

Technical Guide to Gum Printing



Calvin Grier

Digital Workshop Series



Technical Guide to Gum Printing

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Published by The Wet Print
Calle Cronista Uriel N° 5, Bajo Izq.
Llíria, Valencia 46160
Spain
www.thewetprint.com

Design and Images by Calvin Grier

First published April 2022

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PART I

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CHAPTER 1

INTRODUCTION

In this chapter you will learn about:

- The objectives of this book
- The intended audience for this book
- How to use this book
- Various gum printing traits

CMYK+Iron Oxide
Brush coated gum print
Photo Calvin Grier

WHAT IS THIS BOOK?

This book includes detailed step-by-step instructions on how to use the gum process to make prints like those shown in *figures 1-1* and *1-2*. More importantly, we will take a deep dive into understanding the interconnected variables of the gum process. The objective is to supply you with the tools needed to either create a workflow from scratch or modify your current workflow to achieve a desired result. This book is not intended to be a complete guide to gum printing, but a supplement to current gum printing literature. I recommend using this book as a reference for solving problems or modifying your existing workflow to achieve the results you are looking for.

There are four parts to this book

- Part I is a freely available introduction.
- Part II covers preparatory work for the main printmaking process, such as sizing paper, registration, and making negatives.
- Part III has step-by-step tutorials on gum printing with brush or spray applied emulsions.
- Part IV, which covers theory, is by far the most extensive section in this book and aims to minimize frustration in the learning process.
- Part V is an overview of how the calibration methods, described in the book *Calibration for Alternative Photographic Processes* can be applied to calibrating a gum print.

IS THIS BOOK FOR YOU?

New to gum printing

This book is meant to be a technical guide for people already familiar with the gum process, so some of the basic concepts about gum printing are omitted. If you are new to the process, I recommend starting with one of the modern books on gum printing or, better yet, taking a workshop with a gum printing expert like Christina Z. Anderson, Diana Bloomfield, Tony Gonzalez, Marek Wesolowski, or Ellie Young.

Other pigment-based processes

All pigment-based processes are closely related, so you

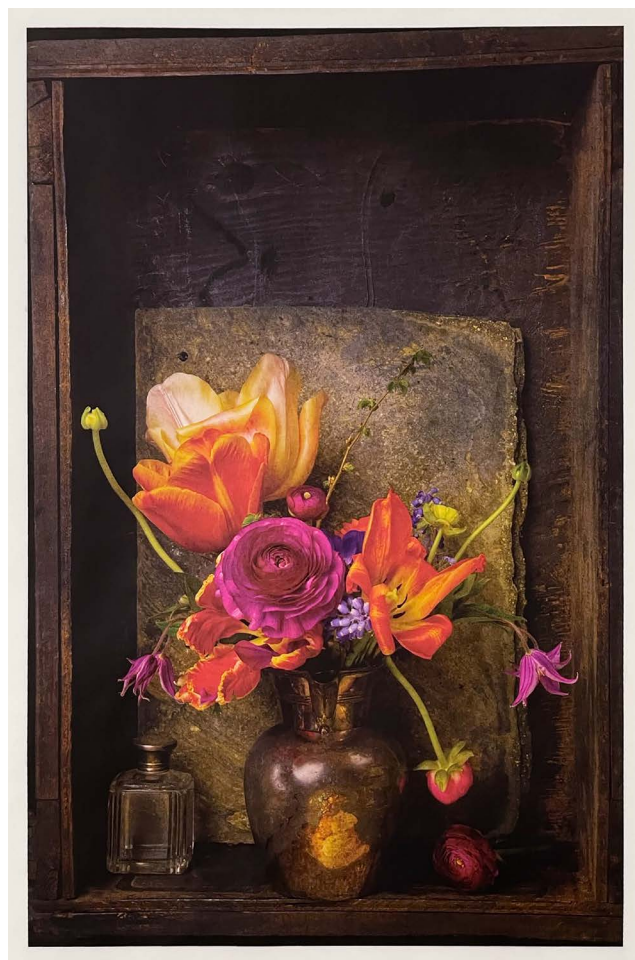


Figure 1-1 Photo by Allan Jenkins



Figure 1-2 Photo by Calvin Grier

can take information from this book and apply it to other processes. That's how I learned gum printing in the first place. I simply applied the knowledge acquired through tens of thousands of hours of experience in carbon transfer printing to gum printing. Many of the

working procedures and concepts in this book can be applied to other alternative processes, including gumoil, carbon transfer, direct carbon, and bromoil.

Novel printing methods

I outline solutions to several problems that, as far as I know, have not been solved before. It's possible some of these methods were invented by someone else, and lost to time, or never made it into common practice. I also implement a couple of different working methods. All of these are covered in the book.

- Sensitize an emulsion after spraying it on the paper. While not necessary, sensitizing the emulsion after brush coating has many advantages as well. I found three methods to achieve this.
- Completely eliminate staining between layers. This creates prints with very vibrant colors and clean whites. With no staining, extended gamut printing becomes worthwhile, allowing gum printing to surpass just about any other pigment-based process such as color carbon printing or even inkjet printing in gamut.
- Faster and much more precise development.
- Reduce metameric color failure.

Missing from this book

This book omits a history of gum printing, conservation practices, an overview of current artists and how their methods differ, and discussions on topics such as creative expression, where gum fits in the worlds of photography and painting, or future directions the process could go.

This book will not directly cover gum over other processes. But all the information for making and calibrating gum overs can be found between this book, *Calibration for Alternative Photographic Processes*, and books specific to the base process such as platinum or cyanotype.

The digital part of preparing and calibrating negatives is covered in this book. If you choose to make imagesetter negatives, this is all you need to know. For the final creation of inkjet negatives, however, I refer you to *Easy Digital Negatives* by Peter Mrhar, or *Digital Negatives*

with *QuadtoneRIP* by Ron Reeder and Christina Z. Anderson.

Halftone gum printing

Many people are drawn to gum printing for its pictorial quality, hands-on production, and potential for artistic creativity. Some printers also enjoy the spontaneous possibilities of creating photographs where any one of a hundred variables could change the outcome of the print. Many of those variables will be described in the theory section of this book, should you choose to tame the process to your liking. If you prefer consistency between prints, then the easiest way to achieve this is to use halftone negatives. The use of halftone negatives does not negate all the other wonderful characteristics of the gum process; it's just another tool for your toolbox.

Math and calibration

I want what I see on my computer monitor to come out in the print on the first try. This is a personal choice. If this is also your preference, you will need to understand how to calibrate a print, which unavoidably requires a little bit of math. If you want to take this approach, I direct you to the book I wrote on calibration. In this book, I'll show you how the concepts in the calibration guide can be applied to gum printing. So, if you haven't read the other book, the calibration overview in this book might be difficult to follow.

Green printing methods

The methods described in the step-by-step tutorials use toxic chemicals, so safety masks for dust and organic vapors are required. One approach also uses a sprayer, so if you go that route, it's wise to have an extraction hood or paint booth. Due to the REACH regulation authority in the EU, dichromates are not allowed in Spain. This is the main reason I no longer practice gum printing. I tested about ten alternative sensitizers to dichromates but never found one that gave the results I was looking for with gum arabic. If you are willing to move away from gum as the binder, I will briefly describe and provide recipes for two environmentally friendly brush coating processes, like gum, that will produce almost identical results.

One method to harden sized paper uses formalin, so you will need a place outdoors to store paper. If you don't want to deal with formaldehyde fumes, I also found a simple acrylic size that is quick and easy to use. Should you choose to avoid sizing altogether, I also tested a few raw papers and will describe how to use them.

Startup costs

If you already have a vacuum table, exposure unit, integrator, spectrophotometer, and sink, you can make a black and white print with an investment of about 500 euros, which covers the cost of brushes, pigments, gum, chemicals, a cheap microscope, acrylic for sizing, negatives, registration punch and pins, and other miscellaneous materials. For a color print with the spraying method, budget about 700 euros more which covers the cost of a sprayer, compressor, more negatives, and more pigments. I also recommend a paint booth, but you could spray outside. I did all my tests and prints in the studio, but it took me three days to clean up a thin film of pigmented emulsion on everything afterward.

HOW TO USE THIS BOOK

Organizing a book and teaching a process is not an easy task because every student's mind works differently, and everyone has different goals. For example, I prefer to learn theory first, then see how those individual ideas come together to create the big picture. Most students, on the contrary, like seeing the big picture first, then learn how to get there. This approach provides context for where the smaller bits of theory fit in. Then there are students, mostly taught through short consulting sessions, who like to work through the process independently, but have a resource to aid in troubleshooting when they encounter problems. Finally, some students just want to print, and prefer to have step-by-step instructions. I have designed this book to fit all these personalities and approaches to learning. Read the following three approaches to decide what suits you best.

1. You just want to print.

Chapters two through six explain exactly how I made the two prints shown at the beginning of this introduction. You can follow my steps, recipes, profiles, and use the same materials, and you will probably get something close in technical precision to those prints. My intention with this book, however, is not for you to produce technically perfect prints.

2. You want to create a workflow from scratch.

As a teacher, the most important knowledge I can pass on to a student is theory. Knowing why something works the way it does is infinitely more important than blindly teaching steps as if assembling an Ikea table. If you are new to gum printing, I recommend reading a few other books on the subject along with this book and trying the process out. After this, you can use everything at your disposal to invent your own workflow to achieve the results you desire. For those who like to learn theory first, start with chapter seven

3. You want to modify your current workflow or troubleshoot a problem.

You don't have to restructure your entire workflow. You can use this book as a reference to choose certain traits you would like to maintain or avoid in your prints. The following pages describe fifteen traits with photos, descriptions, and where you can find more information in the book. For example, let's imagine you like the spontaneity of the process, but your prints look dull, then study up on chapters twelve, thirteen and sixteen. Or, imagine you like the pastel colors typical of gum prints, but you would like to avoid paper texture and mottling, then see chapters six, ten, fourteen, and sixteen. The following fifteen traits can also be used as a table of contents for troubleshooting.

PIGMENT STAINING

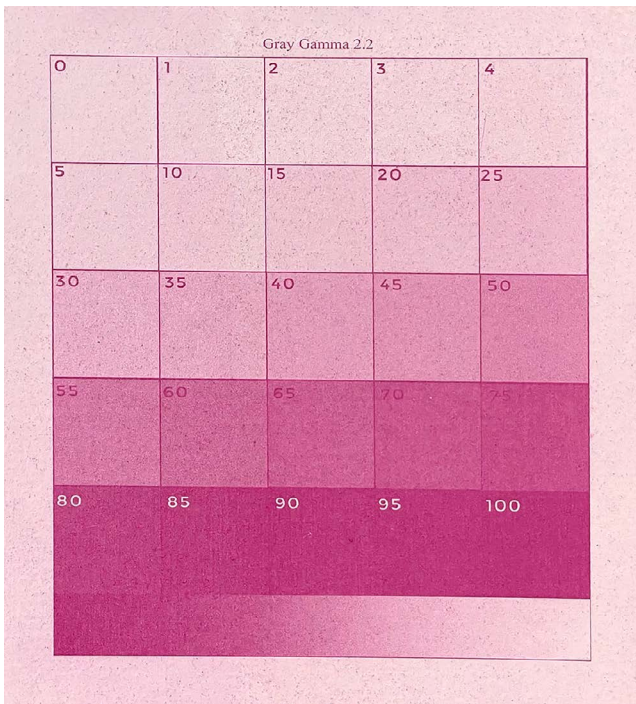


Figure 1-3

What is this trait?

Pigment staining happens when the pigment doesn't fully wash away during development. It is mostly controlled by the sizing of the paper, pigment choice, humidity, and pigment concentration.

Do you want this trait in your print?

Yes- A print with no staining can look too 'digital.' Controlling the amount of staining allows one to produce prints that are more subtle, peaceful, and relaxing to look at. If working with continuous tone negatives, some staining in the highlights will make blown out tones less noticeable.

No- When working in black and white, the tonal scale is reduced, which gives the print a dull look. When working in color, each layer adds more stain, which results in brown, dark, dull prints that may have a color cast if one stain is predominant. If staining is eliminated, and a few other factors controlled, gum printing can rival or even surpass inkjet or carbon printing in the vibrant colors it can reproduce.

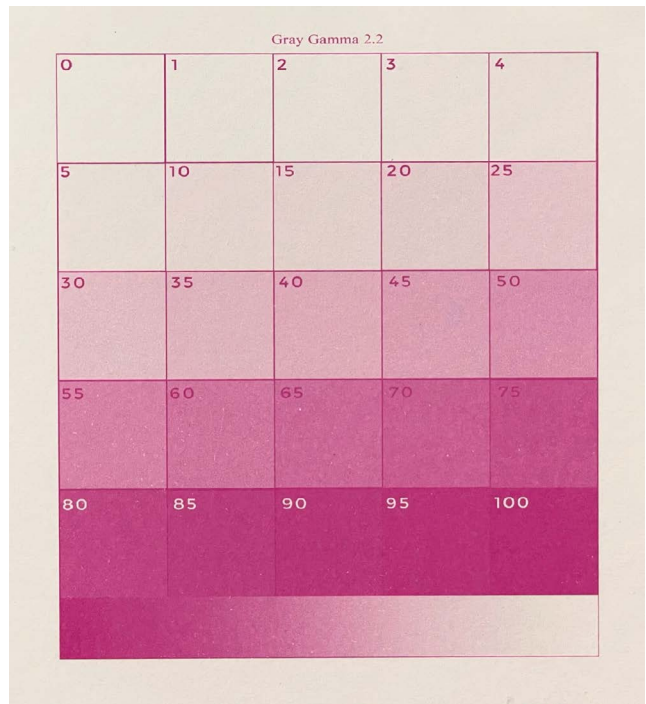


Figure 1-4

Where can you learn more?

Clicking on the page numbers will take you to the indicated section.

- Pigment choice, page 112
- Pigment concentration, page 114
- Humidity, page 116
- Clear coat, page 116
- Paper preparation, page 134
- Emulsion viscosity, page 154

DOT GAIN MOTTLING

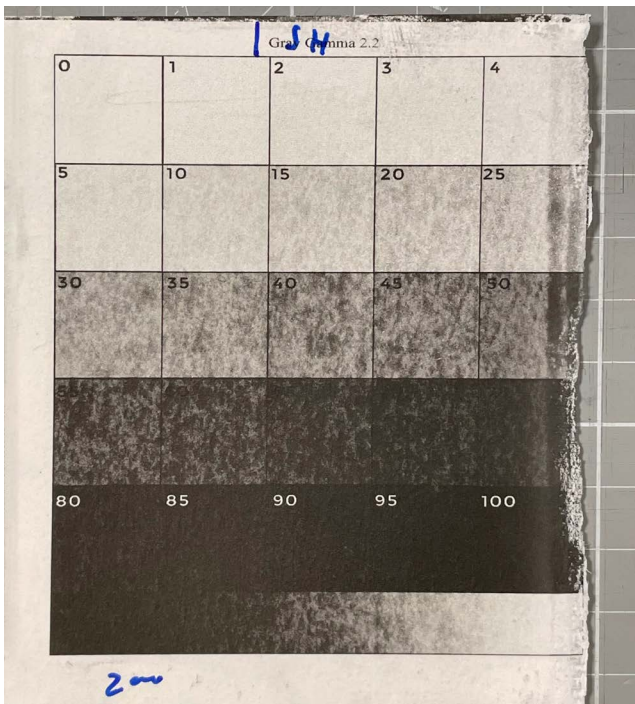


Figure 1-5

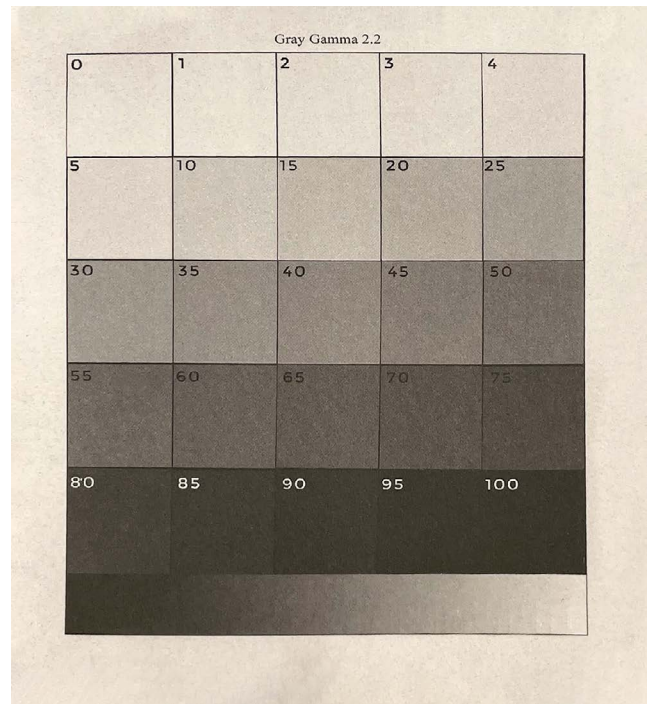


Figure 1-6

What is this trait?

Mottling is an uneven texture in the printed film. There are many reasons for mottling in the printing industry, but for gum printing, mottling seems to be mostly limited to four main causes:

- Uneven dot gain
- Low surface energy of the paper or sizing, or high surface tension of the emulsion.
- Abrasion from brushing
- If you take the approach of spraying the emulsion, incorrect equipment, settings, or emulsion viscosity will lead to mottling.

The following items could also fall under the label of mottling, but depending on the situation, they might be better described as grain, texture, or coating inconsistencies:

- Paper fibers clumping together with the emulsion.
- Pigment issues
- Uneven absorption of the emulsion into the paper
- Uneven coating from the paper texture, or brush strokes

- Uneven coating over large areas from the paper buckling or drying too fast

The photo on the left above shows dot gain mottling. This problem is specific to using halftone negatives and is the result of uneven dot gain. Dot gain is when the printed dot is larger than that of the dot in the negative or digital file. The normal result of dot gain is a print that is too dark. Mottling happens when dot gain is not even over the surface of the print. In this case, it is caused by differences in the distance between the emulsion and the negative due to the texture of the paper.

Do you want this trait in your print?

Yes- It's unlikely that you want dot gain mottling to reach the levels seen in the photo on the left above, but a little paper texture shows an interaction between the emulsion and the paper, or in other words the photograph and the paper being affected by each other. This interaction can give the photo a little bit of life.

No- Mottling can be unpleasant in portraits, landscapes with skies, or prints where a smooth subtle gradient is important. In color printing, the effect is multiplied.

Where can you learn more?

- Vacuum frame and paper choice, page 94
- Exposure time, page 95
- Sizing, page 96
- Dot size, page 97
- Screen choice, page 97
- Exposure unit, page 105
- Pigment concentration, page 154

SPRAYING MOTTLING

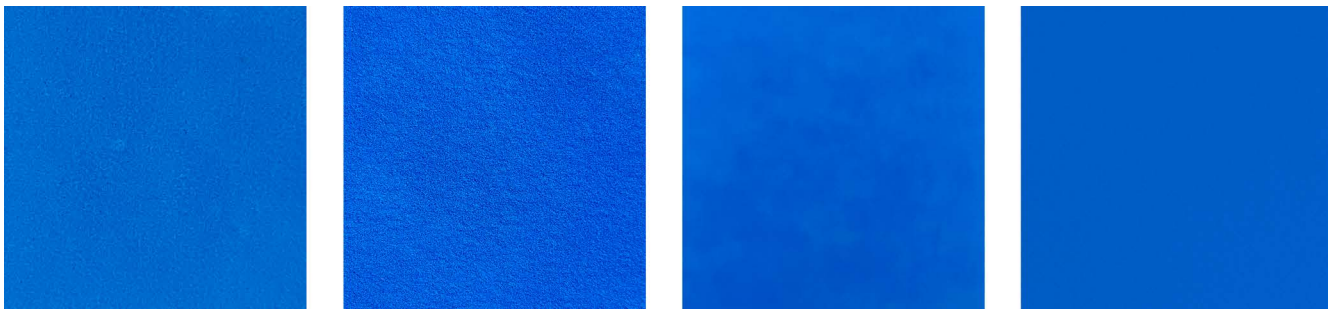


Figure 1-7

1

2

3

4

What is this trait?

If you think that spraying the emulsion is easier than coating with a brush, then think again. If I'm making just one coat, I can get a smoother finish with a brush than a sprayer. I worked with a car detailing specialist with 30+ years of experience, and tested a lot of papers, sizes, and emulsion recipes to get a result I was happy with. Within spraying mottling, there are again different subcategories of mottling types. In the first square above, the emulsion beaded up on the paper much like putting too much ink down with an inkjet printer. This can happen with brush coating as well. In the second square, the sizing of the paper wasn't right which prevented moisture within the emulsion from absorbing into the paper. In the third one, the settings on the gun were not right. The fourth one is very smooth and even, but honestly, that one is simply a digital mock-up. I was never able to achieve that level of smoothness; close, but not quite.

Do you want this trait in your print?

Yes- The second and third squares are interesting textures you could work with. This would allow you to maintain the paper texture in the print, but also achieve high ink densities since you wouldn't have the problem of brushing away lower layers.

No- If the idea of spraying the emulsion is to get a smooth coat, then it defeats the purpose if it's done incorrectly, so brush coating would be easier.

Where can you learn more?

- Sprayer settings, page 60
- Halftone negatives, page 84
- Paper choice, page 136
- Emulsion Rheology, page 155

SURFACE ENERGY MOTTLING

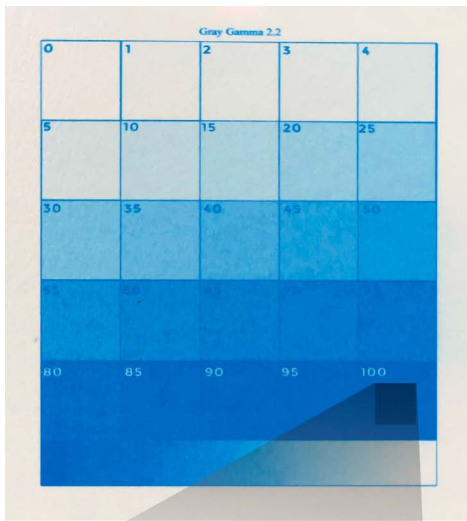


Figure 1-8

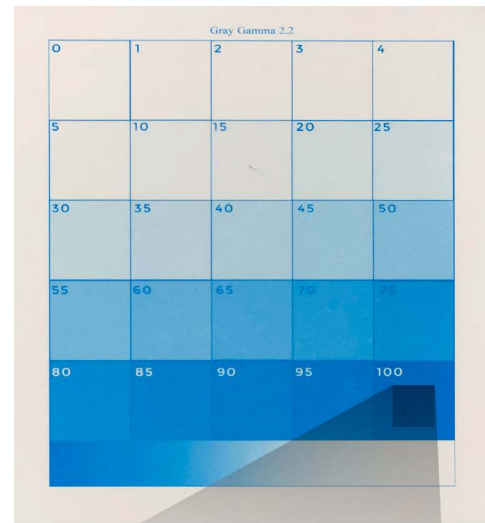


Figure 1-9

What is this trait?

A good way to think about surface energy mottling is to imagine drawing on a piece of plastic with a cheap marker. Most of the time the ink is going to bead up as you draw. This effect is all about the interaction between the surface energy of the substrate and surface tension of the coating material. Dyne is a unit of measure for surface energy and tension, and is used by the printing industry as a reference to see whether an ink is going to adhere well to a surface or not. You can purchase pens that have inks with different surface tensions to test dyne levels of substrates. In *figure 1-8*, the paper was brush coated with a low dyne size and high surface tension emulsion which caused the emulsion to bead up between the paper fibers. The emulsion on the paper in *figure 1-9* was brush coated on a paper with a high dyne, so the coating is much more uniform.

Do you want this trait in your print?

Yes- Like dot gain mottling, this type of mottling can add life to a print. The effect is a little different, and out of the four types of mottling, this is probably the most pleasant to look at. The structure of the mottling is very fine and looks a bit like grain.

No- While most of the surface energy mottling is very fine, it also becomes visible as larger structures which might distract from a print. Since white paper is showing, the mottling is going to decrease density, which will in turn decrease the vibrancy of your prints.

Where can you learn more?

- Surface energy, page 136
- Alkaline treatment, page 140
- Additives, page 153

ABRASION MOTTLING

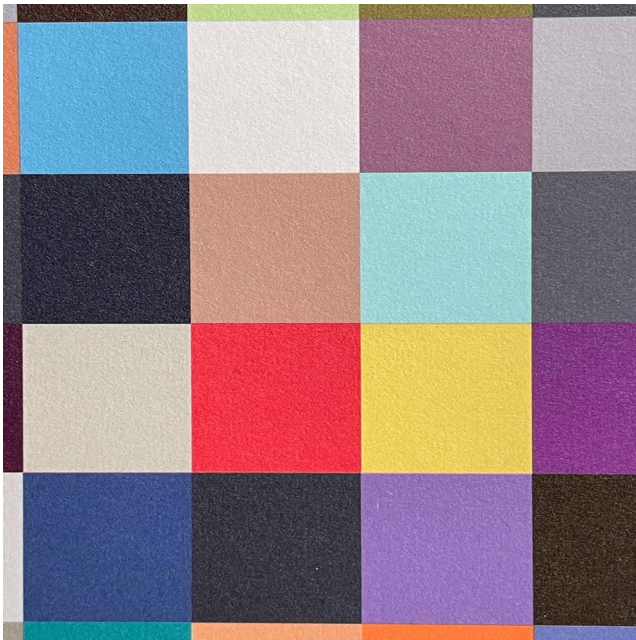


Figure 1-10

What is this trait?

Abrasion mottling happens when brush coating prints in multiple layers. The first layer is applied to the paper, and it looks very smooth. It is exposed, developed, and dried, but as the second layer is being applied, the brush eats away at the first layer, mostly removing pigment from the higher areas in the paper texture. The result is seen in the photo on the left above. The quantity of mottling can be controlled through adjustments to the thickness of the coating, brushing technique, and type of brush.

Do you want this trait in your print?

Yes- This is the most common and typical look to gum prints. Since the only way to completely avoid this problem is to use a spray gun, you may choose this texture to avoid complicating the process. texture to avoid complicating the process.



Figure 1-11

No- The biggest disadvantage of this type of mottling, compared to the other two, is a dramatic decrease in the density of the lower layers, which results in dull prints. If abrasion mottling is reduced or avoided, gum printing can produce a huge gamut, with very deep blacks.

Where can you learn more?

- Spraying, page 59
- Emulsion rheology, page 154
- Paper choice, page 161
- Brush choice, page 161
- Layer order, page 170

DETACHING

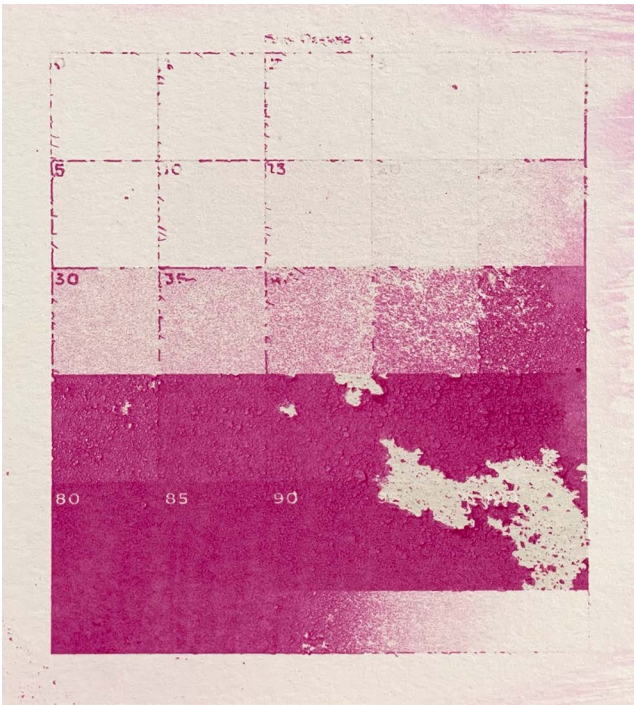


Figure 1-12

What is this trait?

Detaching occurs when the gum doesn't stick to the paper. This might happen if the paper doesn't have enough tooth or micropores, the dyne of the sizing is too low, the sizing isn't hardened or cured properly, or the emulsion holds too much internal tension from being coated too thick.

Do you want this trait in your print?

Yes- This effect might be used in a very rustic looking photo, like an old car rusting away.

No- Some of these traits can be useful to the interpretation of a photo, but when large parts of the photo are missing, I think it's almost always going to be something you want to avoid.

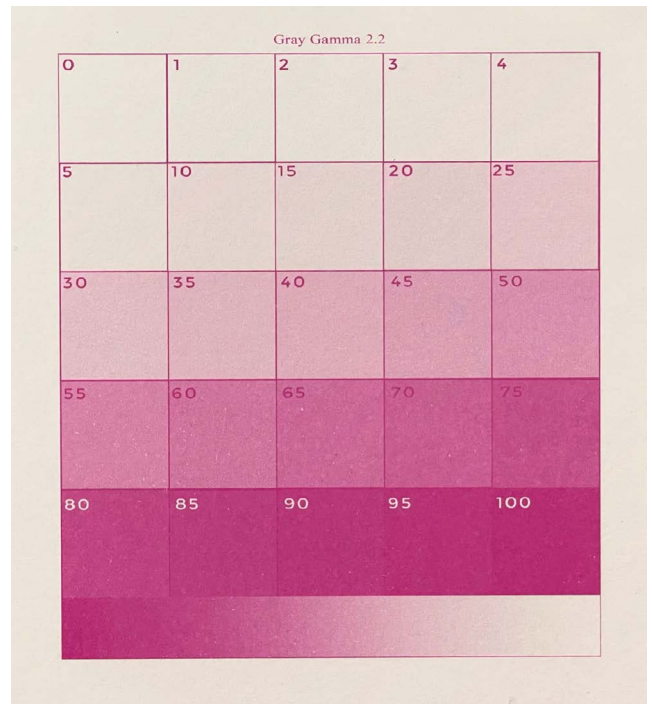


Figure 1-13

Where can you learn more?

- Pigment concentration, page 115
- Surface energy and micropores, page 139
- Raw paper, page 141
- Thickness of coating, page 154
- Sensitizer concentration, page 163

MELTING

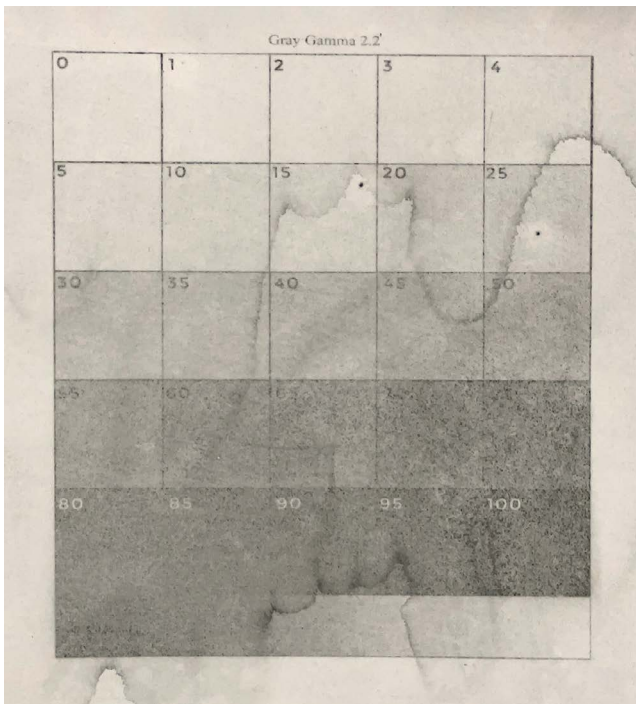


Figure 1-14

What is this trait?

Dichromate sensitized gum doesn't have a precise point where it finishes developing. No matter how long a print is developed, there's always a little bit of pigment running off the print. Besides making calibration a bit of a headache, the loose pigment can manifest as watermarks, as seen on the left above. A correct dichromate ratio, correct exposure, and developing tricks can solve 90% of this problem, but not completely. I invented a new way to develop prints, which completely solves this issue.

Do you want this trait in your print?

Yes- A little bit of pigment running down a print is usually not an issue. In more extreme cases like that seen on the left above, the trait could make prints look spooky.

No- Melting causes three issues in a print. The watermarks could simply be distracting, but they could also make the creation of an ICC profile difficult because the staining might go through several patches which results in a profile that adds color banding and even posterization to a print. Melting causes a print to lose a lot of density, especially if it is developed for

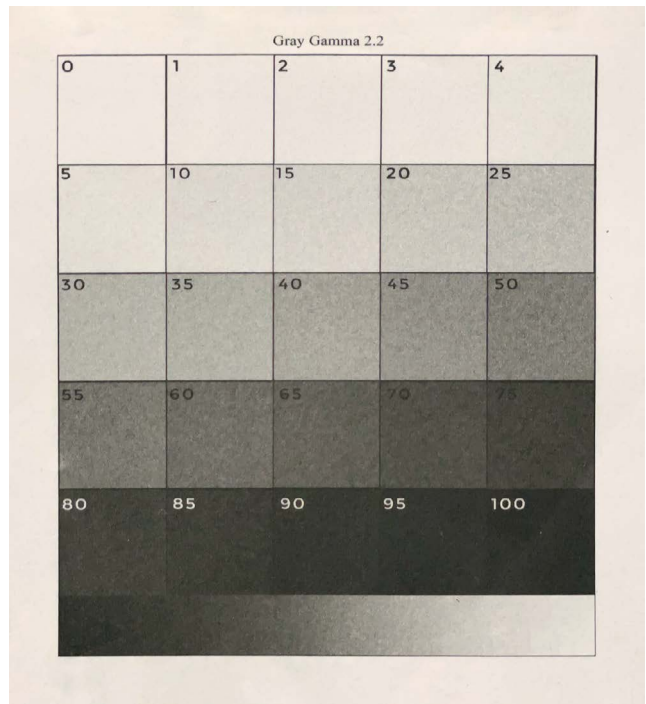


Figure 1-15

too long. This results in dull prints. Melting also makes linearization and calculating tonal separations difficult since it's like trying to hit a moving target.

Where can you learn more?

- Dichromate concentration, page 148
- Additives, page 152
- Developing technique, page 162

LOW DENSITY

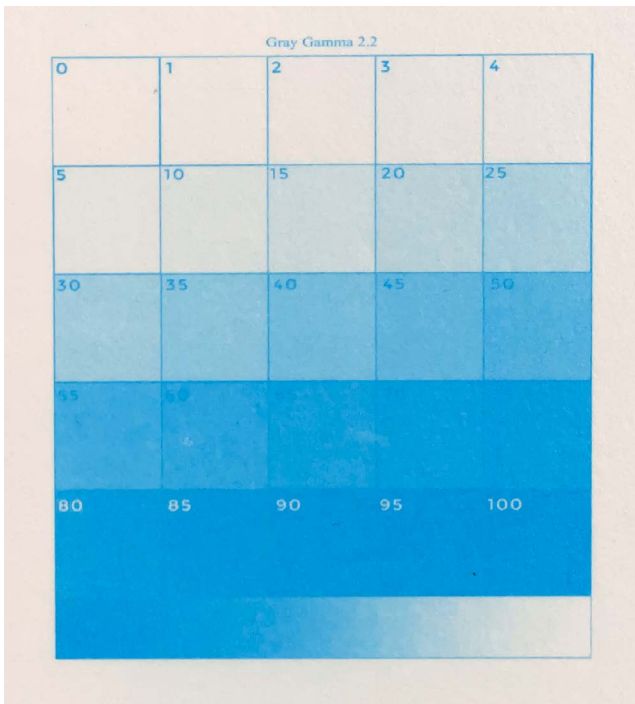


Figure 1-16

What is this trait?

A low density means there's not a lot of pigment on the paper, or the pigment used is weak. Color prints made with low density channels are more relaxing to look at and printing neutral earth tones is easier. In general, a higher density means more vibrant colors in a print and deeper blacks, but calibration of neutral colors becomes more difficult. Pigment choice and concentration are going to have the largest impact on density, but exposure, sizing, and coating thickness also play a role.

Do you want this trait in your print?

Yes- Playing with the density in a print is one of the easiest ways to achieve the look you are going for. Just be careful not to reduce the densities too far, especially the black, or the print will look faded. When I started printing in carbon, I went for the highest densities possible; however, I soon realized that doing so caused numerous problems with calibration, and it wasn't necessary. I'm always astounded by how much can be achieved by very low densities. Our eyes are very good at seeing subtle color differences, especially in near neutral colors, so a little bit goes a long way.

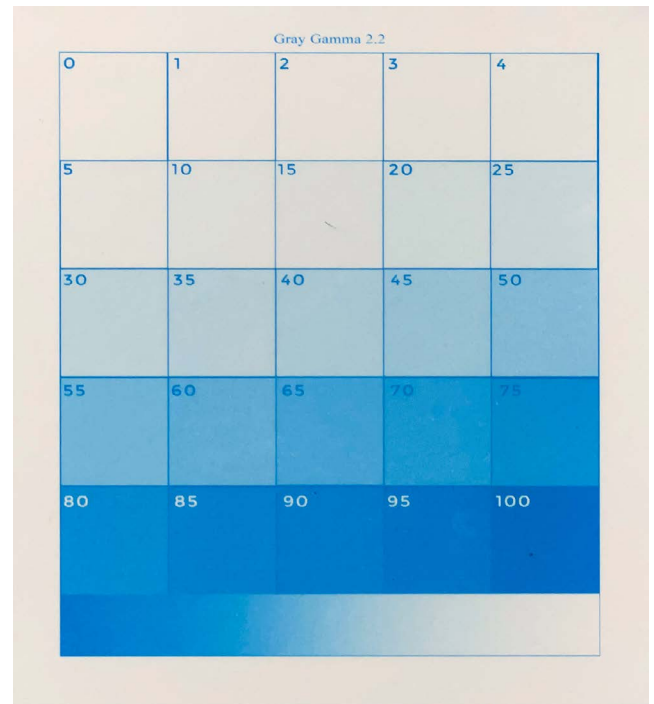


Figure 1-17

No- If you are trying to faithfully reproduce the colors in prints of flowers, colorful landscapes, or brightly colored textiles, etc., you are going to need a higher density. If you want to make a black and white print with just one layer so you can avoid having to deal with registration, then you will want to try and achieve the maximum density possible in one go.

Where can you learn more?

- Spraying, page 64
- Staining, page 112
- Density, page 121
- Pigment choice and concentration, page 125
- Exposure, page 148
- Layer Order, page 177

BRUSH STROKES

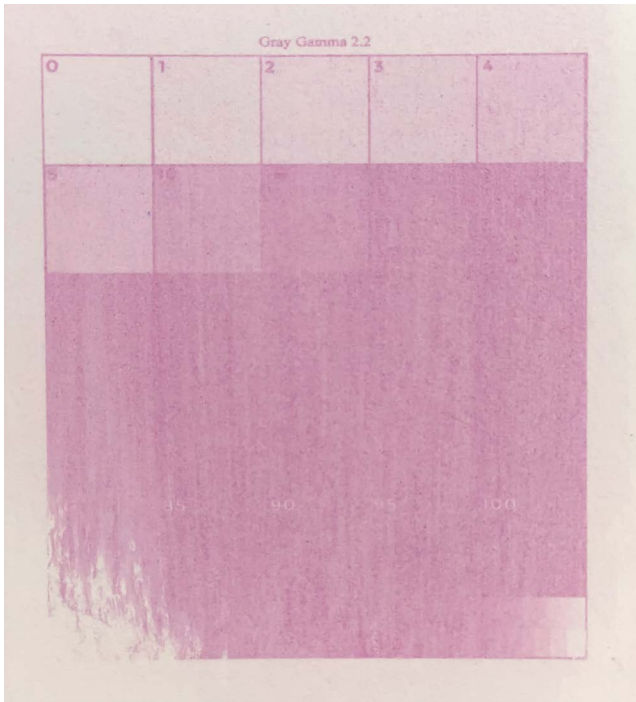


Figure 1-18

What is this trait?

Brushstrokes are simply a result of coating the paper with a brush. Various brushing techniques can produce thin strokes, large strokes, crisscrossing strokes, painterly effects, a rugged texture, or an extremely smooth coating. Some people spend a lot of money on expensive brushes, but I found that the sizing of the paper, the emulsion recipe, quantity of emulsion, and brushing technique are much more important than the actual brush. The print on the left above was made with a 100-euro hake brush, while the one on the right was made with a 7-euro brush from a local construction supply store.

Do you want this trait in your print?

Yes- Out of all the traits described in this section, I think brush strokes are the most desirable. When properly done, it can turn a photograph into a painting. Brush marks around the edges of a print also show that it is handmade and can increase the value of a print.

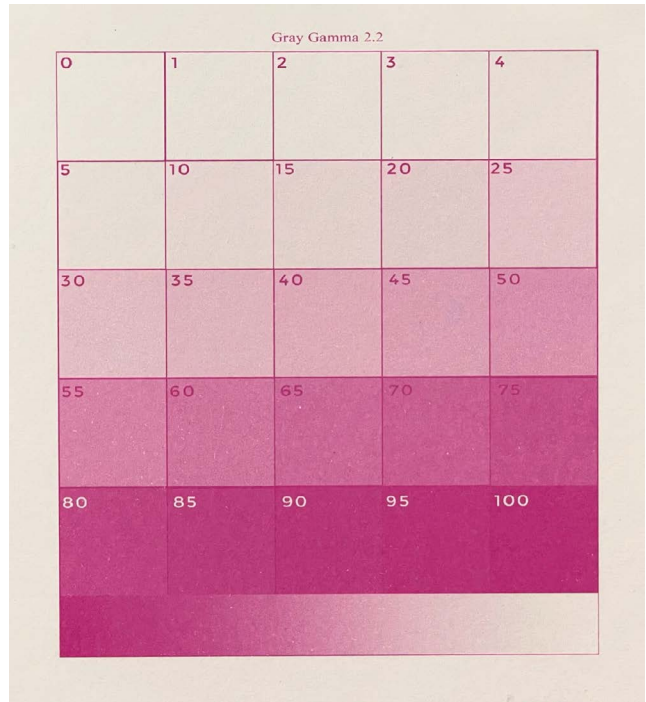


Figure 1-19

No- Brush strokes can be distracting from a photo, especially in color portraits due to micro color casts. The irregularity of the brush strokes will also make calibration more difficult. It's better to build a profile without brush strokes, then add in the effect when making an actual print.

Where can you learn more?

- Brushing technique, page 49
- Spray coating, page 59
- Paper sizing, page 137

MISREGISTRATION

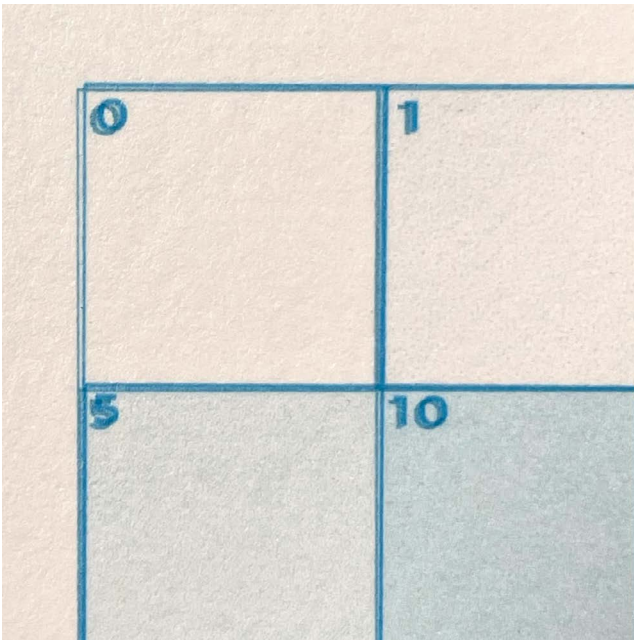


Figure 1-20

What is this trait?

A double image, as seen in the photo on the left above, is caused when layers are not lined up. This results in a blurry image, loss of resolution, and color fringes.

Do you want this trait in your print?

Yes- A small misregistration like shown above probably isn't desirable, but a large, purposeful misregistration can produce interesting effects.

No- If you have gone through the trouble of purchasing expensive imagesetter negatives, a punch, pins, and have put in the work of registering each layer, you probably want them to line up as best as possible. If done correctly you should be able to register a 40x50cm print to within 80 microns, or about the width of a hair.

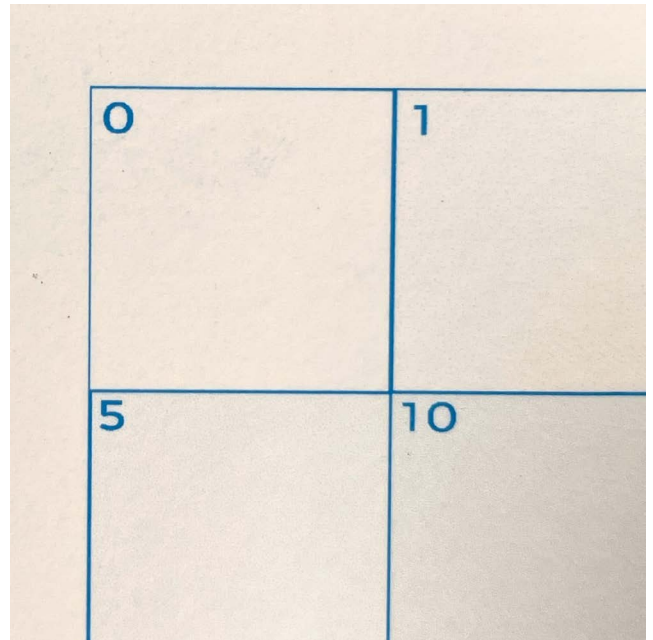


Figure 1-21

Where can you learn more?

- Paper preparation, page 23
- Registration method, page 31
- Climate control, page 133

UNSHARP



Figure 1-22

What is this trait?

There are many reasons why a pixel from a digital file will blur as it makes its way from your computer monitor to a print. The resolution of the negative, process variables, and the equipment you use will all affect how sharp the print will be.

Do you want this trait in your print?

Yes- Over sharpened prints look artificial, cheap, and are stressful to look at. I'm referring to prints with halos in them, over the top micro contrast, and no grain. Think of super high-fidelity movies, with too much CGI, which can look terrible when seen at 60fps. Watching films at 24fps, with a little grain, and no excessive sharpening looks much more natural. A slightly blurry print can look very good in many circumstances.

No- Imagine you are trying to make a print of a tree with a million tiny little branches. In a blurry print, those branches are not going to show up. A blurry print is going to cause other problems, especially when working with halftone negatives. If a halftone dot is not reproduced with sufficient fidelity, then it will lead to problems with dot gain, mottling, and blown out highlights. Instead of making a blurry print, a better effect is to use a soft-focus lens.



Figure 1-23

Where can you learn more?

- Vacuum frame, page 94
- Paper choice, page 94
- Exposure unit, page 105
- Pigment choice, page 127
- Coating thickness, page 154
- Sizing, page 154
- Exposure time, page 161
- Negatives, page 165

SPECKLES

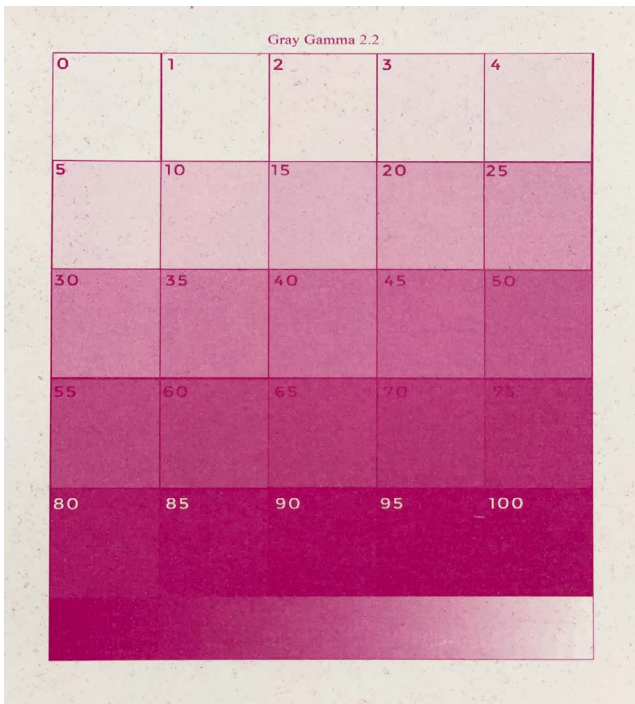


Figure 1-24

What is this trait?

Speckling is a type of staining, but it is different from the solid film of pigment leftover from development seen in *figure 1-3*. Speckling happens when the pigment is absorbed deep enough into the paper that it doesn't wash out during development. This can be avoided by sizing and preparing the paper in a certain way, or through process tricks like clear coats. Speckling can range from hardly noticeable, as seen on the left above, to dominating a print. In a single layer print, speckling is usually very subtle, but as more and more layers are added to the paper, the effect increases.

Do you want this trait in your print?

Yes- On unsized paper, speckling is going to be difficult to avoid. You must either size the paper or use clear coats, so the process is going to get more complicated. The look and feel of a sized piece of paper is also going to be a little different than an unsized sheet, especially if coated with straight gelatin. (The sizing method covered in the paper preparation section in this book is so close to the original feel of the paper, that it's hard to see a difference between sized and unsized paper.)

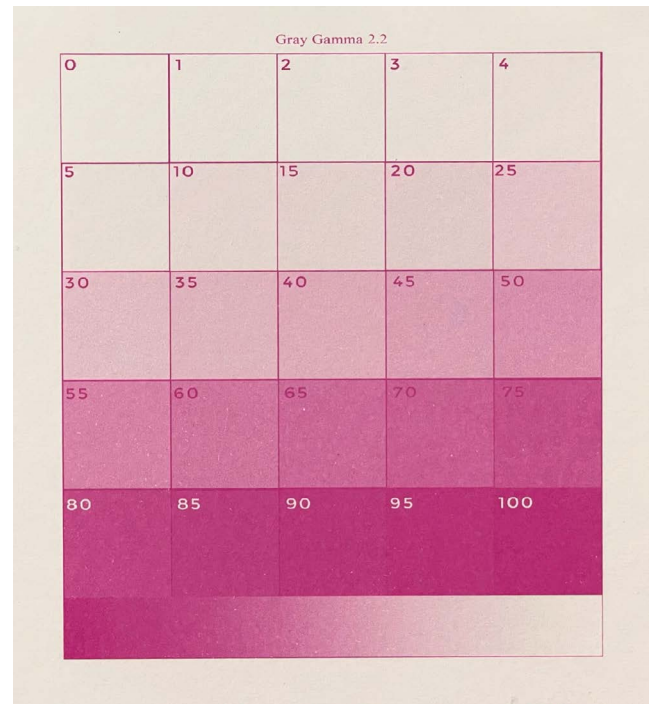


Figure 1-25

No- If you are printing in black and white, I wouldn't worry too much about speckles, but when working in color it can get a bit extreme and cause muddy highlights.

Where can you learn more?

- Clear coats, page 116
- Paper preparation, page 135
- Emulsion spraying, page 160

SENSITIZER STAINING

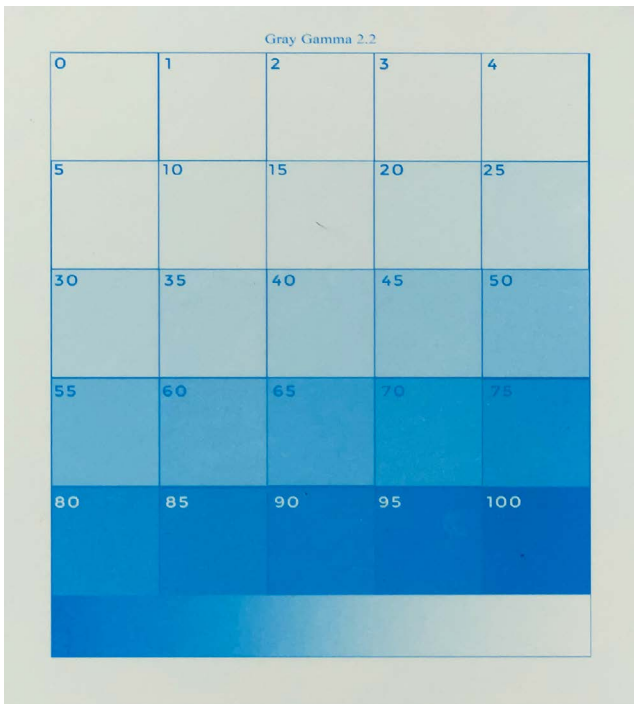


Figure 1-26

What is this trait?

As dichromate is reduced in the clearing stage of making a print, chrome iii oxide is formed which is used as a green pigment. This green pigment cannot be removed from the print, and it's very lightfast, so it's going to be a part of the print forever. If you hold a gum print next to a fresh sheet of paper and it looks a bit grayish, it's possible the print wasn't cleared properly. The type of sizing on the paper will have a large effect on the amount of sensitizer staining.

Do you want this trait in your print?

Yes- If you want the whites in the print to be a little bit subdued, then this is one way to achieve it.

No- - If you have put a lot of effort into researching pigments and a sizing that doesn't stain, then you probably don't want any stain from the sensitizer.

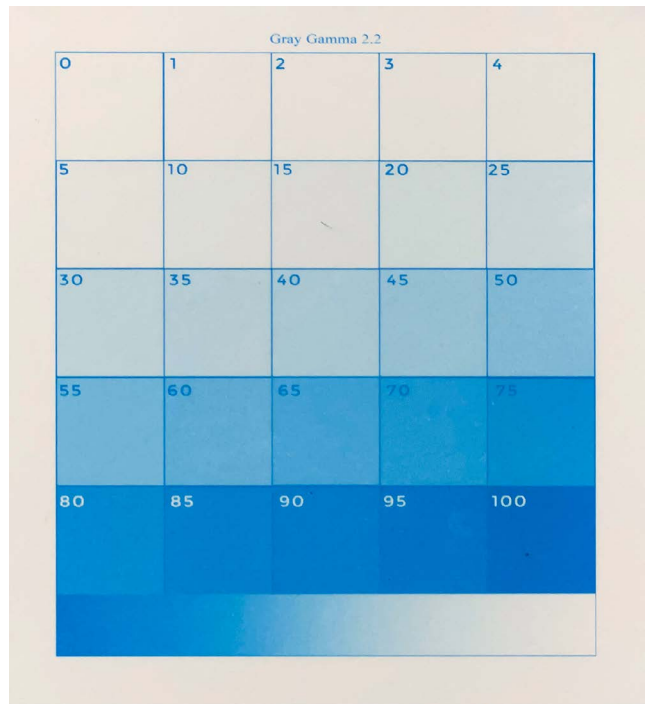


Figure 1-27

Sensitizer stain will also dull the colors in a print, especially cool colors, and in extreme cases add a color cast to a print.

Where can you learn more?

- Clearing, page 54
- Sizing, page 136
- Additives, page 152

BLOWN OUT HIGHLIGHTS



Figure 1-28

What is this trait?

Like all pigment-based processes, gum printing has a tonal threshold. There is abrupt transition from paper white to the tone in the print. This book will look at common ways to minimize the threshold, improving the transition into the lightest tones, such as printing in layers, reducing the contrast, adding grain, or slightly overexposing.

Do you want this trait in your print?

Yes- You may choose to use the strategies mentioned above to control the tonal threshold without needing a halftone screen.

No- It's a misconception that carbon and gum printing can't achieve the same subtle highlights as a platinum print. There's no reason why a gum print can't produce extremely high key and smooth images. The trick to completely avoid the problem of blown out highlights



Figure 1-29

is to use a halftone screen. While some people dislike the look of a halftone screen, like you would see in a newspaper, a much finer screen can be used to achieve the illusion of a continuous tone print.

Where can you learn more?

- Retaining highlights, page 73
- Reducing contrast, page 74
- Halftone negatives, page 79

COLOR CASTS AND METAMERIC COLOR FAILURE

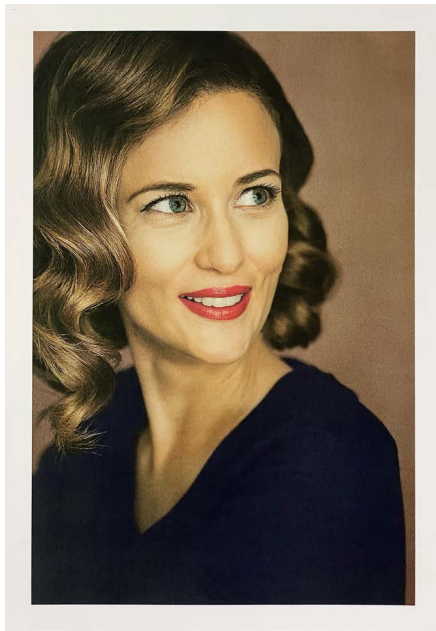


Figure 1-30

What is this trait?

There is always a bit of variation in a handmade process, and gum is no exception. In a CMY print, a 5% variation can lead to unwanted color casts, especially in portraits. CMYK prints on the other hand will be much less susceptible. Even if a CMY print is made with absolutely no error in calibration, the print will still change colors under different lighting conditions and different viewers will see the colors differently. The addition of an iron oxide layer reduces illuminant and observer metamerism, and makes the calibration of difficult colors like skin tones, much easier.

Do you want this trait in your print?

Yes- I'm currently working on a project that takes the illuminant metamerism color failure effect to the extreme. You may like the spontaneity of the color casts. Each print is going to be unique.

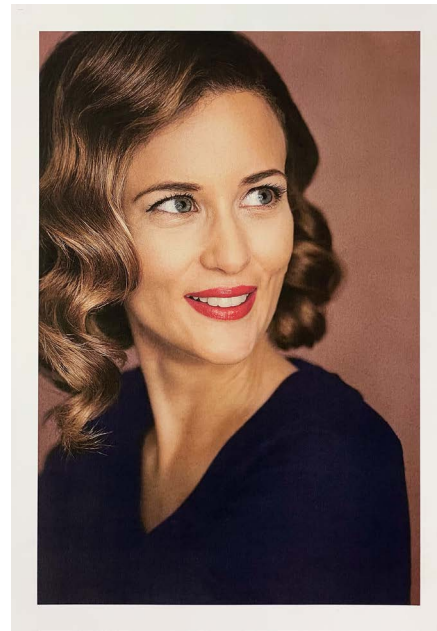


Figure 1-31

No- With flowers and saturated images, color casts and metamerism color failure are not much of an issue. However, when printing memory colors, i.e. colors that we all know what they should look like, neutral toned landscapes, skies, and portraits, then it can be an unwanted effect.

Where can you learn more?

- Pigment lightfastness, page 121
- This book does not cover much information on color casts and metamerism color failure. For more information, I recommend visiting www.handprint.com. There is also a good section on the subject in the book *Calibration for Alternative Photographic Processes*.

PART II

PREPARATIONS

CHAPTER 1 Introduction

CHAPTER 2 Sizing

CHAPTER 3 Registration

CHAPTER 4 Negatives

CHAPTER 5 Brush Coating

CHAPTER 6 Spray Coating

CHAPTER 7 Retaining Highlights

CHAPTER 8 Halftone Print

CHAPTER 9 Halftone Screening

CHAPTER 10 Dot Gain

CHAPTER 11 Exposure Unit

CHAPTER 12 Staining

CHAPTER 13 Pigments

CHAPTER 14 Paper

CHAPTER 15 Sensitizer

CHAPTER 16 Emulsion

CHAPTER 17 Balancing Act

CHAPTER 18 Calibration

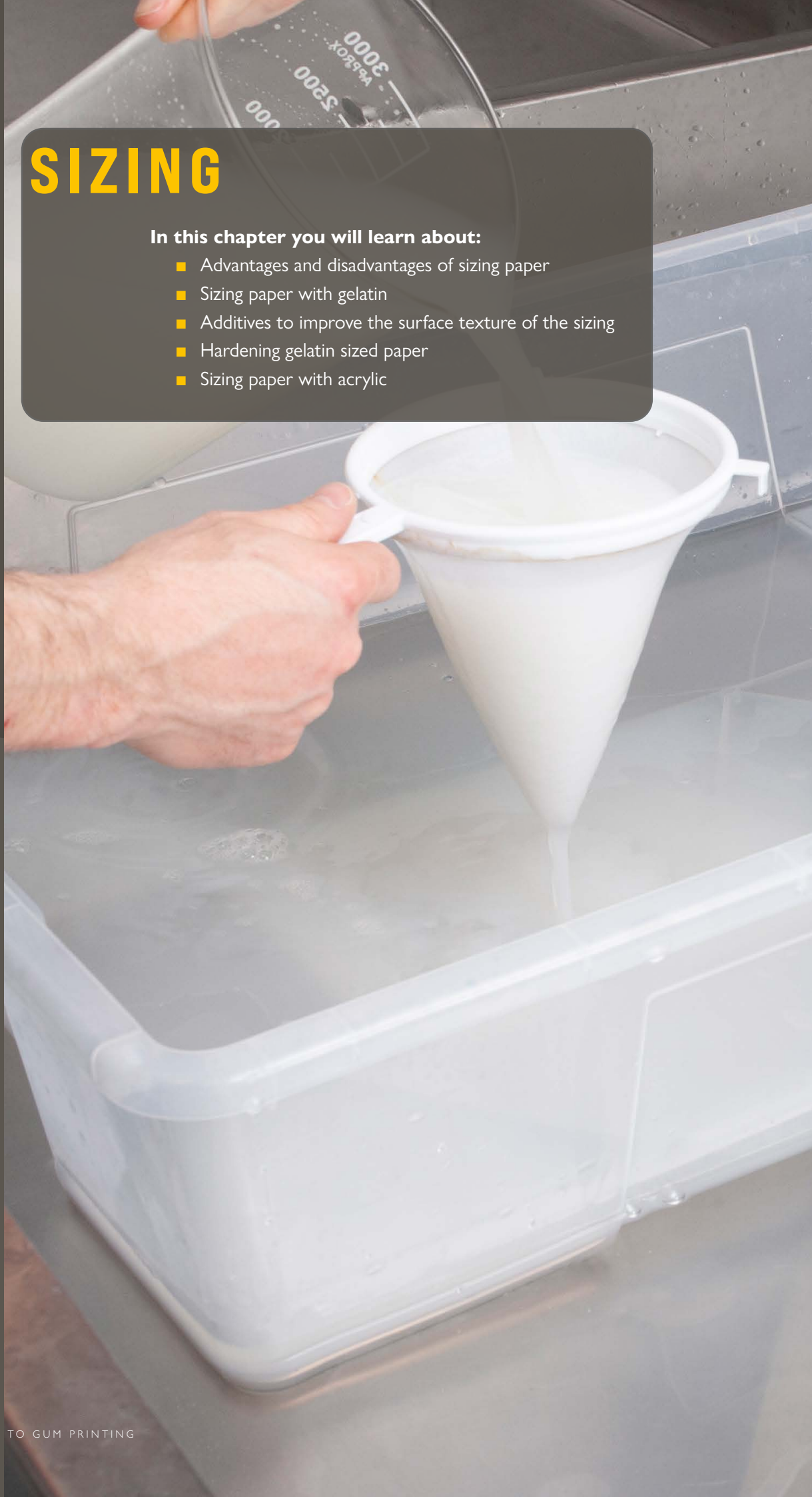
Appendix

CHAPTER 2

SIZING

In this chapter you will learn about:

- Advantages and disadvantages of sizing paper
- Sizing paper with gelatin
- Additives to improve the surface texture of the sizing
- Hardening gelatin sized paper
- Sizing paper with acrylic



INTRODUCTION

Why Size Paper?

Almost all paper is already sized by the manufacturer but adding extra sizing may be necessary to achieve certain desired characteristics. Below are some benefits extra sizing may offer.

- Reduction in the amount of pigment staining
- The sizing can seal the paper, which will prevent speckling.
- A sized paper can have a smoother surface for coating.
- Sized paper holds the emulsion on the surface of the paper instead of letting it soak in, which increases resolution.
- A sizing that incorporates an opaque pigment also decreases light scattering within the paper, which in turn decreases dot gain in halftone prints and increases resolution.
- A sized and hardened paper is also more dimensionally stable since the fibers are often glued together or the paper absorbs less water.
- Some papers will be much easier to coat when sized, especially eastern papers. This may require treating with an Alkyl Ketene Dimer, which is covered on page 141.
- Sizing offers abrasion resistance, so coating the emulsion doesn't lift up fibers.
- Sized paper will be more durable than unsized paper when wet, and will hold up better through processing.

Sizing has a few disadvantages as well.

- In gum printing, sizing decreases the adhesion of the emulsion which leads to reticulation and detaching.
- Many sizes can lead to preservation issues such as yellowing and embrittlement of the paper. I always test sizing for yellowing by leaving paper in the sun for three months. Avoid acidic sizes.
- Sizing may increase sensitizer staining.
- Sizing changes the feel of the paper.

- Sizing takes time and adds extra cost to make a print.
- Some sizes require the use of toxic chemicals, for example, formalin to harden gelatin.

Whether you choose to add extra sizing or not is going to be a very personal choice and can change with each print you make. I liked using sized papers for gum printing, but towards the end of my research, I started working with sensitized clear coats, which nearly eliminated staining and speckling without the need for sizing. You might still choose to use sized papers for higher resolution and less dot gain, but clear coating closes the gap between sized and unsized papers in terms of getting a clean print. You can read more about clear coats on page 58 and page 116.

Method for Sizing

There are probably as many methods for sizing as there are gum printers in the world. Common sizes include gelatin, acrylics, starches, waxes, oils, resins, casein, and alkylated ketene dimers. This chapter is by no means an exhaustive description of those sizing possibilities and their respective printing and preservation issues. I'm simply going to describe why I used gelatin and acrylic to size the papers used in the prints shown throughout this book, and then show my method for applying those two sizes. More information on why I chose those two sizes is found in the theory section of this book, on page 135.

GELATIN SIZING

Gelatin

Depending on the bloom of your gelatin, you may need to adjust the concentration of gelatin and sugar in the recipe on the next page. The gelatin I used has a bloom of about 290. If the bloom is lower and used at the same concentration as a higher bloom gelatin, then the coating solution will be less viscous. This means that the coating on the paper will be thinner, and may not set up in time, resulting in drip marks running over the surface of the paper. Along the same lines, you can control the thickness of the coating by the