

Guidelines for offset preprinted media

CopyPress Technology

Canon varioPRINT 6000 series / VarioPrint 4000-series / VarioPrint 2090-2100-2110-series

Introduction

Monochrome (toner based) digital printing systems are often used to print information on offset preprinted media. Offset preprinted media will expose the printing systems to offset inks and in many cases drying powders as well. Due to the fundamental steps in the digital printing process- which are for instance transfer of the image onto the paper and fixation (fusing) of this image by applying heat and/or pressure - the performance of digital printing systems can (seriously) deteriorate if these inks and powders are not suitable for digital printing.

Inks and powders can seriously impact printing systems using both traditional electro photographic printing technologies as well as the unique DirectPress technology.

However, due to the differences in the technology, there is some variation in how these technologies can be impacted by preprinted media. These guidelines tell you in detail how you can ensure optimal performance with preprinted media on Canon varioPRINT 6000 series, VarioPrint 4000-series and VarioPrint 2090 / 2100 / 2110-series.

These guidelines are updated periodically. The latest version of these guidelines is available at the OIP-Venlo/PPP BU SP Sharepoint site under Products Overview > Canon varioPRINT 6000 line > Media.

Recommended offset inks and varnishes

Optimal performance can only be achieved when the preprinted media are produced (sheet-fed or web-fed) in accordance with the sound craftsmanship guidelines for offset printing. Thick ink layers, excessive use of drying powders, extremely short drying times and/or improper curing may seriously impact the performance of your digital printing system. For optimal print conditions, please see the ink and varnish manufacturer's instructions.

Due to REACH classification and EUPIA (European Printing Ink Association) regulations there are many changes ongoing in formulations for inks and lacquers. On UV products there have mainly been changes on photo initiators but there have also been some major changes in core components. There is a worldwide drive to create globally conforming products so very likely changes are going to be continuing for the next few years.

In order to provide best possible advice to our Canon customers, we have teamed up with the world's largest ink and varnishes manufacturers. In very close cooperation, a list of inks and varnishes is created. Part of the inks have been actually tested, others have been secured by the manufacturers for the use of heat resistant additives and ensuring good compatibility with laser printing applications on the Canon varioPRINT 6000 series, the VarioPrint 4000-series and the VarioPrint 2090 / 2100 / 2110 series within the established conditions. With continual changes in regulatory and formulation technology used outside of Canons control we are unable to warranty all potential variations so we recommend to conduct upfront testing to ensure suitable performance.

These recommendations are based on offset ink and varnish layers, offset printed on plain paper. Oxidative drying offset inks require time for the drying process to complete. UV curing offset inks requires a good combination of UV intensity and offset process speed.

On page 7 to 14 of this document you can find the lists of all recommended offset inks and their product codes. The lists are subject to continuous modification. Please contact your local Service & Support organization to check the latest status.

Conventional offset inks/varnishes (oxidative drying)

Performance after:	72 hours	120 hours	168 hours	Availability
Epple ProLaser	✓	✓	✓	US / EU
Huber Alpha Laser Professional 358	✓	✓	✓	EU
Sicolor MultiLaser	✓	✓	✓	EU
Superior Ink LASER 287	✓	✓	✓	US
Braden Suthpin (acquired by Wikoff)	✗	✓	✓	US
Eco-Pride Laser				
Flint Novaform E80	✗	✗	✓	US / EU / AP

Aqueous inkjet inks (physical drying)

Ink series	Availability
Canon VP iX-series ink	US / EU / AP

UV offset inks/varnishes (ultraviolet curing)

Ink series	Type of curing lamp	Required intensity of transmitted light on printing sheet by printing CMYK (mJ / cm)	Availability
Huber NewV Pack UG5000*	Mercury lamp	150	US / EU / AP
Huber NewV Set HS UEH5000*	Iron doped lamp	150	US / EU / AP
Huber NewV Set LED UEL4000*	Curing by LED lamp	150	US / EU / AP

UV offset inks/varnishes (ultraviolet curing)

Performance using: (after 2 days)	200 W / cm 150 m / min	400 W / cm 150 m / min	600 W / cm 150 m / min	Availability
Flint Flexocure Force	X	V	V	US
Zeller+Gmelin Uvalux 20	X	V	V	US
Zeller+Gmelin Uvalux 22 *	X	V	V	US
Zeller+Gmelin Uvalux 40	X	X	V	EU
Sun Chemical SunCure Lazer	X	X	V	EU
Monarch Color Corporation Generic UV Bases "FM"	X	X	V	US
Toyo Ink FD FormX	X	X	V	Japan

*) = these inks are advised by the ink manufacturers based on the use of heat resistant additives and are derived from existing successful ink formulations in CopyPress Technology printers. Upfront testing is advised.

X = not approved

V = optimal performance

US = United States of America

EU = Europe

AP = Asia Pacific

Disclaimer

The offset inks and coatings are recommended on the basis of functionality in CopyPress and DirectPress printers. For safe handling and use of recommended offset inks and coatings, consult respective Material Safety Data Sheets (MSDS) and other safety instructions provided by the respective ink and coating supplier. With continual changes in regulatory and formulation technology used outside of Canons control we are unable to warranty all potential variations so upfront testing is recommended to ensure suitable performance.

WARNING: If you use non-recommended inks and varnishes there is a serious risk that you may cause damage to important parts of the printing system - resulting in deterioration of the print quality, downtime and additional (service) costs.

Recommended coatings

A coating is an aqueous dispersion lacquer. Like inks, varnishes and drying powders, dispersion coatings can also seriously impact printing systems using both the traditional electro photographic printing technologies as well as the unique CopyPress technology. Not all coatings can be used with CopyPress technology. It is important to clean the offset coating station thoroughly, before using the approved coating.

The drying process of dispersion coatings takes place through absorption into the printing substrate or through evaporation. The surface of the coating should be rub-proof approximately 10 seconds after the sheets are removed. The complete build-up reaches its final properties regarding adhesion and scratch resistance after the underlying printing ink is completely dry. The total drying time is dependent on the substrate, but for optimal performance should be at least the number of hours mentioned for the drying of the individual inks on page 3 of this document, taking into account a minimum drying time of 120 hours.

The following dispersion coatings have proven optimal performance with the Canon varioPRINT 6000 series, VarioPrint 4000-series and VarioPrint 2090 / 2100 / 2110-series within the established operating conditions and on low-porosity papers only. The application of the recommended aqueous dispersion coatings does not affect the print quality.

Aqueous dispersion coatings (water evaporation)

Supplier/code:	Availability
Vegra DL-Glanz VP 10667/050 für Thermodirektdruck	US / EU / AP
Vegra DL-Matt VP 10720/050 für Thermodirektdruck	US / EU / AP
Actega ACTDigi Gloss Coating AQ440315	US / EU / AP
Actega ACTDigi Silk Matt Coating AQ440191	US / EU / AP
Hi-Tech Coatings W2145 Primer Gloss	US / EU / AP
Hi-Tech Coatings W2135 Primer Semi Matt	US / EU / AP
Heidelberg Saphira W7445 Primer Gloss	US / EU / AP
Heidelberg Saphira W7435 Primer Semi Matt	US / EU / AP
Prisco Q6211A Heat Resistant Coating	US

US = United States of America

EU = Europe

AP = Asia Pacific

Disclaimer

The offset inks and coatings are recommended on the basis of functionality in CopyPress and DirectPress printers. For safe handling and use of recommended offset inks and coatings, consult respective Material Safety Data Sheets (MSDS) and other safety instructions provided by the respective ink and coating supplier.

Tips

This paragraph describes some general tips for the optimal use of offset preprinted media in digital printing systems and how to use the inks and dispersion coatings that are mentioned in these guidelines.

Drying time

- Thick ink layers (up to 320%) may require a longer drying time than recommended in these guidelines.
- Optimal drying of the preprinted media is recommended at environmental conditions of $22 \pm 2^\circ\text{C}$ and $50 \pm 10\%$ RH (Relative Humidity). Preprinted sheets should not be wrapped in moisture proof material while drying (e.g. shrink-wrapped in plastic). Preferably store the preprinted sheets unpacked in small piles (up to 1500 sheets). If the drying conditions differ from the above, the drying time can increase significantly.
- The media should be pH-neutral (pH between 6 and 8). If the acidity or alkalinity level of the media used is $\text{pH} < 6$ or $\text{pH} > 8$, the drying time can increase as well, especially in humid conditions.

The preprint process

To ensure the quality of the preprinted media, mind the following factors:

- If the offset ink carries excess fountain solution or if the fountain solution has a $\text{pH} < 4.7$ or a $\text{pH} > 5.3$, the drying time of the preprinted media can increase significantly.
- Do not use anti-oxidant sprays.
- Minimize the use of drying powders. Excessive use of drying powder may cause contamination of your laser printer.

Tip: in case of accidental excessive use of drying powder, this powder can be removed by rerunning the preprinted media through an offset press.

Digital printing

- Do not use preprinted media which has already been processed on a digital printing system (neither toner nor inkjet technology)

Recommended oxidative offset inks and varnishes - Product codes

Epple - ProLaser*

Process inks	
Yellow	100 985
Magenta	100 986
Cyan	100 987
Black	52 745
PANTONE® basic inks	
Pantone Yellow	100 950
Pantone Warm Red	100 951
Pantone Rubine Red	100 952
Pantone Rhodamine Red	100 953
Pantone Purple	100 954
Pantone Reflex Blue	100 955
Pantone Process Blue	100 956
Pantone Green	100 957
Pantone Mixing White	100 958
Pantone Yellow012	100 959
Pantone Orange021	100 960
Pantone Red032	100 961
Pantone Blue072	100 962
Pantone Violet	100 963
Pantone Black	100 964

* For ordering the Epple ProLaser ink outside Europe, please contact the Epple Head Office in Germany
Telephone +49 821 4603 151

Huber Group – ALPHA Laser Professional 358

Process inks	
Yellow	41 AP 358
Magenta	42 AP 358
Cyan	43 AP 358
Black	49 AP 358
PANTONE® basic inks	
HBL Pantone Yellow	427557
HBL Pantone Yellow 012	427559
HBL Pantone Yellow 021	427564
HBL Pantone Warm Red	427566
HBL Pantone Red 032	427569
HBL Pantone Rubine Red	427571
HBL Pantone Rhodamine Red	427573
HBL Pantone Purple	427575
HBL Pantone Violet	427579
HBL Pantone Blue 072	427581
HBL Pantone Reflex Blue	427597
HBL Pantone Process Bue	427601
HBL Pantone Green	427602
HBL Pantone Black	427603

Sicolor – MultiLaser

Process inks	
Yellow	58004735
Magenta	58004736
Cyan	58004737
Black	58004738
PANTONE® basic inks	
Pantone Yellow	58004750
Pantone Warm Red	58004751
Pantone Rubine Red	58004752
Pantone Rhodamine Red	58004753
Pantone Purple	58004754
Pantone Reflex Blue	58004755
Pantone Process Blue	58004756
Pantone Green	58004757
Pantone Mixing White	58004758
Pantone Yellow012	58004759
Pantone Orange021	58004760
Pantone Red032	58004761
Pantone Blue072	58004762
Pantone Violet	58004763
Pantone Black	58004764

Superior Ink Laser 287

Process inks	
Yellow	YC-5496
Magenta	DRE-3337
Cyan	MBE-1458
Black	AE-3612
PANTONE® inks	
Transparent White	W-6969
Yellow	YC-4627
Warm Red	MRC-4989
Rubine Red	DRE-2431
Rhodamine Red	DRE-2432
Purple	PB-4215
Violet	PB-4216
Process Blue	MBE-9542
Green	MGC-2565
Reflex Blue	DBE-1059
Neutral Black	AE-2664
Yellow 012	YC-4628
Orange 021	OA-9219
Red 032	MRC-4985
Blue 072	DBE-1065

Braden Sutphin (acquired by Wikoff) – Eco-Pride Laser

Process inks	
Yellow	Y11580F
Magenta	R25180F
Cyan	B160280F
Black	K4580F
basic inks	
Blue 286	B160486F
Transparent White	W1006
Yellow	Y11751
FR Yellow	Y11766
Warm Red	R25880
Y/S 2B Red	R25882
Rubine Red	R25884
B/S Quinacridone Red	R25888
Y/S Quinacridone Red	R25890
Pro Blue	B161050
Carb Violet	B161060
Green	G17650
Neutral Black	K4950

Flint - Novaform E80*

Process inks	
Yellow Novaform 1 E 80	VL20-166N-XSBM
Magenta Novaform 2 E 80	VL20-366N-XSBM
Cyan Novaform 4 E 80	VL20-566N-XSBM
Black Novaform 80	VM20-966N-XSBM
PANTONE® basic inks	
Yellow	VL41-100N-XSB1
Warm Red	VL41-300N-XSB1
Rubine Red	VL41-301N-XSB1
Rhodamine Red	VL41-302N-XSB1
Purple	VL41-400N-XSB1
Violet	VL41-401N-XSB1
Reflex Blue	VL41-500N-XSB1
Process Blue	VL41-501N-XSB1
Green	VL41-600N-XSB1
Mixing Black	VM21-960N-XSB1
Yellow012	VL41-112N-XSB1
Orange021	VL41-221N-XSB1
Red032	VL41-332N-XSB1
Blue072	VL41-572N-XSB1
Transparent White	VL41-000N-XSB1

For ordering the Flint Novaform E80 ink, please contact the Flint office in Helmond, The Netherlands +31 492 580 100.

Recommended aqueous inkjet inks - Product codes

Canon – VP iX-series ink

Process inks	
Yellow - D1	1070110971
Magenta – D1	1070110958
Cyan – D1	1070110945
Black – D1	1070110931

Recommended UV offset inks and varnishes - Product codes

Hubergroup – NewV Set LED UEL4000

Process inks	
Yellow	41UEL4000
Magenta	42UEL4000
Cyan	43UEL4000
Black	49UEL4000
PANTONE® inks	
*) see remark below	

Hubergroup – NewV Pack UG5000

Process inks	
Yellow	41UG5000
Magenta	42UG5000
Cyan	43UG5000
Black	49UG5000
PANTONE® inks	
*) see remark below	

Hubergroup – NewV Set HS UEH5000

Process inks	
Yellow	41UEH5000
Magenta	42UEH5000
Cyan	43UEH5000
Black	49UEH5000
PANTONE® inks	
*) see remark below	

*) Pantone colours and spot colours can be formulated on request using the same composition. These will be allocated sales codes when the order is received, as the ink is formulated to be the optimum match to the Pantone target taking into account the substrate it is printed on and any overprint varnish used.

The customer just has to specify the ink according to the brand name and Pantone colour required e.g. NewV Set LED Pantone Blue 300C and communicate this to the **hubergroup** sales representative.

Flint Flexocure Force series

Process inks	
Yellow	UFR10080
Magenta	UFR30080
Cyan	UFR50080
Black	UFR80080
Flexocure Force PANTONE®	
Yellow	UFR10031
Yellow	UFR10034
GS Yellow	UFR10037
Orange 021	UFR20033
Warm Red	UFR30005
Rubine Red	UFR30002
Rhodamine Red	UFR30003
Red 032	UFRP0032
Violet	UFR40013
Violet	UFR40010
Purple	UFR40012
Purple	UFR40011
Reflex Blue	UFR50021
Process Blue	UFR50022
Blue 072	UFRP0072
Green	UFR60052
Black	UFR80071
Opaque White	UFR90100

Zeller + Gmelin - UVALUX 20 series

Process inks	
Yellow	2001
Magenta	2002
Cyan	2003
Black	2004
PANTONE® inks	
Opaque White	RH2049302
Dense Black	2006
Yellow	2010
Warm Red	2020
Rubine Red	2030
Rhodamine Red	2040
Purple	2050
Violet	2055
Reflex Blue	2060
Process Blue	2070
Green	2080
Mixing Black	2090
Transparent White	2095
Yellow012	20012

Orange021	20021
Red032	20032
Blue072	20072

Zeller + Gmelin - UVALUX 22 series

Process inks	
Yellow	2001
Magenta	2002
Cyan	2003
Black	2004
PANTONE® inks	
Opaque White	2205
Dense Black	2206
Yellow	2210
Warm Red	2220
Rubine Red	2230
Rhodamine Red	2240
Purple	2250
Violet	2255
Reflex Blue	2260
Process Blue	2270
Green	2280
Mixing Black	2290
Transparent White	2295
Yellow 012	22012
Orange 021	22021
Red 032	22032
Blue 072	22072

Zeller + Gmelin - UVALUX 40 series

Process inks	
Yellow	U40-S1100
Magenta	U40-S1200
Cyan	U40-S1300
Black	U40-S1400
PANTONE® inks	
Yellow	U40-P100
Yellow012	U40-P101
Orange021	U40-P150
Warm Red	U40-P200
Red032	U40-P201
Rubine Red	U40-P202
Rhodamine Red	U40-P203
Purple	U40-P250
Violet	U40-P251

Reflex Blue	U40-P300
Process Blue	U40-P301
Blue072	U40-P302
Green	U40-P350
Black	U40-P400

Sun Chemical - SunCure Lazer

Process inks	
Yellow	ULA26
Magenta	ULA27
Cyan	ULA25
Black	ULA46
Other Process Colours & Blending Colours	
PSO Yellow	ULA02
PSO Cyan	ULA07
Intense Yellow	ULA30
Intense Black	ULA76
Orange 021	ULA21
Red 032	ULA32
Reflex Blue	ULA61
Process Blue	ULA17
Green	ULA71
Black	ULA50
Transparent White	ULA48

Monarch Color Corporation - Generic UV Bases "FM"

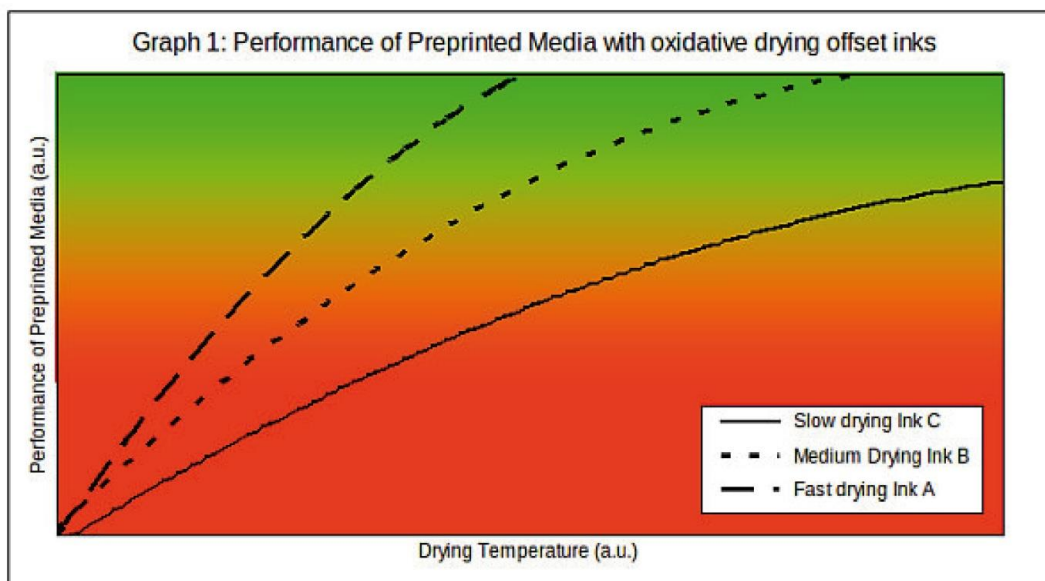
Generic UV Bases "FM"	
UV OS KRAFTMASTER PC YELLOW	MCUV-1-9000
UV OS KRAFTMASTER PC MAGENTA	MCUV-3-9000
UV OS KRAFTMASTER PC CYAN	MCUV-5-9000
UV OS STYRENE PC BLACK	MCUV-7-5700
Generic UV Bases "FM" PANTONE®	
OS UV REFLEX BLUE	MTUV-5-0024

Toyo Ink – FD FormX

Process inks	
Cyan	D1443664-3
Magenta	D1443662-3
Yellow	D1443657-3
Black	D1443668-2
Reflex Blue	D1230710-3

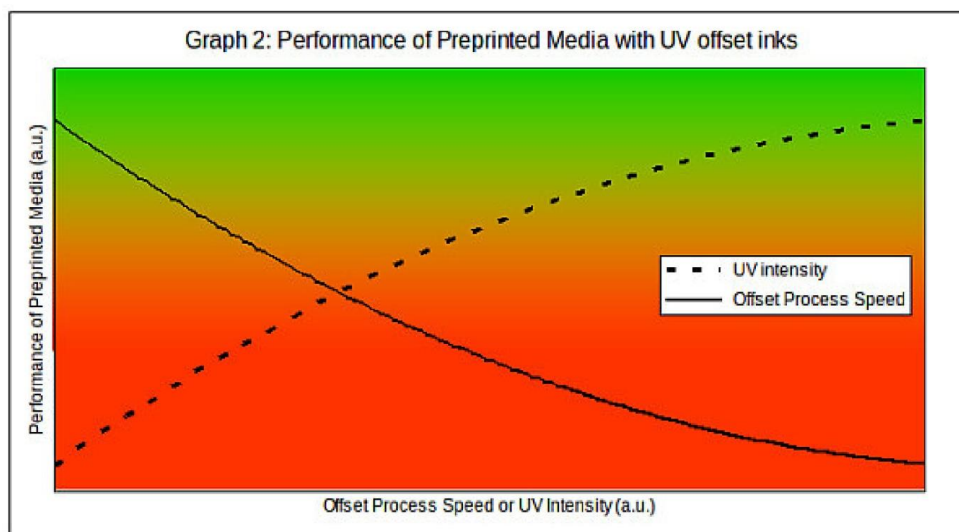
The ideal properties for oxidative drying offset inks

- The oxidative drying offset inks should contain **no migratable components** (0.0 mass% at 110°C). This means that the ink contains **no** low melting polyethylene wax. High melting polyethylene wax ($T > 133^{\circ}\text{C}$) and preferably PTFE-wax can be useful and are allowed. Further, the ink contains **no** mineral oils (petroleum distillates) and **no non-reacting** vegetable-oils (glycerol-esters of saturated fatty acids, e.g. stearic acid) and **no non-reacting mono-esters** (e.g. no Butyl, Methyl or Ethyl-Hexyl and others)
- For oxidative drying offset inks **complete oxidative drying** of all reacting-vegetable-oils should take place. This means that anti-oxidants that prevent oxidative drying should not be used. Furthermore, it is known that temperature has a large influence on the rate of oxidative drying (see Graph 1). Therefore a minimal storage temperature of 20°C is strongly recommended during oxidative drying of preprinted media.



The ideal properties for UV offset inks

- The UV offset inks should contain **no migratable components** (0.0 mass% at 110°C). This means that the ink contains **no** low melting polyethylene wax. High melting polyethylene wax ($T > 133^{\circ}\text{C}$) and preferably PTFE-wax can be useful and are allowed.
- For UV offset inks **complete UV curing** of all acrylate monomers should take place. This means that the acrylates have to cross-link to create molecules that are too large to migrate. For good UV curing in the preprinted media guidelines offset UV curing settings (offset process speed and UV intensity) are advised. In general higher intensity UV curing at lower offset printing speeds increases the processability quality of the preprinted media (see graph 2). To ensure good UV intensity it is important to check the output of the UV units in offset presses regularly.



The ideal properties for aqueous dispersion coatings

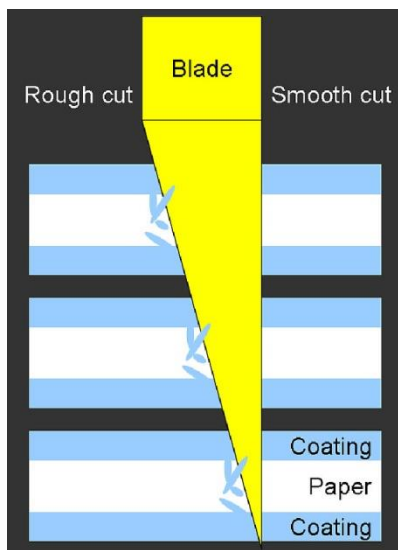
- The aqueous dispersion coatings contain **no transferable components** (0.0 mass% at 110°C). This means that the coating contains **no** low melting polyethylene wax. High melting polyethylene wax ($T > 133^{\circ}\text{C}$) and preferably PTFE-wax can be useful and are allowed.
- For aqueous dispersion coatings **complete evaporation** of the water should take place. Usually, the water evaporates fast, but the remaining coating slows down the oxidative drying process of the underlying oxidative inks. Furthermore the dried dispersion coating does not prevent the migration of components out of the underlying offset inks. Therefore the performance of the offset inks below the coating is dominant for the processability of preprinted media with aqueous dispersion coatings in Canon laser printers based on CopyPress or Direct Press technology.
- Only recommended oxidative offset inks are allowed in combination with ditto dispersion coatings.

Paper cutting and dust

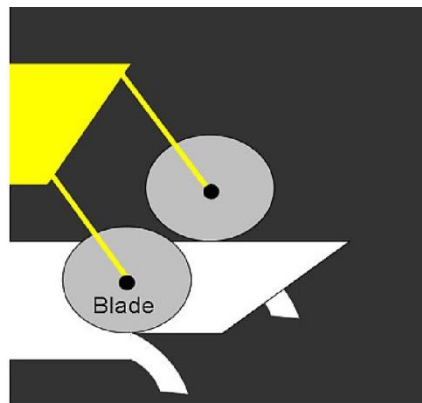
Loose paper dust on (preprinted) paper causes problems in digital printing systems. Dust is most likely created on the sides of sheets during cut and trim operations (see illustration 1 and 2). It can be composed of both fibre and coating materials that have been fragmented from the edges. Once the (preprinted) paper is processed in a digital printing system the dust can contaminate the system, leading to printed artefacts and contaminated sensors. This results in runnability problems.

Paper trimmed by the back of the cutter knife will have clean edges. Paper edges cut by the sloped side of the knife will show dust and paper particles (see illustration 1). The trimming and slitting wheels on finishing equipment can also create a rough cut that can generate excess dust (illustration 2).

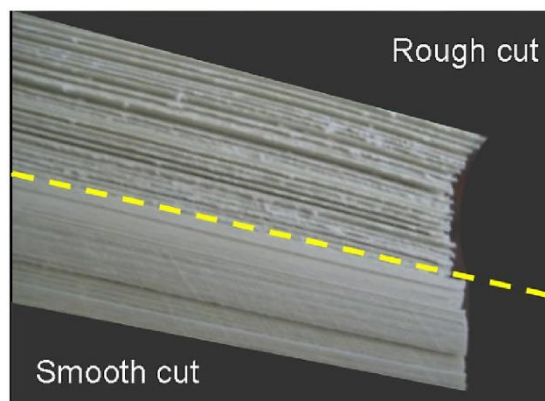
Illustration 3 shows the effect of paper cut by the sloped side of the knife versus paper trimmed by the back of the knife. Finally, an important measure to prevent paper dust on the edges of paper is keeping the cutting knives sharp. Furthermore, keep in mind that different papers have a different impact on the sharpness of cutting knives.



1. Fracture of coating at the sloped edge (or left side) of the blade



2. A rough cut from a dull slitter Wheel will generate dust



3. Side view of a stack of paper. A rough cut from the sloped edge of a trimmer blade and a smooth cut from the back edge of a trimmerblade.