FUJIFILM
GRAPHIC SYSTEMS

Technical Publication

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FINALPROOF

LUXEL CP-5600

White Paper

Introduction

As the graphic arts industry continues its move to an all-digital workflow, more and more printers and prepress houses are streamlining their workflow processes and adopting digital contract proofing technologies. Consequently, many questions have arisen from those working in the industry as to the capabilities of different manufacturer's digital proofers: what technologies are used and why? Which proofer will ensure accurate color representation? And, perhaps most importantly, what is the best way to guarantee that the press sheet will match the proof sheet each and every time?

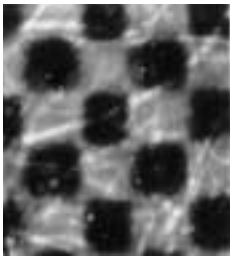
FinalProof
Luxel CP-5600
Digital Contract Proofer

Fujifilm Graphic Systems Division introduced its digital contract proofer, the FinalProof Luxel CP-5600, in 1999 and has become a trusted partner to many in the graphic arts industry. For those printers and prepress managers still making their decisions as to which digital proofing device will best suit their needs, Fujifilm offers the following explanations about FinalProof's technologies and the rationale behind their selection and inclusion.

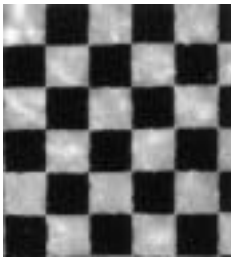
Pigment vs. Dye

When considering a digital proofing device, the most important issue is the color integrity of the proofer and how well the proof will match on press. In order to provide the best color representation, as well as the ability to easily match the proof on press, Fujifilm researchers chose to use the most stable technology available: pigments.

By definition, a dye is a soluble colorant, as opposed to pigment, which is insoluble. This is important in that it indicates the relative stabilities of the two types of colorants. Printing inks use pigments as colorants due to their inherent ability to remain stable when exposed to extreme or extended light and/or atmospheric conditions. Dyes, in contrast, are much more prone to be unstable at these conditions. Pigments also allow for a very sharp, crisp transfer and precise placement of color on the proof.



Dye-based dot proof



Pigment-based FinalProof

FinalProof is unique in that it uses Binary Pigment Technology, which means there is a 100 percent transfer of the pigment for each pixel that is exposed. By using binary pigment technology, the proof becomes an accurate representation of the press sheet.

Pigments also provide for a better and more accurate depiction of the final piece when viewed under a variety of light sources. While proofs made from dyes appear very similar to printed matter under a 5000K standard light source, they are vulnerable to the effects of different light sources, a quality called metamerism. It is extremely difficult to make dyes react in the same ways as pigments and, because of that, they are very dependent on the light source in which they are being observed with regard to their level of resemblance to the actual printed matter.

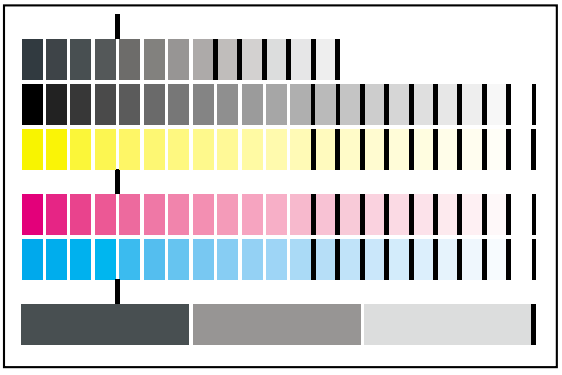
In contrast, pigment-based proofs are not nearly as affected by the type of light source being used for viewing and are regarded as a much longer lasting proof and sample of color, with much lower metamerism. The stability of the color of pigment-based colorants can last for several years, whereas dyes are less suitable because they are often subject to fading over time. Thus, Fujifilm's FinalProof output is not just a proof. It can also serve as a long-lasting color sample for the standard colors of printed matter. In addition, because of the use of halftone dots, actual printing stock, and a high-precision color management system, the proof results are extremely close to the actual printed matter, making the proofs both easy to use and highly reliable.

Calibration

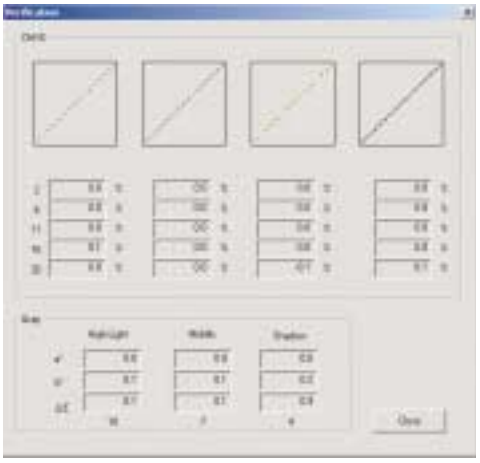
Calibration compensates for the slight changes in actual output caused by machine differences, media lot differences, as well as the local environment. Therefore, calibration is essential in maintaining consistent output quality, and it allows the user to match the output quality of multiple machines. While calibrating proofing devices is obviously an important task, it can also be very time-consuming and costly.

Common complaints regarding calibration are that it takes too much time – leading to decreased productivity – and that it needs to be done too often. Fujifilm researchers kept those issues in mind when developing FinalProof and its software for calibration and control, ProofManager.™

ProofManager provides for high precision and direct control of the gray areas (in which color differences are most perceivable), which are the best methods for reducing the effects of machine, media lot, and environmental differences on an output sample. This type of "gray standard" calibration already has a proven record of performance on other Fujifilm proofers – the popular PictroProof and FirstProof – currently serving the industry.



FinalProof Calibration Chart

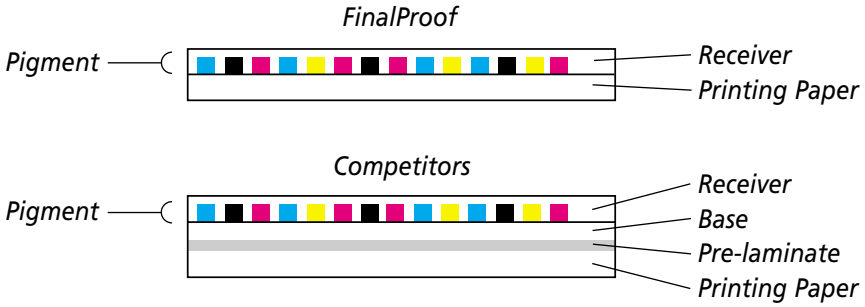


Proof Manager– gray calibration for dot gain control

Using ProofManager gray calibration, precise corrections (Delta E +/- 2) on output media-specific standard values are possible. ProofManager uses values including colorimetric values of gray (3-color light, middle, and shadow) and CMYK dot percentages in the range from 1% highlight to 99% shadow areas. This differs from competitive methods that match to standard single color densities and dot gains.

Paper Stocks

Paper often has two significant effects on color reproduction. First, the brightness of the paper governs the total possible gamut of the final color results. Secondly, the paper surface also affects the amount of light reflected back to the viewer, which in turn determines the saturation of the colors. A more reflective surface, such as a coated paper, will produce a wider range of colors than will an uncoated paper, whose rough surface scatters the light and reduces the amount reflected back to the viewer's eye.



Laminating directly to the actual printing stock, without any pre-laminates, allows the user to properly see the significance the different papers will have on the printed image. FinalProof was designed with this benefit in mind and has the unique ability

to laminate directly to any coated or matte paper with no pre-lamination step. Pre-laminations dramatically and permanently change the stock's reflectance, optical gain, and potentially introduce artifacts from out-gassing. With FinalProof, users are able to get the most accurate color representation and an early look at the final printed piece.

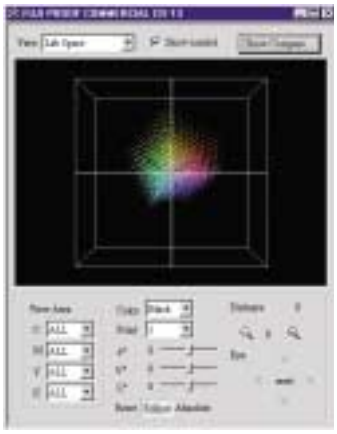
Multiple Resolutions

In addition to offering users a preview of the final piece, FinalProof was also designed to accommodate more than one workflow and output capability, making its integration into customer sites as seamless as possible.

In response to the market's demand for a writing engine capable of seamlessly plugging into various pre-existing workflows, Fujifilm developed FinalProof, which is capable of integrating into a 2,400, 2,438 or 2,540 dpi output workflow. By offering all three resolutions as standard in a single device, Fujifilm has eliminated constraints that other high-end DDCP devices must incur. By offering this flexibility, end-users no longer have to choose which resolution they are limited to at the time of ordering the device. FinalProof also eliminates the concern of costly service fees to have a unit upgraded in the field to support another resolution.

Color Tables

FinalProof can be used in conjunction with Fujifilm's Visual Profiler™, which is the first visually oriented color management system available to our industry. All previous systems have been based on machine-oriented color management where, during both capture and output, look up tables (LUT's) translate each color between the machine's unique internal method of designating a given color and a known color space. To minimize the extreme computation required for color management and therefore make the machines process faster, previous systems have used a limited number (750 – 1,500) of base colors that are all weighted equally, which means that a machine looks at every part of an image with equal importance.



Visual Profiler– visualy-oriented color management

In contrast, Visual Profiler addresses the true problem. The Visual Profiler target has been specially designed based on data from approximately 3,000 graphic arts companies to reflect human vision by weighting the relative importance of different areas of color space. It gives added importance to neutrals, near neutrals, and the full range of flesh tones, and it gives some extra weighting to other "memory" colors like skies and grass. This is accomplished by choosing the number of patches in a given area to accurately reflect the visual importance of that area. By keeping the "distance" between patches small in important color areas Visual Profiler is better able to "see" the variations. In order to keep computation requirements down, there are fewer patches and a larger transition in other, less sensitive areas. As a result, a Visual Profiler-based proof may have the same level of match to the original as other systems if judged by a machine-oriented "average Delta E" difference, but it will much more closely reflect a visual interpretation of the original.

Secondly, and perhaps more importantly, other systems assume an open sequential color management process where input profiles are applied at input, and output profiles and color management can be applied only once at output. The operator subsequently applies closed-loop adjustments. Visual Profiler is designed around the Fujifilm CMS concept, with a closed-loop color management workflow, which is why the effect of changes in critical areas can be built into the system. By outputting and re-measuring the initial target, Visual Profiler can "see" how close its first profile-based proof came to the target image in critical areas. With that knowledge it can then allow for metamerism, fluorescence, and rapid color transitions in critical areas like neutrals and produce an adjusted profile with an "expert" match.

The Visual Profiler's profiles are a more tightly controlled subset of an ICC profile. ICC profiles must facilitate a wide range of conditions across many industries (i.e., RGB monitor, 6 color ink-jet, lithographic, etc.). Visual Profiler profiles use *only* the aspects that are important to lithographic reproduction. The Fujifilm CMS process supports ICC for compatibility, but eliminates a lot of the potential problems concerning quality and reliability.

To achieve this, Visual Profiler has an ICC import feature that accepts ICC output profiles, converting them to Fujifilm LUTs or device link profiles that work in conjunction with Fujifilm's Proof Manager System.

Visual Profiler has also been custom-tailored to meet the printing industry's need for color retention of black and the primary and secondary process colors during color management - a highly desirable feature for halftone dot proofers. (Conventional ColorSync-based color matching modules do not support black retention and have problems with complementary colors mixing into the primary and secondary colors.)

Fujifilm is confident that it has assembled all of the main requirements for a color-matching system that is in demand by users: precision, visual-based color matching, color retention (required for high-quality halftone DDCP), and general ICC profile support.

Special Uses

The ProofManager software provides for optimization (job arrangement) of the media, which works well for single pages or random scans (scatter proofing). For workflows

ProofManager– optimizes media usage

consisting of eight- page signatures, Proof Manager automatically tiles the job into two, four-up proofs.

Although FinalProof is a four-page proofer, by laminating two four-up proofs it can produce an eight-page proof. The FinalProof receiver, which is semi-transparent, makes it easy to back-up a job creating an eight or 16-page signature. Other features include rotation and mirroring to produce the same orientation of the halftone screen and image on the proof as on the printed job.

Workflow Configurations

FinalProof is easily integrated into a variety of workflow solutions from Fujifilm, Rampage, Screen, Creo, Heidelberg, Agfa and Artwork Systems (PCC). (Please see Addendum A.)

Type Quality

Because of FinalProof's high resolution, characters are represented at the same quality as printed matter for accurate proofing. Its high-resolution *Thin Layer Thermal Transfer* technology provides for binary transfer, delivering type and halftones with superior sharpness.

Inkjet type rendering

FinalProof type rendering

In contrast, type and halftones using ink jet or dye sublimation thermal transfer systems are much softer, due to the inferior transfer technology.

Productivity

FinalProof is an automated system that produces approximately four four-page proofs per hour. Producing 18.78 sq. ft. per hour, the Fujifilm FinalProof is one of the fastest systems available, compared with competing proofers that typically produce 15.44 sq. ft. per hour, offering an 18% improvement. The only manual process associated with FinalProof is laminating the imaged receiver to the desired stock or substrate. Fujifilm chose not to

automate this part of the process to allow for maximum flexibility in the selection of the desired stock on a proof-by-proof basis.

Because FinalProof is a roll-fed device, it eliminates such issues as the introduction of dirt and dust by a carrier, kinks or misplaced donor, wasted time used for adjusting a device from four-page to eight-page, and introducing more artifacts into the unit and causing unusable, costly proofs.

FinalProof Size Options

FinalProof is available in two output sizes: a 4-up size of 21.5" x 25.5" (A2) and an oversize 21.5" x 32.25" (B2). FinalProof also offers users the ability to automatically tile, step & repeat, or media-optimize any type of file sent to it.

FinalProof Luxel CP-5600 and Laminator

Appendix A

Workflow Diagrams

8-BIT
COMPOSITE TIFFS
(RANDOMS)

TIFF/ IT P-1
(FROM 3rd PARTY)

POSTSCRIPT,
PDF, EPS, DCS2

CELEBRANT EXTREME

8-BIT
SEPARATED
TIFFS WITH
FINALPROOF
DRIVER
(5590 5053)**

1-BIT SEPARATED TIFFS
WITH HR TIFF OUT
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLORS
(5590 5042)**

ADDITIONAL 2 SPOT COLOR
SUPPORT FOR 1-BIT TIFFS USING
SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)**

1-BIT
SEPARATED TIFFS
(FROM 3rd PARTY)

1-BIT SEPARATED TIFFS
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLORS

ADDITIONAL 2 SPOT COLOR
SUPPORT FOR 1-BIT TIFFS USING
SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)**

PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION), TILING,
ROTATION, CROPPING,
MIRRORING,
INTUITIVE COLOR
(SPOTS ENTERED
AS CIELAB
CONVERTED TO CMY)

SPOT COLORS CAN BE IMAGED
SEPARATELY USING CO-RES SCREENING
OR USE UP TO 2 SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)

PROOF MANAGER

ORIGINAL SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION), TILING,
ROTATION, CROPPING,
MIRRORING

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

REVISED 11/2001

RAMPAGE

PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

TIFF/ IT P-1 OPTION*

POSTSCRIPT,
PDF, EPS,
DCS2

RAMPAGE RIP

RAMPAGE
CTR DATA
ICC SUPPORT
WITH V8.3

RAMPAGE SHOOTER

RAMPAGE SCREENING,
TILING, ROTATION,
SCALING, MIRRORING,
AUTOMATICALLY SIMULATES
SPOT COLORS
TO PROCESS

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

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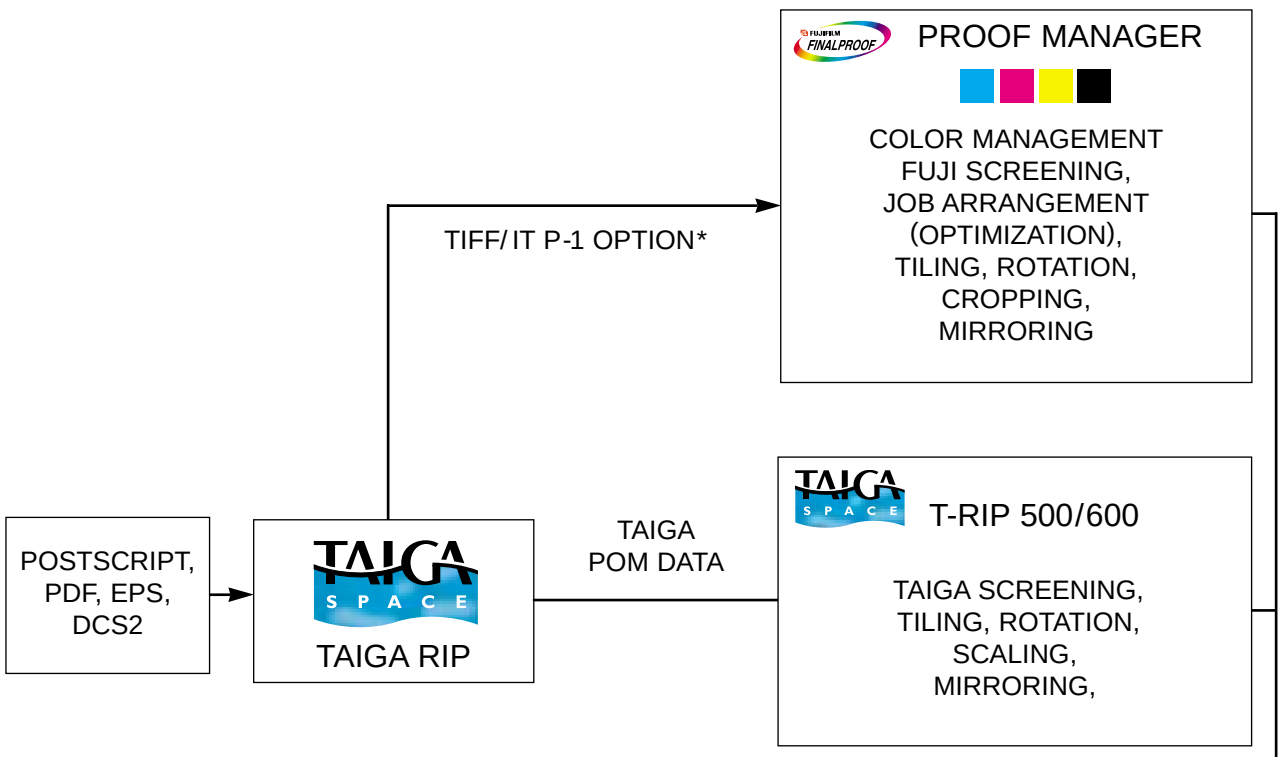

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

REVISED 11/2001

CreoScitex™

POSTSCRIPT,
PDF, EPS,
DCS2

CreoScitex™
BRISQUE
RIP

TIFF/IT P-1 OPTION*
(8-BIT)

TIFF/IT P-1

NLW
NCT
DATA

RORKE DATA®

celebrant extreme

CELEBRANT EXTREME

PS OUT*
PDF2GO*

SCREEN2GO
1-BIT SEPARATED TIFFS
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLOR*

PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION), TILING,
ROTATION, CROPPING,
MIRRORING

PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION), TILING,
ROTATION, CROPPING,
MIRRORING, INTUITIVE COLOR
(SPOTS ENTERED AS CIELAB
CONVERTED TO CMY)
SPOT COLORS CAN BE IMAGED
SEPARATELY USING CO-RES SCREENING
OR USE UP TO 2 SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)

8-BIT SEPARATED TIFFS WITH
FINALPROOF DRIVER (5590 5053)**

TIFF/IT P-1 CONNECTIVITY

NO SCITEX SCREENING
NO BRISQUE IMPOSE
NO SPOT COLORS
(UNLESS RORKE IS USED—RORKE
CONVERTS TO PROCESS BEFORE TIFF/IT)
NO DUOTONE/TRITONES
NO CO-RE SCREENING
(FOR SPOTS)

SCREEN2GO CONNECTIVITY

NO FUJI COLOR MANAGEMENT
NO FUJI CALIBRATION
BRISQUE IMPOSE

PROOF MANAGER

CREOSCITEX SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

ADDITIONAL 2 SPOT
COLOR SUPPORT FOR 1-BIT
TIFFS USING
SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)**

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

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HEIDELBERG

POSTSCRIPT,
PDF, EPS,
DCS2

HEIDELBERG

DELTA RIP

DELTA LIST DATA
OPTION (5591 3437)**

FUJIFILM FINALPROOF PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING, MIRRORING,
INTUITIVE COLOR
(SPOTS ENTERED AS CIELAB
CONVERTED TO CMY)

SPOT COLORS CAN BE IMAGED
SEPARATELY USING CO-RES SCREENING
OR USE UP TO 2 SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)

POSTSCRIPT,
PDF, EPS,
DCS2

HEIDELBERG

PRINERGY RIP

1-BIT SEPARATED TIFFS
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLORS

ADDITIONAL 2 SPOT COLOR
SUPPORT FOR 1-BIT TIFFS USING
SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)**

FUJIFILM FINALPROOF PROOF MANAGER

HEIDELBERG SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

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Agfa Apogee

POSTSCRIPT, PDF, EPS, DCS2

1-BIT SEPARATED TIFFS
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLORS
ADDITIONAL 2 SPOT COLOR SUPPORT FOR 1-BIT TIFFS USING SPOT COLOR DONORS (RED, BLUE, GREEN, ORANGE) (PROOF MANAGER V4.0 ONLY)**

Agfa APOGEE RIP

Agfa PRINT DRIVE

FINALPROOF PROOF MANAGER

AGFA SCREENING, JOB ARRANGEMENT (OPTIMIZATION), TILING, ROTATION, CROPPING, MIRRORING

PDF

celebrant extreme CELEBRANT EXTREME

8-BIT SEPARATED TIFFS WITH FINALPROOF DRIVER (5590 5053)**

FINALPROOF PROOF MANAGER

COLOR MANAGEMENT FUJI SCREENING, JOB ARRANGEMENT (OPTIMIZATION), TILING, ROTATION, CROPPING, MIRRORING, INTUITIVE COLOR (SPOTS ENTERED AS CIELAB CONVERTED TO CMY)
SPOT COLORS CAN BE IMAGED SEPARATELY USING CO-RES SCREENING OR USE UP TO 2 SPOT COLOR DONORS (RED, BLUE, GREEN, ORANGE) (PROOF MANAGER V4.0 ONLY)

Agfa SELECTPROOF

8-BIT SEPARATED TIFFS*

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

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ARTWORK SYSTEMS

POSTSCRIPT,
PDF, EPS,
DCS2

ARTWORK SYSTEMS
RIP

1-BIT SEPARATED TIFFS
1, 2, 3 OR 4 COLOR ONLY
NO SPOT COLORS
ADDITIONAL 2 SPOT COLOR
SUPPORT FOR 1-BIT TIFFS USING
SPOT COLOR DONORS
(RED, BLUE, GREEN, ORANGE)
(PROOF MANAGER V4.0 ONLY)**

TIFF/ IT P-1

FINALPROOF PROOF MANAGER

ARTWORKS SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

FINALPROOF PROOF MANAGER

COLOR MANAGEMENT
FUJI SCREENING,
JOB ARRANGEMENT
(OPTIMIZATION),
TILING, ROTATION,
CROPPING,
MIRRORING

* OPTION FROM VENDOR
** OPTION FROM FUJIFILM
FUJIFILM COLOR MANAGEMENT

REVISED 11/2001

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FPWP-1