



# THE BLACK & WHITE PAPERS

## SCANNING

When bridging the gap between the optical negative and the digital print, the most important factor is the quality of the scan. Only high quality scans will produce high quality prints and in the black and white world, digitizing negatives to create black and white prints is tricky. In order to get optimal results you need to consider the quality of the scanner, the bit depth, the largest final print size, the desired crop, appropriate scan size, and the saved file format. As with traditional printing, the negative is everything and in digitizing a negative there is an inevitable loss of information, so err on the side of overcompensation.

### OPTICAL VS. INTERPOLATED SCANS

The scanner's quality is based upon several components that can determine the resulting quality of the digitized negative. Scanners have the ability to interpret information as optical resolution or interpolated information. Optical information is the superior mode of resolution, as it makes no interpretation of the measured material. Interpolation measures the material and then will fabricate new information based on those values in order to make files of larger resolution.

### DYNAMIC RANGE

The Dynamic range or "dMax" is the amount to shadow tonality in a print or negative that maintains printable detail. In digital terms, dynamic range is the ability of a scanner to pull out these shadow details. Ratings for dynamic range can run from the high end at 4.2, like the **CREO EVERSMART SUPREME** to 3.6 in the **DURST SIGMA 67** and lower.

### PIXELS PER INCH

Different scanners have different resolutions and those resolutions should be considered when determining the quality of the scan. The higher the number of pixels per inch (ppi), the more finely detailed the scan. The **Creo Eversmart Supreme** has an ultra-high resolution of 5600 ppi so it's scans are slower, more detailed, and can pick up a greater range of tones – perfect for large prints or fine art prints. The **Durst Sigma 67 Film Scanner** has a high resolution of 4000 ppi and produces fast, high quality scans of rolls of film or individual images. Sigma scans are cost-effective and fast while still producing optical, high-resolution images.

### BIT DEPTH

Scanners measure the color and tonality of the original material at varying levels. As all scanners assign their measurements in the three-mode color channel RGB, each pixel is assigned one tone from each of these colors. Thus bit depth determines the number of possible tones assigned to each pixel with higher bit depth allowing a greater capture of subtle tones and detail. 16-bit scans assign 1 of 65,536 possible tones to each pixel creating smooth, subtle continuous tone images. 12-bit scans assign 1 of 4096 possible tones to each pixel but will be taken to either 8-bit or 16-bit by the imaging software. 8-bit scans assign 256 possible tones to each pixel - as you make changes to these small 8-bit files, some of these pixels are lost and your images may lose their smooth continuous tone look.

### PRINT SIZE

What is the LARGEST size you will eventually need from this image? If you know that you'll get a 16x20 eventually, but only need a 4x6 right now, get the larger scan to avoid rescanning later. If you try to print the 16x20 from the smaller scan, your print quality will suffer. However, the 4x6 from the 16 x 20 scan will look fabulous! This will save you from getting the same image scanned twice and paying for artwork twice. This will save you money. Also, be sure to take into consideration what crop will be necessary. ***Severe crops should, on average, be considered as one size larger than the actual print size.***

### SCAN SIZE

Choosing a scan size must first be determined by the final print size at 400 dpi. Choosing too small of a scan will cause the print to have evident digital artifacts, pixilation, and other obvious signs of degradation. ***Also, consider the amount of crop, as it may be equivalent to a larger size print.*** The chart below shows the *minimum* optical scan size in Megabytes (MB) that is required for the best quality print.

Final Print Size	8-BIT	16-BIT
2½ X 3½	5 MB	9 MB
3 ½ X 5	9 MB	17 MB
4 X 5	10 MB	19 MB
4 X 6	12 MB	24 MB
5 X 5	12 MB	24 MB
5 X 7	17 MB	34 MB
8 X 8	31 MB	62 MB
8 X 10	39 MB	77 MB
11 X 14	74 MB	148 MB
16 X 20	154 MB	307 MB
20 X 24	231 MB	461 MB
20 X 30	288 MB	576 MB
24 X 30	346 MB	691 MB
24 X 36	415 MB	830 MB
30 X 40	576 MB	1152 MB
40 X 60	1152 MB	2304 MB

### JPEG VS. TIFF

Jpeg (Joint Photographic Experts Group) is a standard image compression mechanism, which is intended to be "lossy", meaning that it compromises and loses image quality with each compression in order to reduce file size (by an average of 1/3). Jpegs are inherently small, great for websites, e-mails, and small quick prints that require little or no manipulation. However, if you need to have detailed information, medium to large prints, or more than a little manipulation (i.e.-crops, retouching, or even some dodging and burning) jpegs are at high risk of degrading. These files are intended to lose quality each time they are compressed in order to save space and are available as 8-bit only. Since jpeg files degrade, they are ***non-archival.***

## **TIFF**

Tiff (Tag Image File Format) is a standard file format used to store high-resolution bit-mapped images with all data being fully recoverable. Tiff files tend to be well detailed, are identical bit-for-bit after each compression without any loss of quality. They are available in either 16-bit or 8-bit. Tiff is THE industry standard for high-resolution image storage and is the archival storage format.

## **SUMMARY**

Consider your final needs. Whether you will be printing a high end Giclée or getting small scans for your website, optical resolution scans are the best choice as they measure the actual information of your original material. Choosing between the **Creo Eversmart Supreme** and the **Dusrt Sigma 67** should be determined by the final print size and quality. These same factors should also determine the scan size. If you are getting a custom 20 x 30 Digital Custom print, you'll need a minimum of 576 MB 16-bit file in order to capture the greatest number of tones possible. Finally, how should you save the file? Jpegs are compact and quick to download but degrade quickly. Tiff files are larger, more detailed and do not lose any detail as you save and resave them. As has always been true, the negative is everything so make sure to have the best one you can.