'Éclairage or CIE. It is in English the International Commission on Illumination.

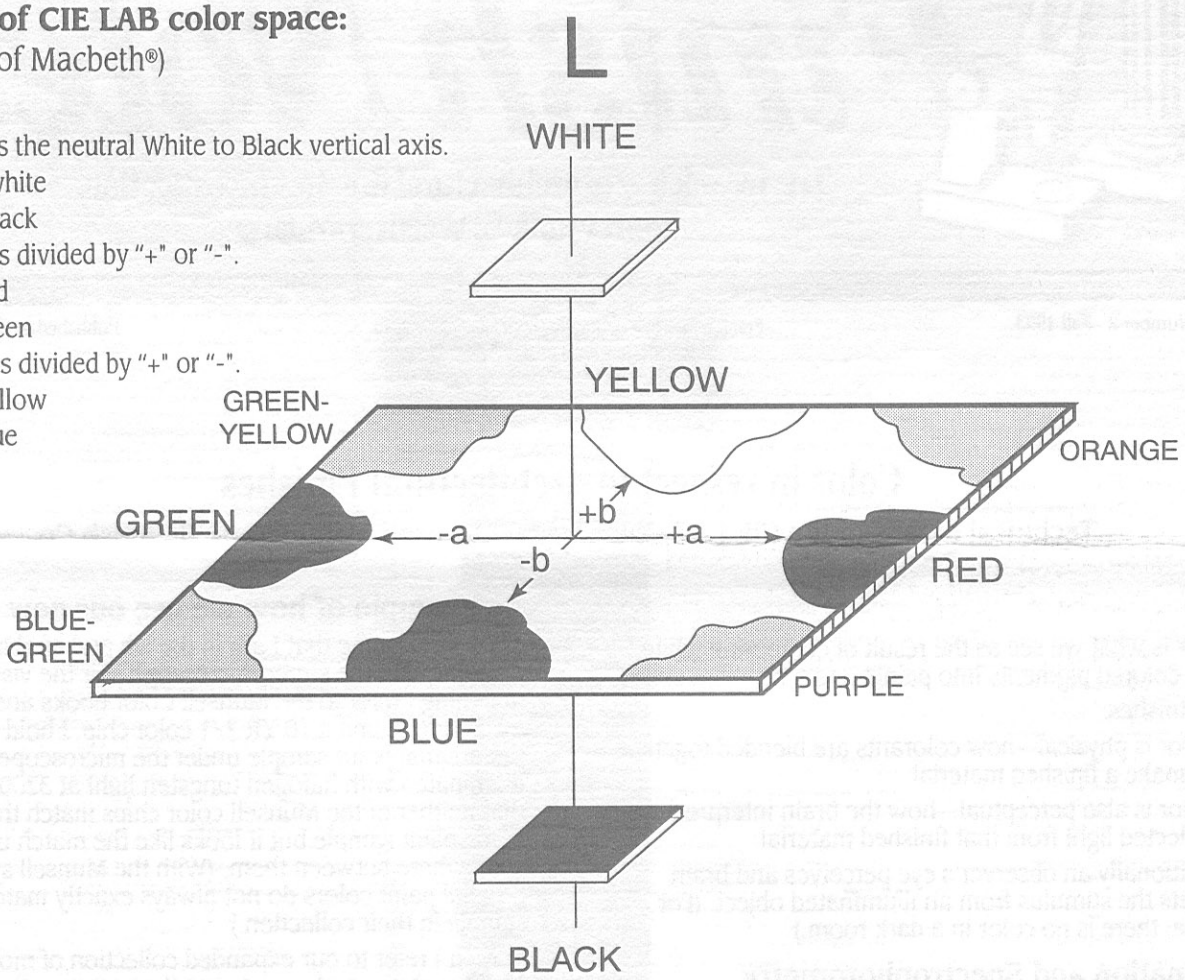
CIE LAB Color-order System

The most frequently used CIE color system in the paint industry and which manufacturing is moving towards presently is CIE LAB—represented as L*a*b*.

CIE LAB is an opponent color-order system which references colors in terms of whiteness-blackness; redness-greenness, and yellowness-blueness. The CIE LAB system is a very easy color space to visualize as the following diagram will illustrate.

Diagram of CIE LAB color space:
(Courtesy of Macbeth®)

L* value is the neutral White to Black vertical axis.
100 = white
0 = black
a* value is divided by "+" or "-".
+a = red
-a = green
b* value is divided by "+" or "-".
+b = yellow
-b = blue



To use this color system, the spectrophotometer must be programmed to use a standard illuminant and a standard observer. We are using either: L*a*b* $D_{65}{}^{10}$ or C^2 on our portable spectrophotometer in our lab.

Converting between CIE LAB and Munsell

Should you be wondering, there is a way to convert the L*a*b* values to the Munsell color system and vice versa! On request we will do this in our reports.

We can provide both to you because the management at Munsell Color was very kind to furnish us with a copy of this expensive computer program. We thank Munsell Color Co. very much for their assistance.

The manufacturer preferred illuminant and observer setting with L*a*b* is $D_{65}{}^{10}$. However, the Munsell conversion can only be done in C^2. When an equivalent Munsell value is desired, we make the necessary conversion to C^2 and enter that into the computer and the Macbeth® conversion software matches the value to the equivalent Munsell notation.

We can provide any one or all three reference values if necessary.

For additional information

Our next issue of ***Finish Notes***™ will illustrate several case studies where we have already taken advantage of the CIE LAB system and the accompanying computer formulation software to get paint accurately color matched for our clients.

If your firm or organization would like to have me present to you, please write or call to set something up.

I hope you see the advantages of the "new" system and I am sure that you will in time appreciate our additional services. I have lectured several times this summer on this subject and have received extraordinary responses.