



The measurement and profiling of special materials:
glass, leather, laminates, etc:
problems and solutions, practical experiences



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5C Model: valid for all Print Process and Media

Shot at FESPA

The 5C Model:

1. (Establish) Consistency
2. Calibrate
3. Characterise (build ICC-profiles)
4. Convert
5. Check (validate)

Check

Conversion

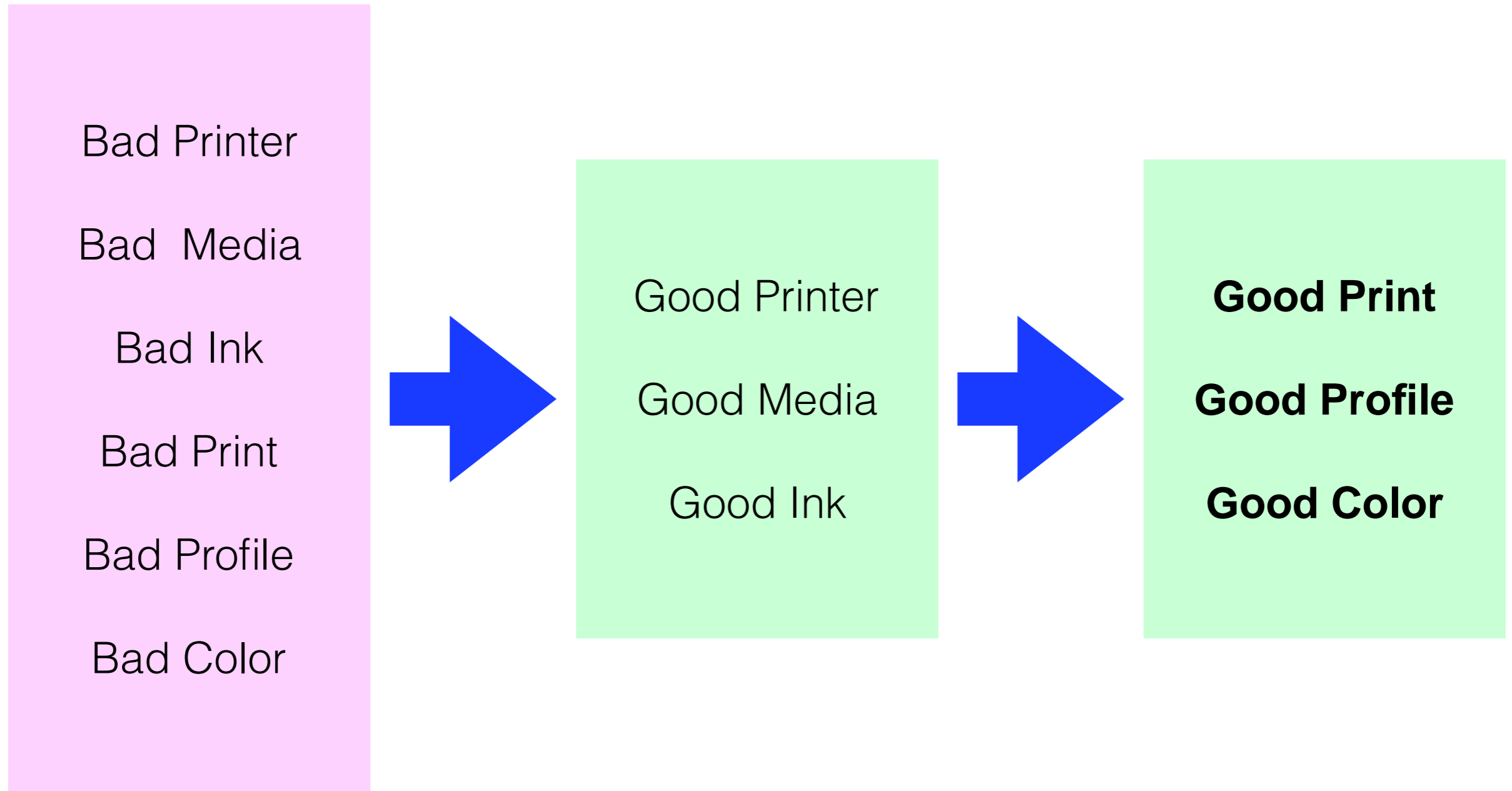
Characterisation

Calibration

Consistency



When the best quality for Industrial Printing?





10 Tips for Inkjet Industrial Printing

- 1- Air-conditioned environment, free from dust
- 2-Media stabilized in the work environment
- 3-Inks with low miscibility, good wettability and adequate surface tension
4. Purged and well-wet heads.
5. Absence of printing/physical defects such as Banding and Bleeding
6. Medium with planar printing surface, clean, dry, dust free
and without electrostatic charge
7. Setting of print modes appropriate to the Media
8. Print preliminary Test Form for checking the printer settings
9. Printer calibration: amount of ink suitable for the type of support
10. Printer profiling



The Variables in Digital Printing

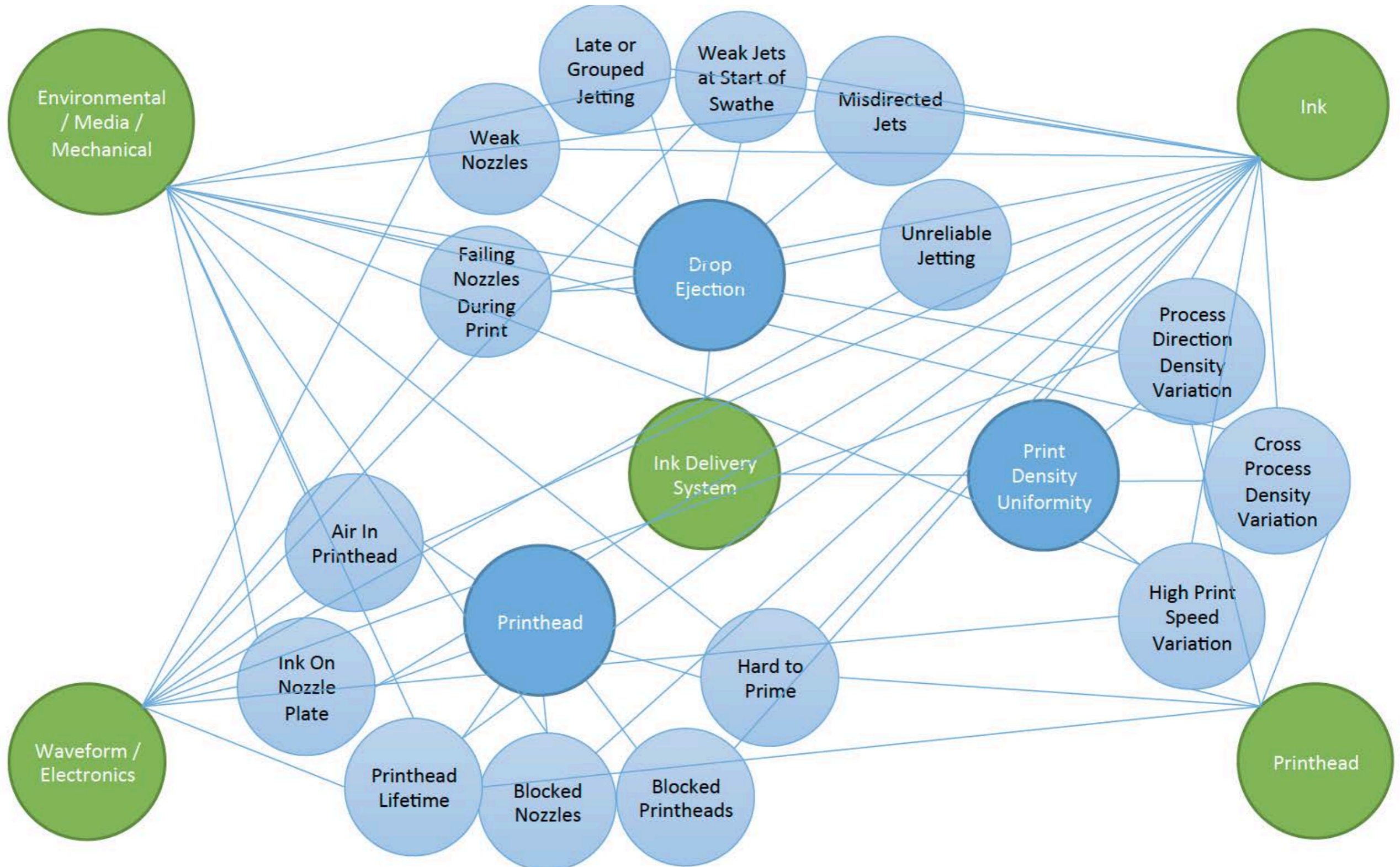
When we are printing on structured materials the technical difficulties increase for the presence of many variables that interact in the printing process.

The principal variables are:

- Printer Mechanics
- Printhead
- Waveform /Electronics
- Ink Delivery System
- Ink
- Media
- Environmental
- Color Management



The interaction between the different variables



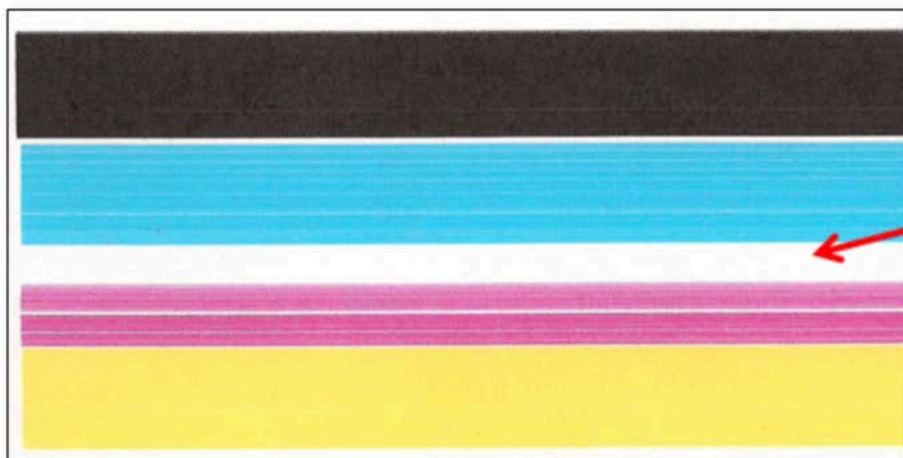
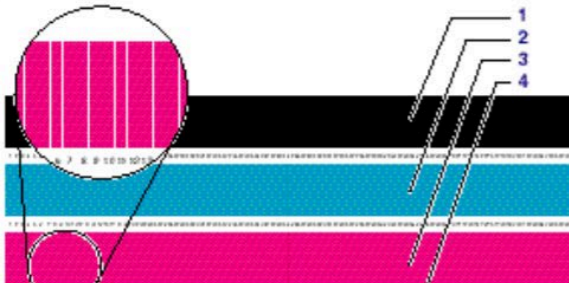
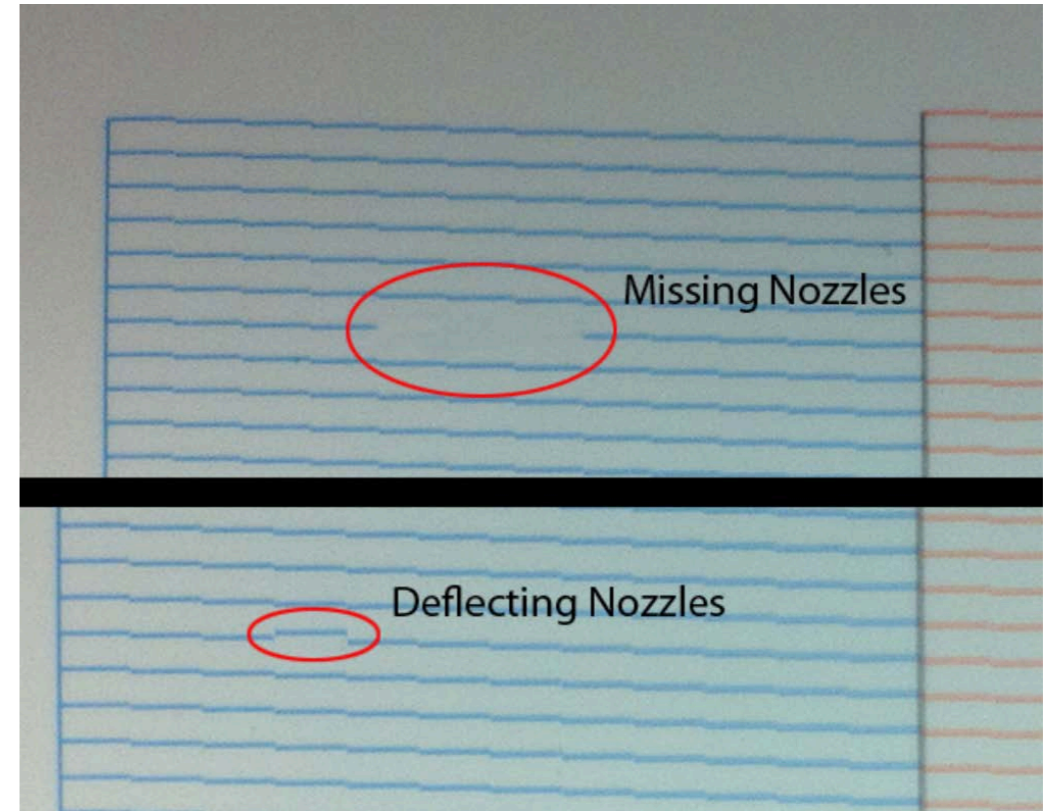
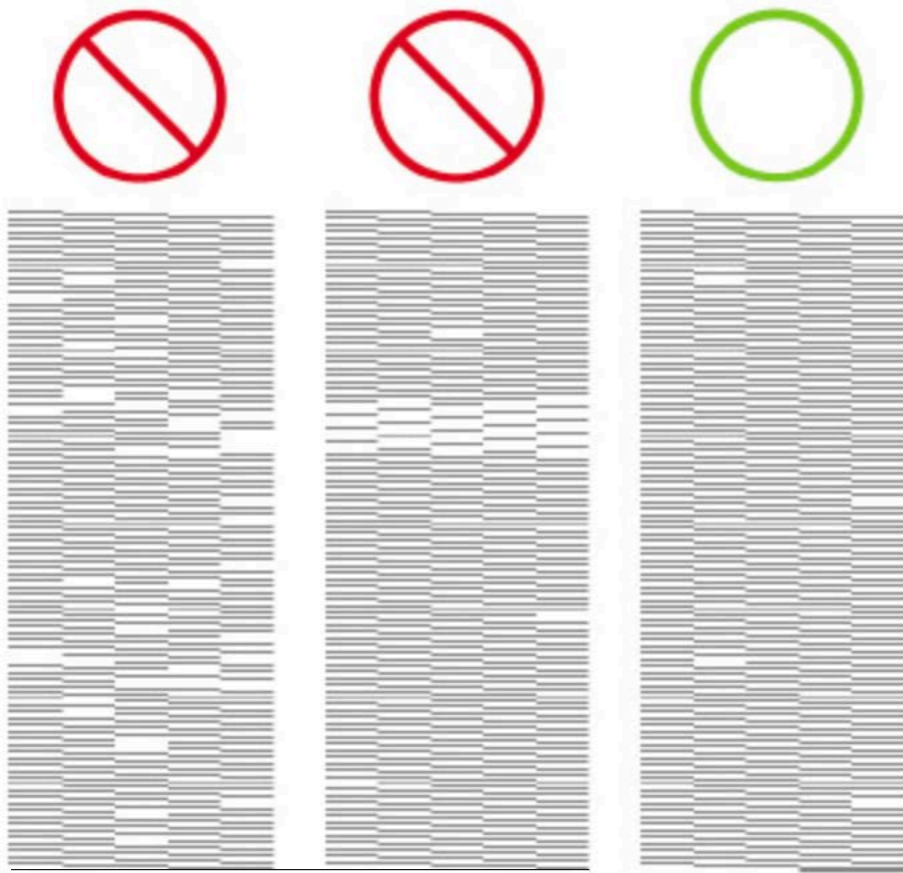


What influence Inkjet Printing Quality

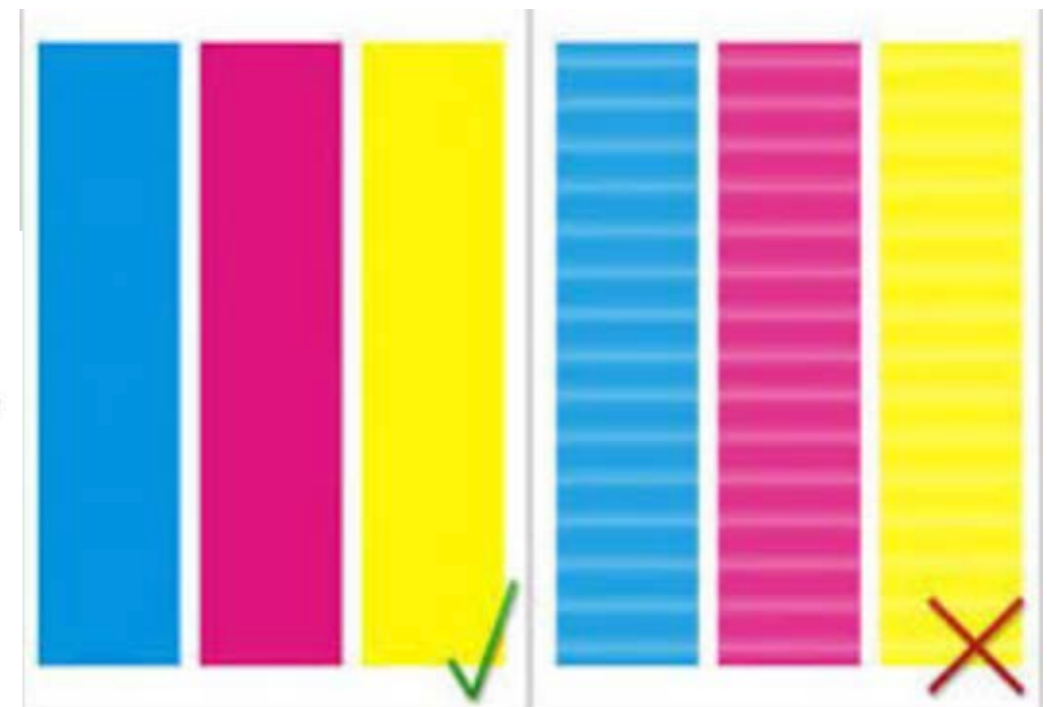
- Feeding and mechanics
- Heating/time: before, during and after printing
- Power of the UV/UV-Led lamp
- Head distance from the media
- Print Mode: resolution, directionality, printing steps
- Print speed
- Type of screen pattern
- Ink adhesion and fixing on media
- Ink thickness (density)
- Time of Ink drying
- Printer Calibration
- TAC
- Profiling
- Color Management by DLP
- RIP setting and color conversion



Head Printing Control Test



Partially
Jetting
Nozzles

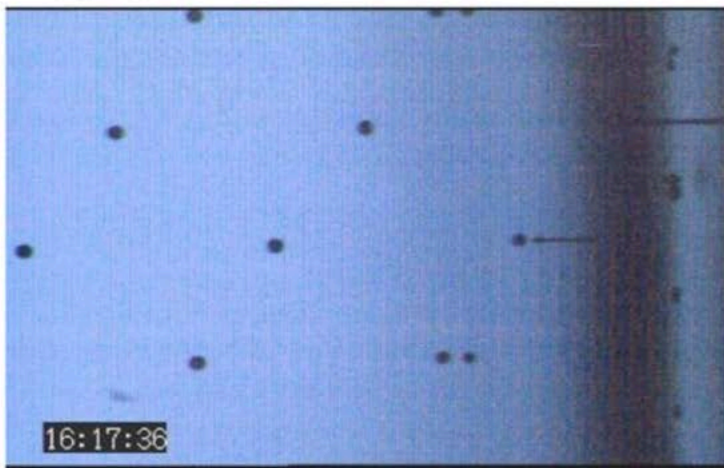




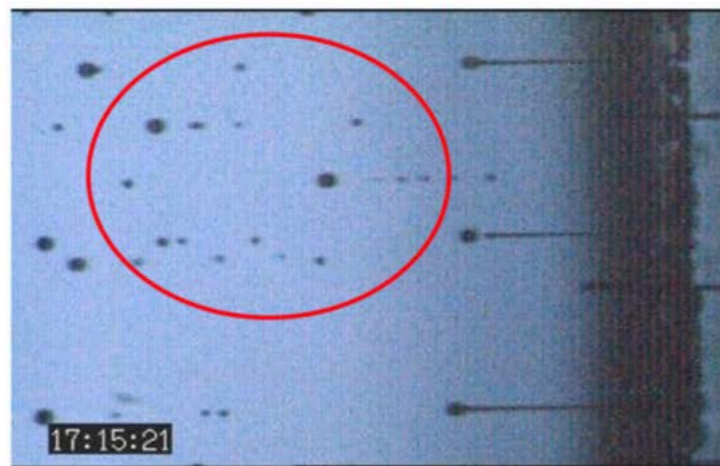
Satellite drops in single-pass printing



<OK>



<Satellite>

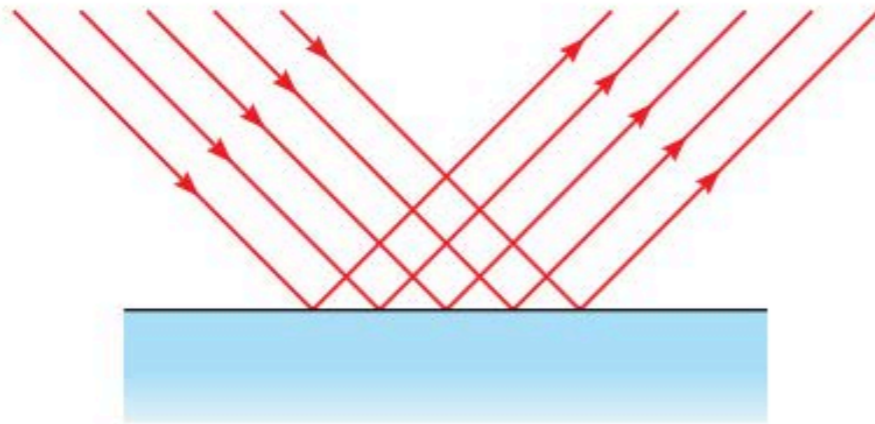


First problem to be solved e to check constantly!

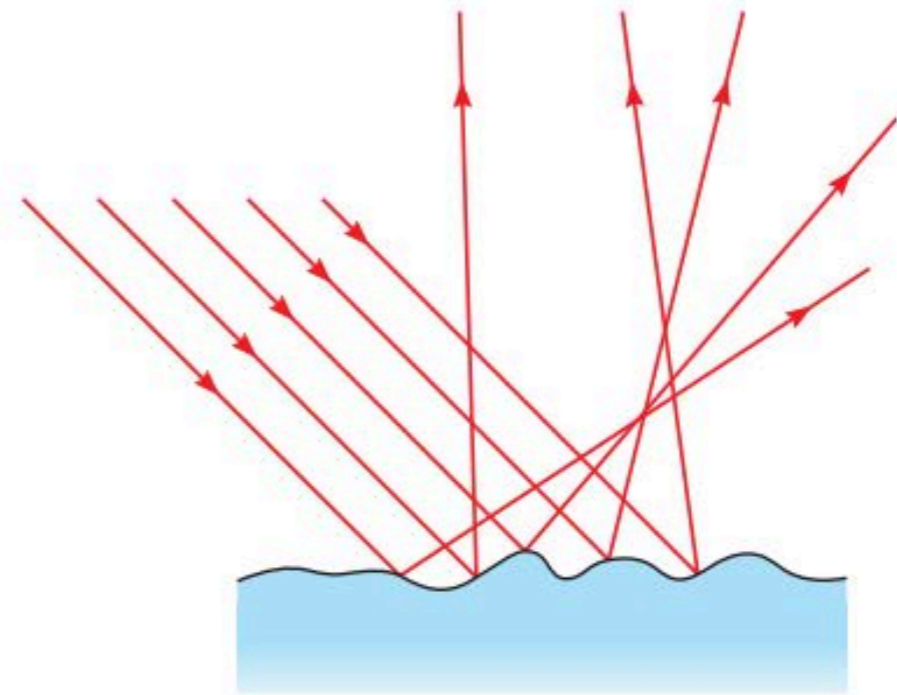
Satellite drops nebulization
Defected printing: directional printing lines



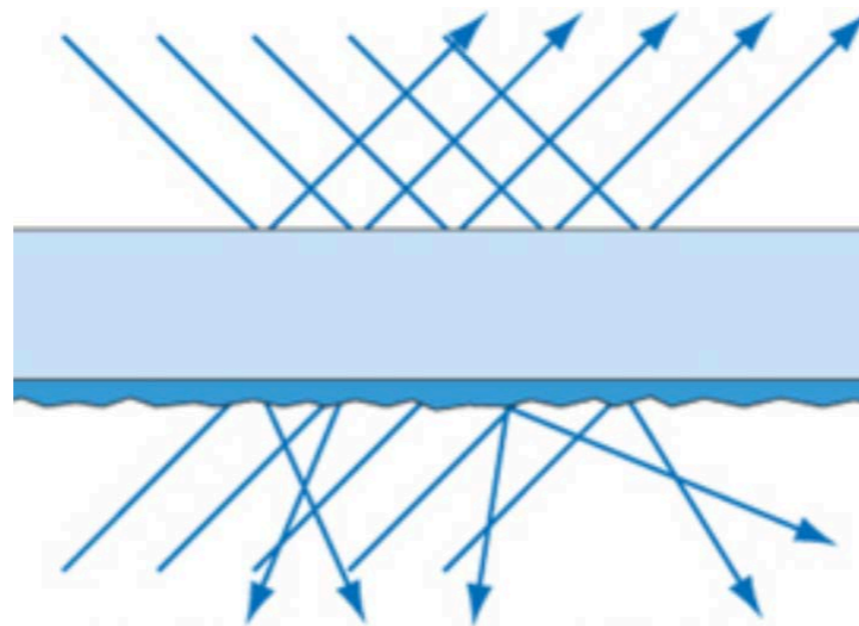
Reflective and Transmissive Media



Specular Reflection



Diffusion Reflection





Media requirements

Pre surface treatment (plasma/crown)

Primer coated treatment

Flat surface

Planarity and uniformity

Regular thickness

Cleaner surface

Dry surface

Surface without defects and irregularities

Surface without dust and dirt

Elimination of electrostatic charge

Surface without OBA (possibly)



How to treat Media

- Cleaning the material with a carbon brush
- Or dust extractor
- Remove the electrostatic charge from the surface with
 - With carbon brush
- Use gloves to avoid leaving fingerprints on the surface:
 - Antistatic gloves to not load dust on the support
- With plastic materials, a corona pretreatment is recommended
- Check thickness of the material with micrometer





Ink requirements

QUALITY PRINT PROPERTY

wettability

adhesion

non-miscibility

not bleeding

no smearing

uniform spreading

spreadability

low thickening

easy to dry

surface tension

APPLICATION PROPERTY

scratch resistance

resistance to forming

not migration

outdoor resistance

waterproof

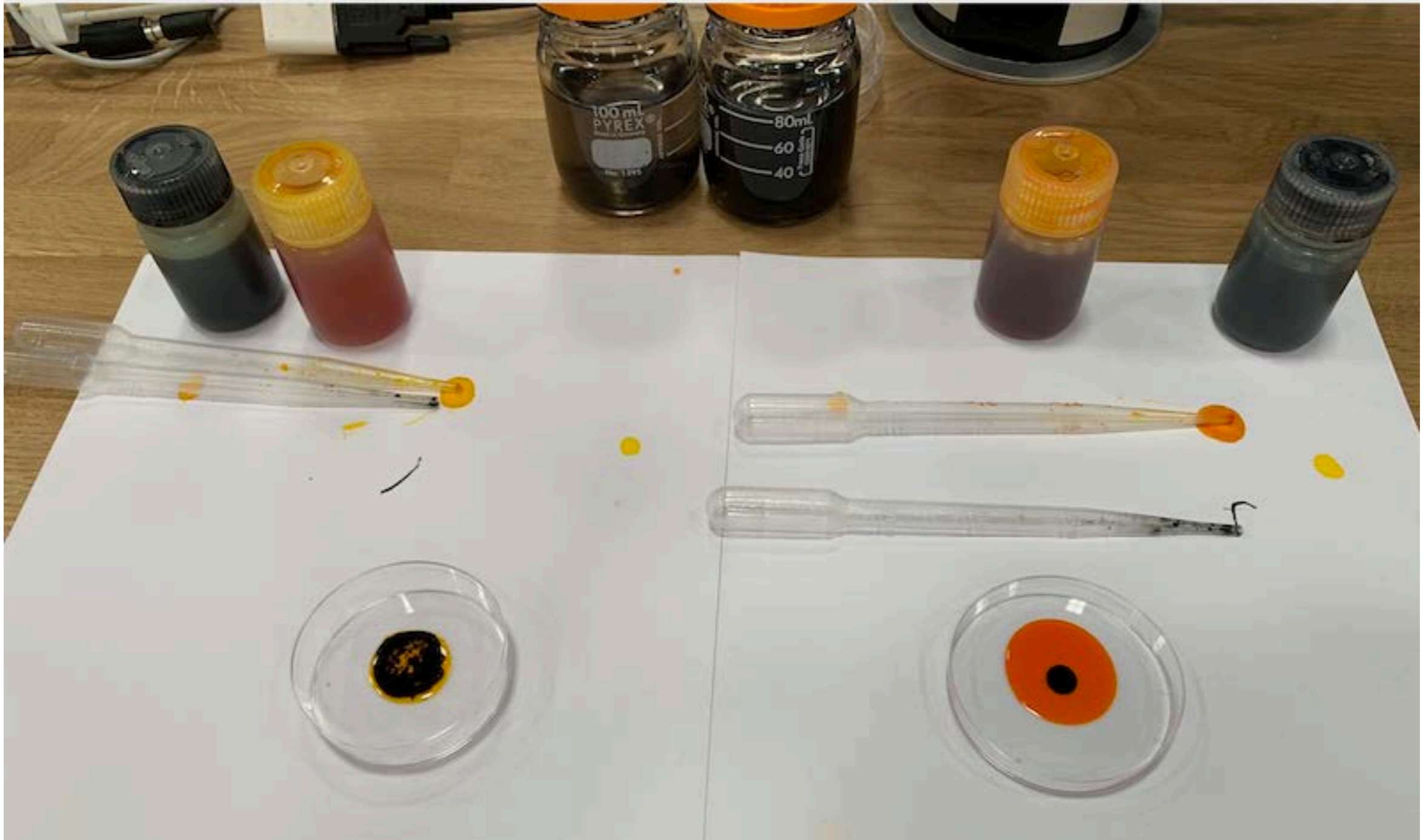
light fastness

no grainy

flexible fiber



Checking the ink properties



miscibility

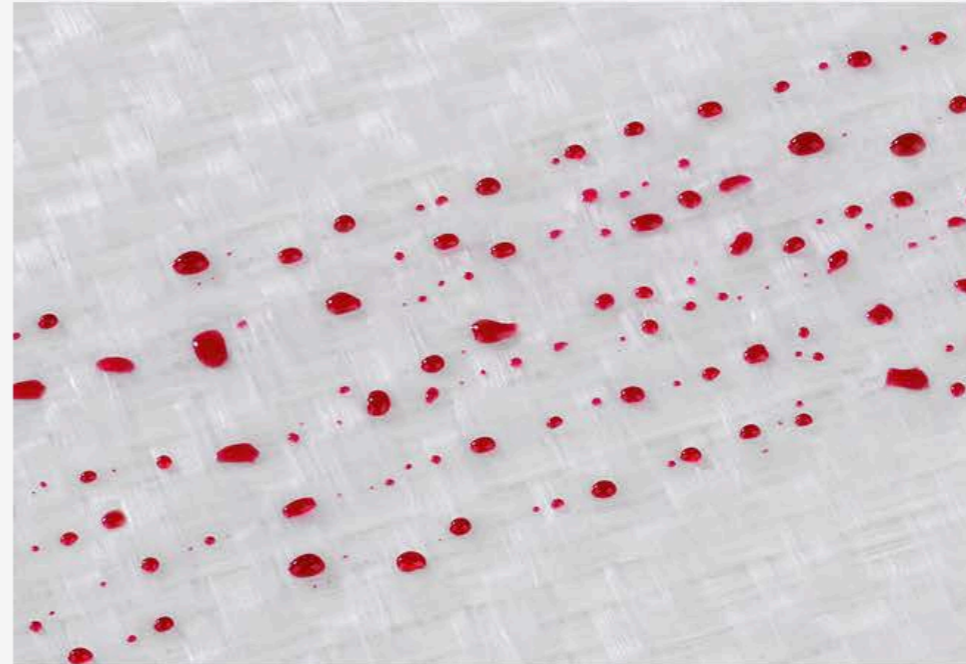
non miscibility



Preliminary Ink Control



good wettability



poor wettability



scratch resistance



UV Ink Adhesion Testing (*ASTM Tape Test*)

UV Ink Adhesion Testing





Printer Consistency

Control of the status of the printer (head):

head cleaning, head alignment, feeding, efficiency, ink alimentation,
lamp UV set, heating set...

Set the print mode:

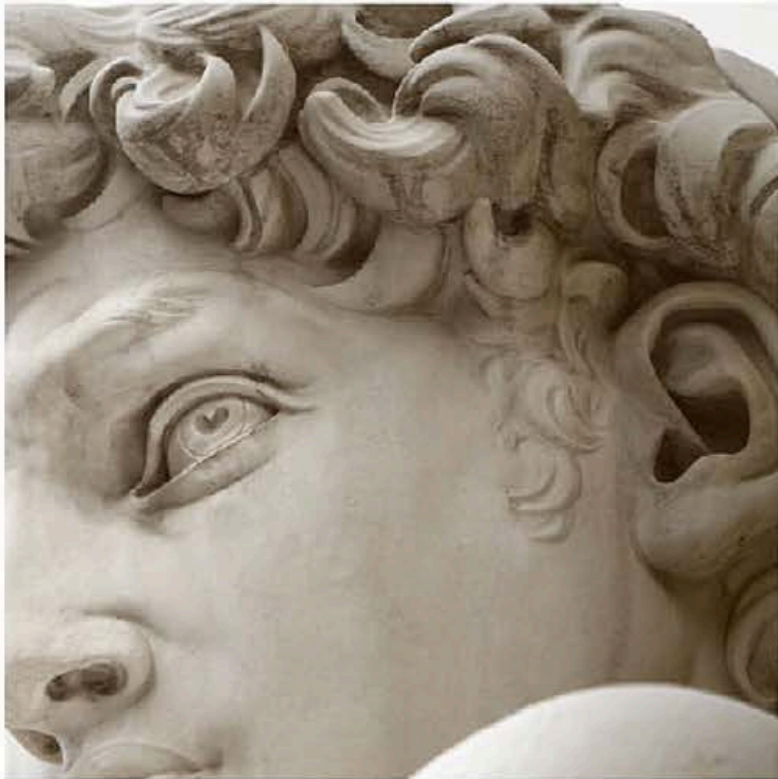
head height, speed/resolution, print direction, number of pass,
type of screen pattern, type of drop (single, variable)

Test the printing setting (Calibration):

sharpness of the texts, Ink coverage, uniformity,
screen texture, overprinting, grainy of the black ink (GCR!)



What type of screen pattern?



Original



Ordered Dithering



Error Diffusion



Put less ink is possible!



It does not dry, counterprint, smear, peel, crack, stain, dirty colors, grays and darkens the print



Too much Ink



Reference



high level of inking



Calibration goal

reduce excess ink

good ink adhesion

good ink trapping

good color balance

Good tonali gradation (TVI 15-20%)

good gray balance

Linear printing output



Color Variations with bad Calibration



Reference



Printed samples

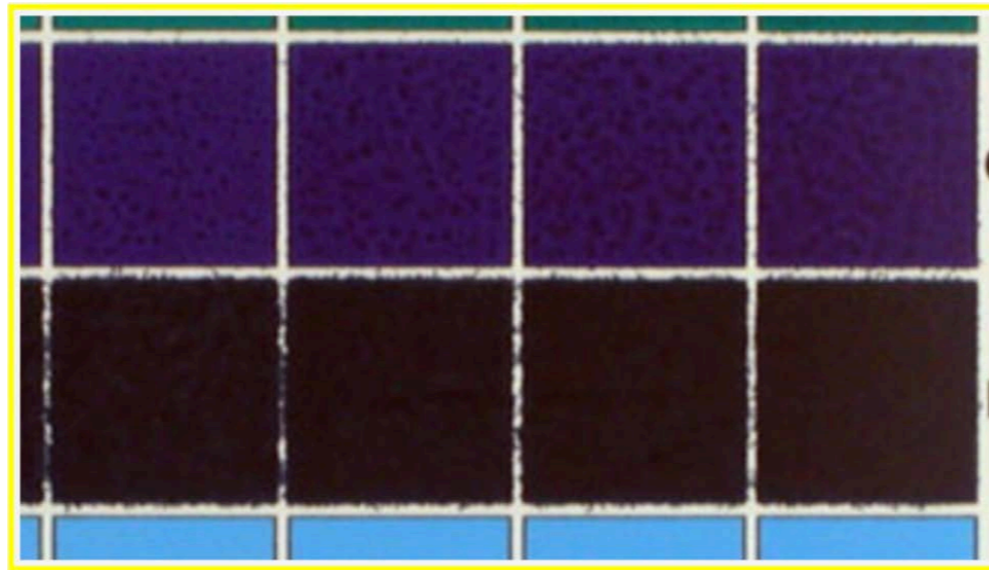


Calibration: less ink better quality!

Define the ink limit for single ink

Define the ink limit for double overprint ink

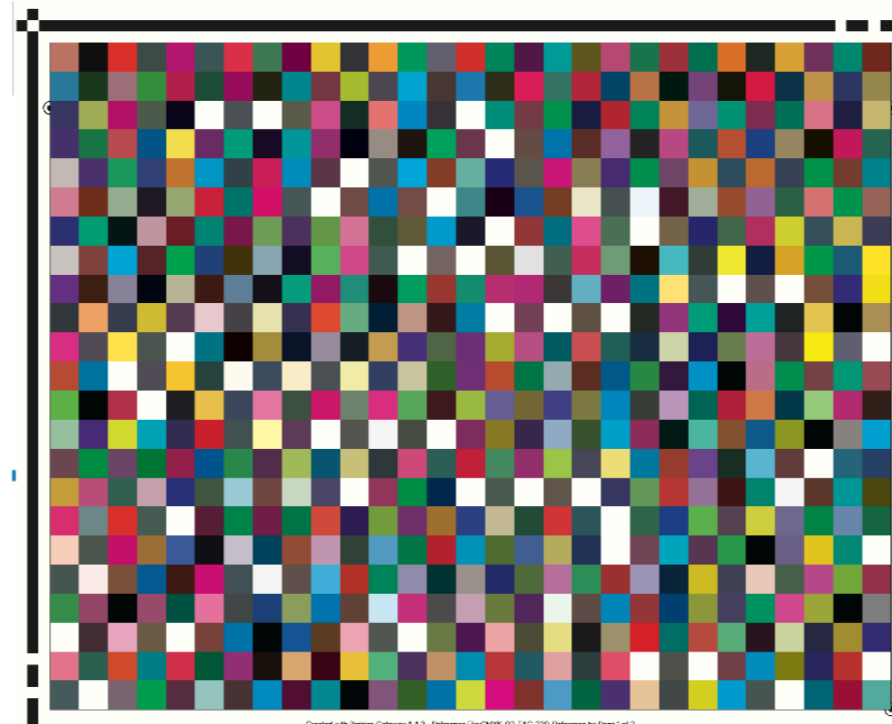
Define the ink limit for triple overprint ink



Print the TIC-TEST (Hutchinson) for define the TAC of Color Target and the width of separator lines



Special Color Target with separator lines

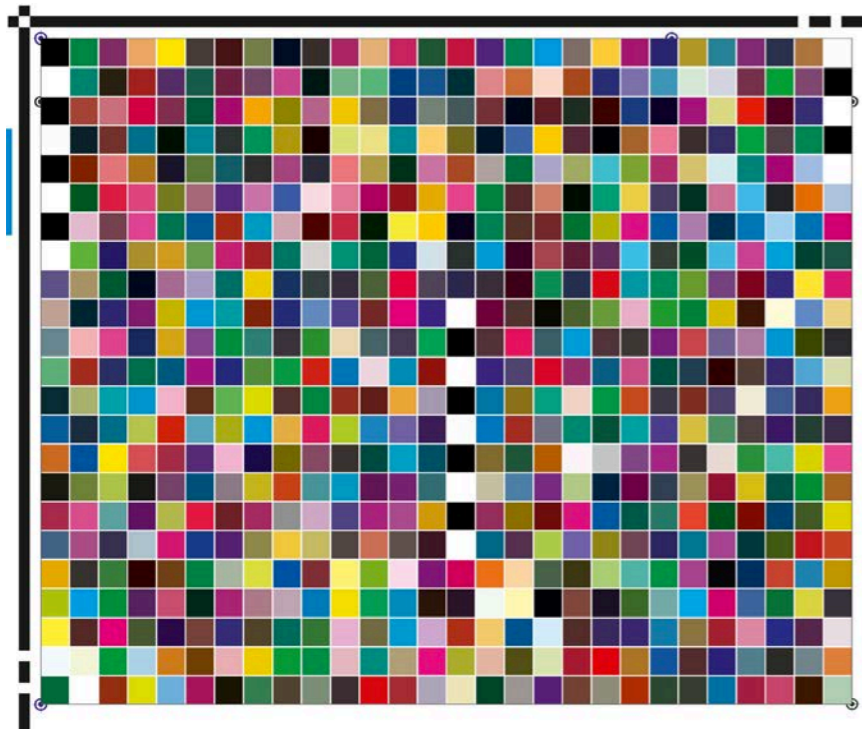


for photography paper
Ultrachrome ink

for vinyl
and solvent ink

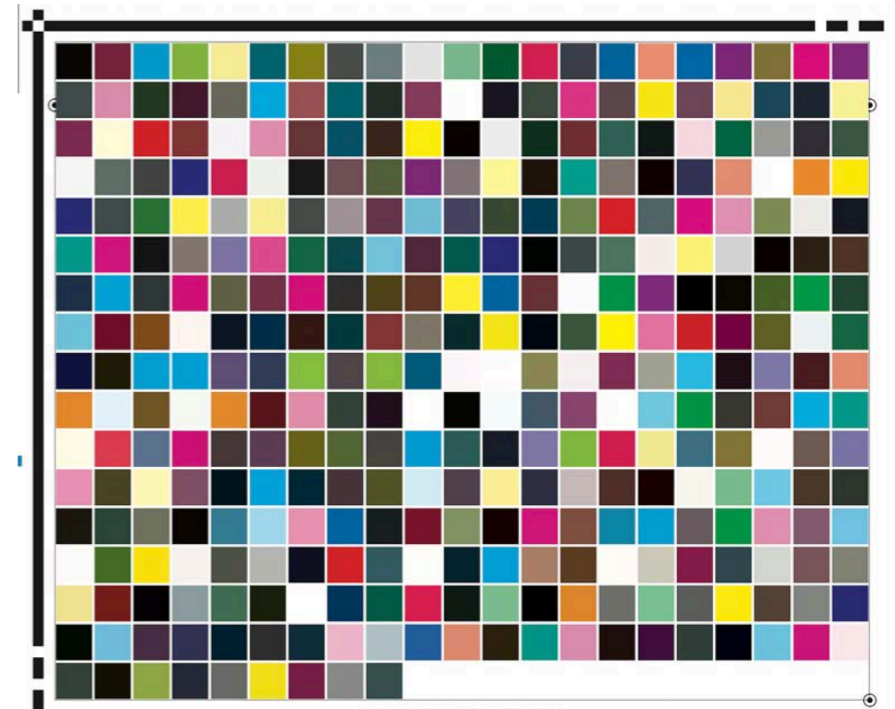
Without separator lines

For glass
and dye ceramic ink



*separator lines
0,5 mm*

*separator lines
1mm*





General Evaluations before print Color Target

Analysis of the media structure and OBA

Analysis of the ink drop on the media

Analysis of the inking defects:

adhesion/trapping, drop enlargement

spreadability, wettability, ink splitting...

Choosing the best screen pattern (type of screening)

which is more adapt at the media structure

and limits optical interference defects

Get the best visual color contrast on Color Target!



Color Target printed well



good visual contrast between the neighboring color patches
and no dominant color!

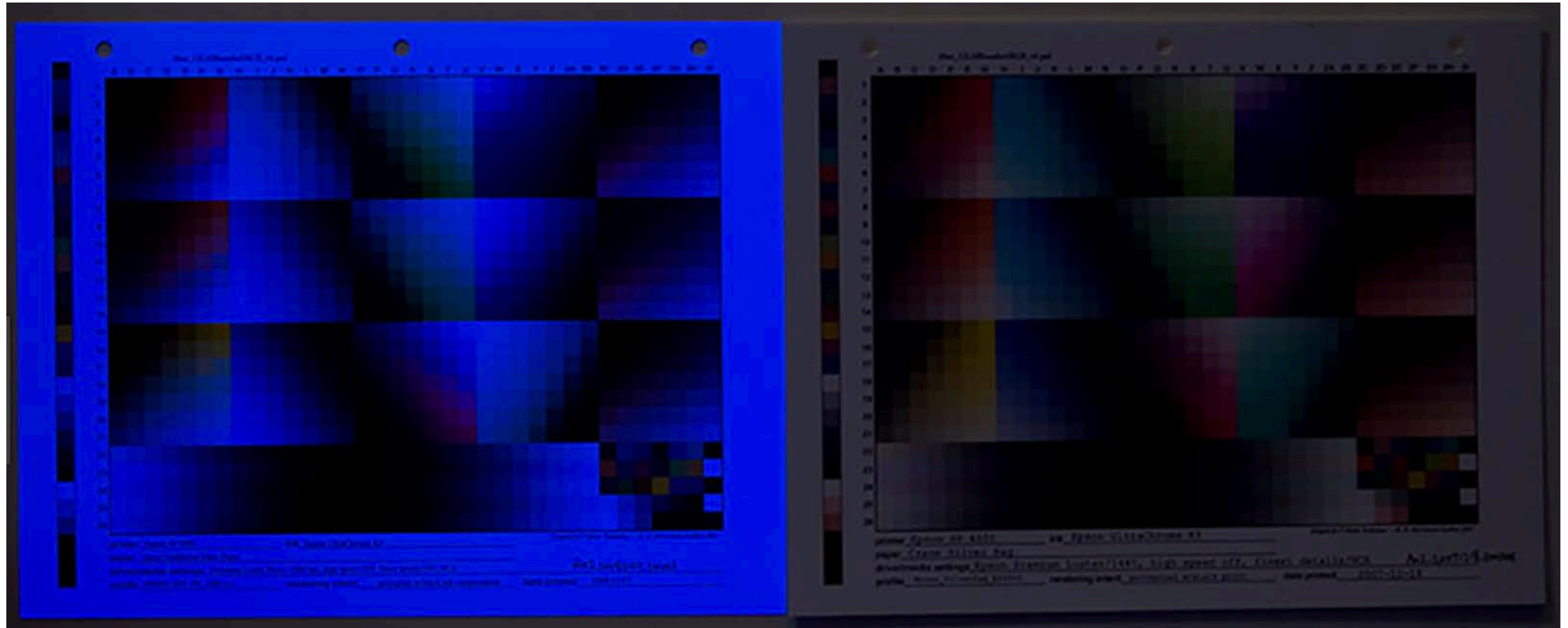


OBA





What Color do you measure on the Color Target?

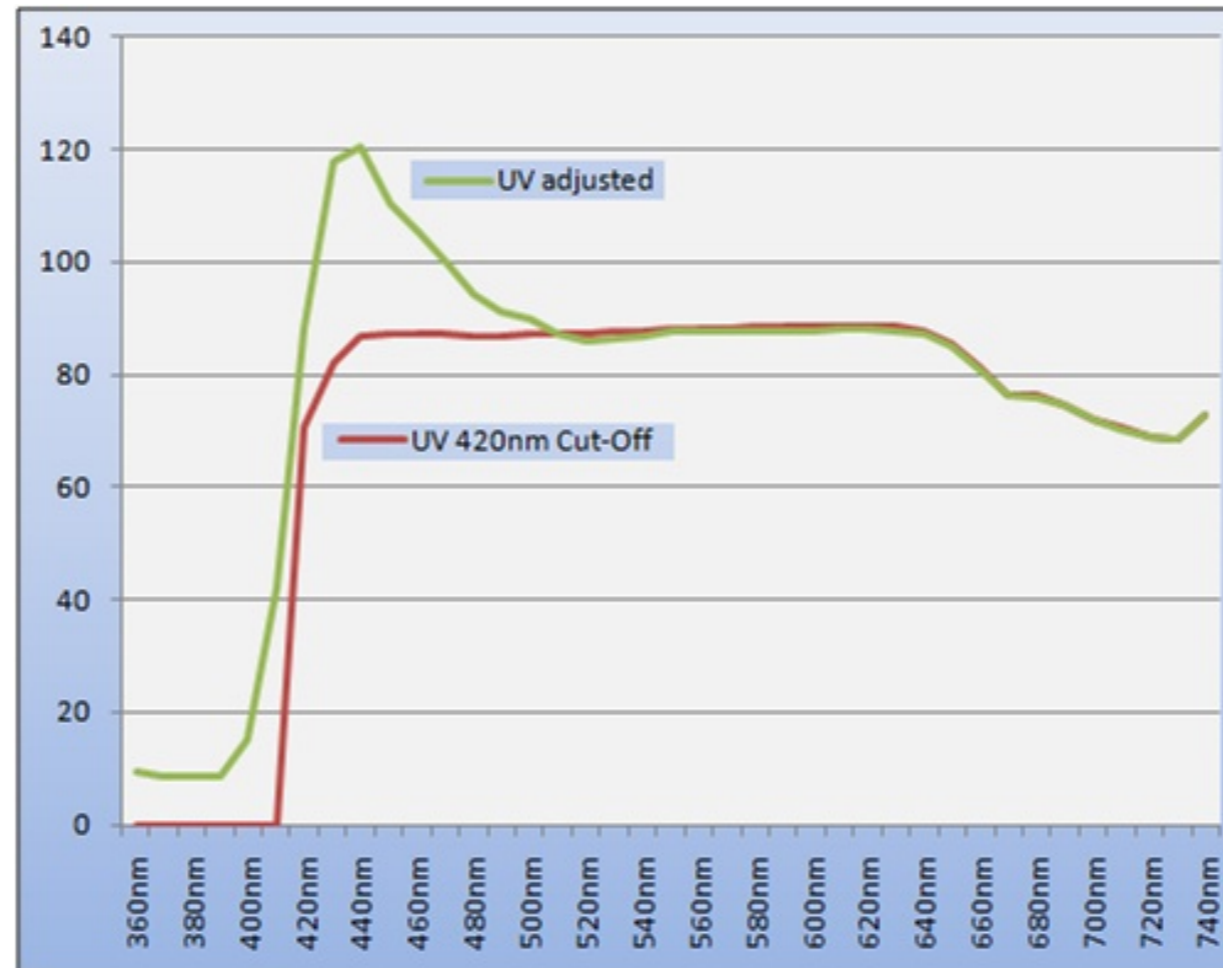


Viewed under UV light

Viewed in black room



Recommended Measurement Method M2 (UV Cut)



The OBA optical brightener (fluorescent) contained in the papers and fabrics have a peak of spectral remission in the Ultra-Violet area but they also emit as peak Blue color in the visible area of the visible around 420-430 nm. The UV Cut filter cuts this abnormal reflection by preventing incorrect measurements on substrates and light colors (seen bluish) that a wrong ICC profile created with M0 measurements tries to neutralize, compensates with a consistent amount of the complementary yellow color.



The Media surfaces

Smooth

Microporous

Porous

Absorbent

Textured

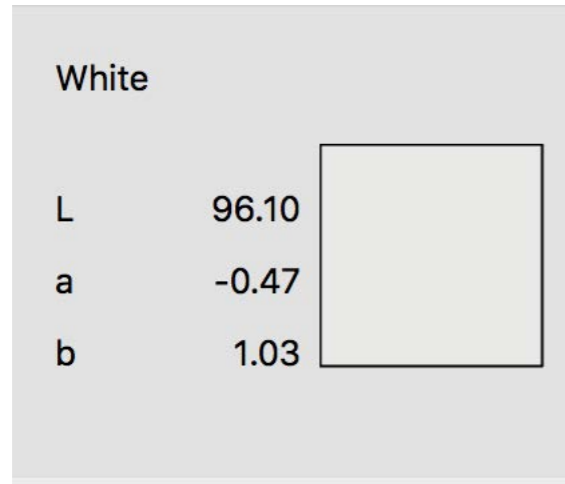
Structured

Matte

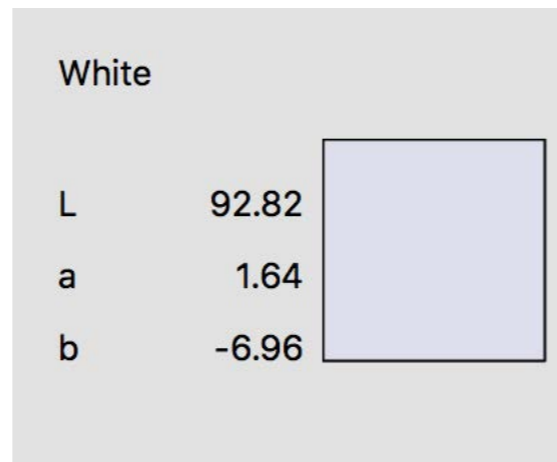
Glossy



Substrates white point



Leather



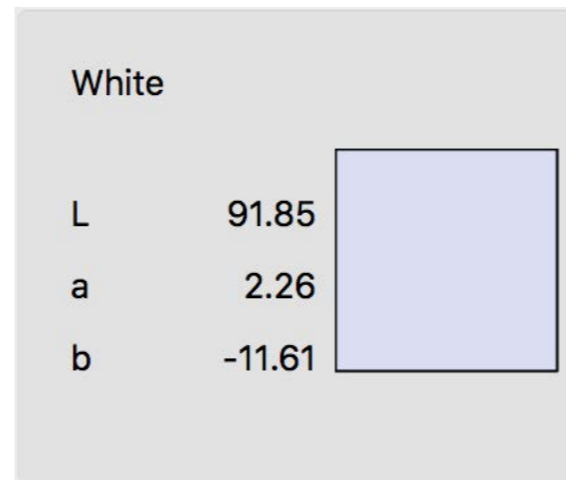
PVC



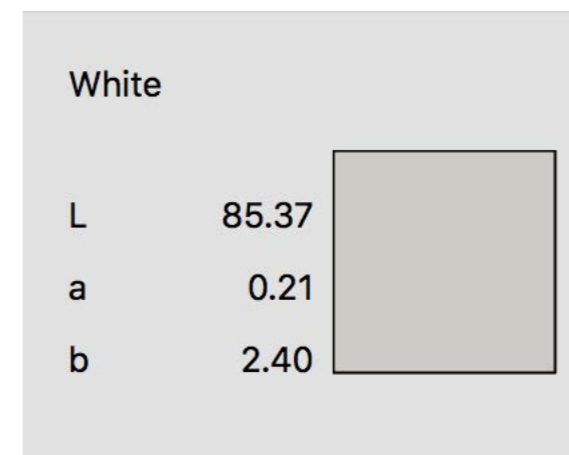
Forex-1



Vinyl



Blueback Paper



Ceramic

The color changes with the white point of the substrates and the "spreading/adhesion" of the ink



Measurement diaphragm aperture

Color Measurement Systems	Aperture mm	Area coverage mm ²	*Quante volte >
	8	50,24	5,23
	6 (scan area 6x60)	28,26 (360)	2,94 (37,46)
Generic	3,0 /3,5	9,61	1*

Larger aperture = better measurement accuracy

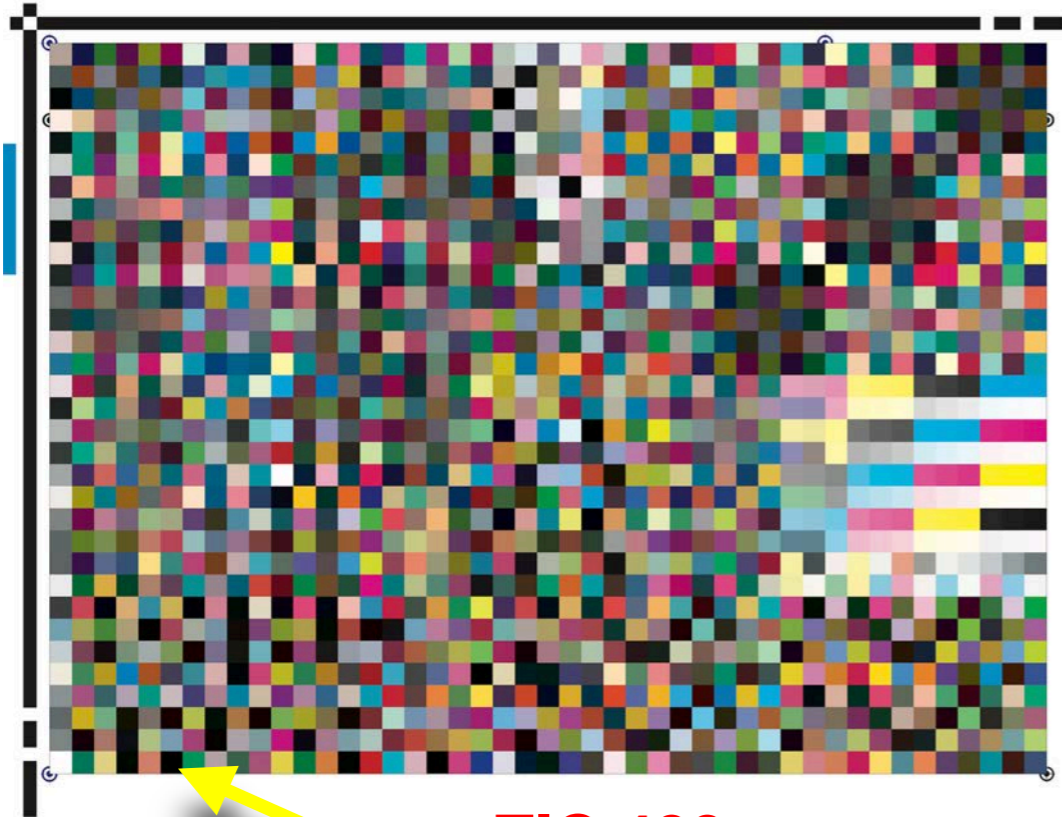


Media / Color Measurement System

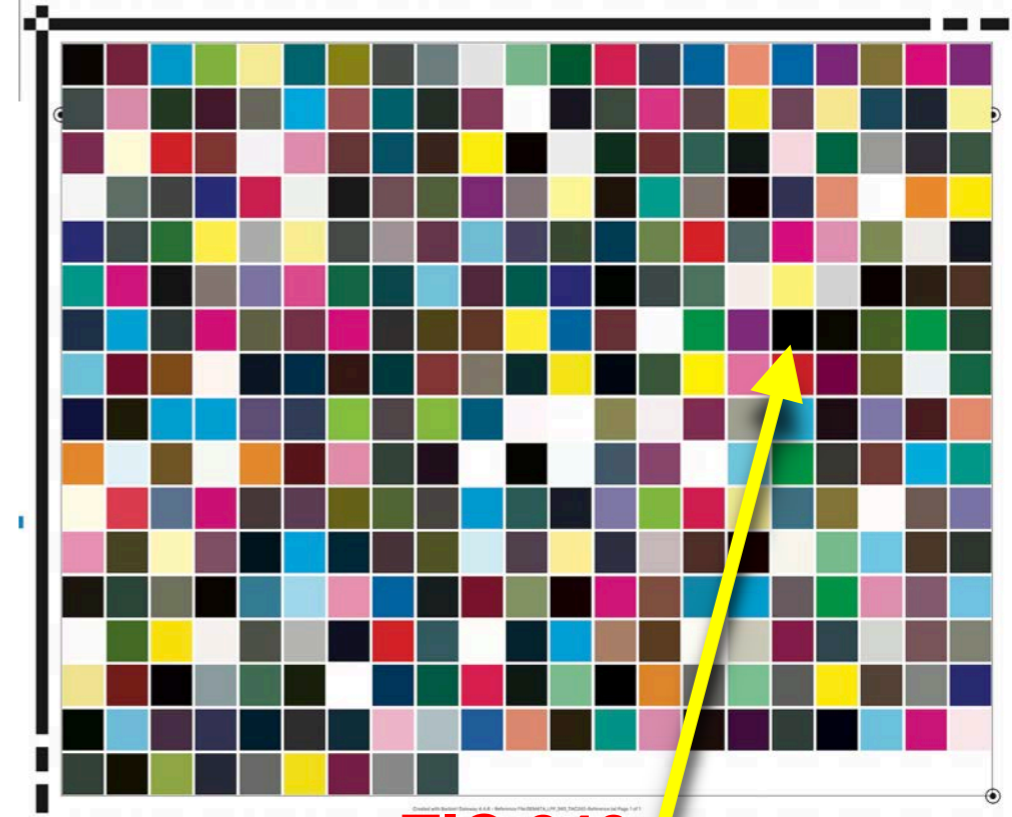
Color Measurement Systems	Spectrophotometer 0°/45°	Spectrophotometer Spherical	Spectral scanner	RGB Camera
Media	<i>Aperture diameter mm.</i>	<i>Applications</i>	<i>Applications</i>	<i>Applications</i>
Paper / carton board	3			
Corrugate	6-8			
Plastic/Vinyl	3-6			
Textile/Fabrics	6-8	X		
Wood/Laminates	6-8			
Glass/Plexiglass	3-6			
Metal	3-6	X		
Ceramics	6-8	X	X	X
Leather	6-8			
Cakes	3-6			
Speed	FAST	SLOW	SLOW	FAST



Industrial Printing: Color Target with lower TAC



TIC 400



TIC 240

Selettore colore (colore di primo piano)

OK
Annulla
Aggiungi a campioni
Librerie colori

nuovo
corrente

H: 0 ° L: 0
 S: 0 % a: 0
 B: 0 % b: 3
 R: 0 C: 100 %
 G: 0 M: 100 %
 B: 0 Y: 100 %
000000 K: 100 %

Solo colori Web

Selettore colore (colore di primo piano)

OK
Annulla
Aggiungi a campioni
Librerie colori

nuovo
corrente

H: 194 ° L: 1
 S: 84 % a: -1
 B: 1 % b: 0
 R: 1 C: 57 %
 G: 3 M: 44 %
 B: 3 Y: 39 %
010303 K: 100 %

Solo colori Web



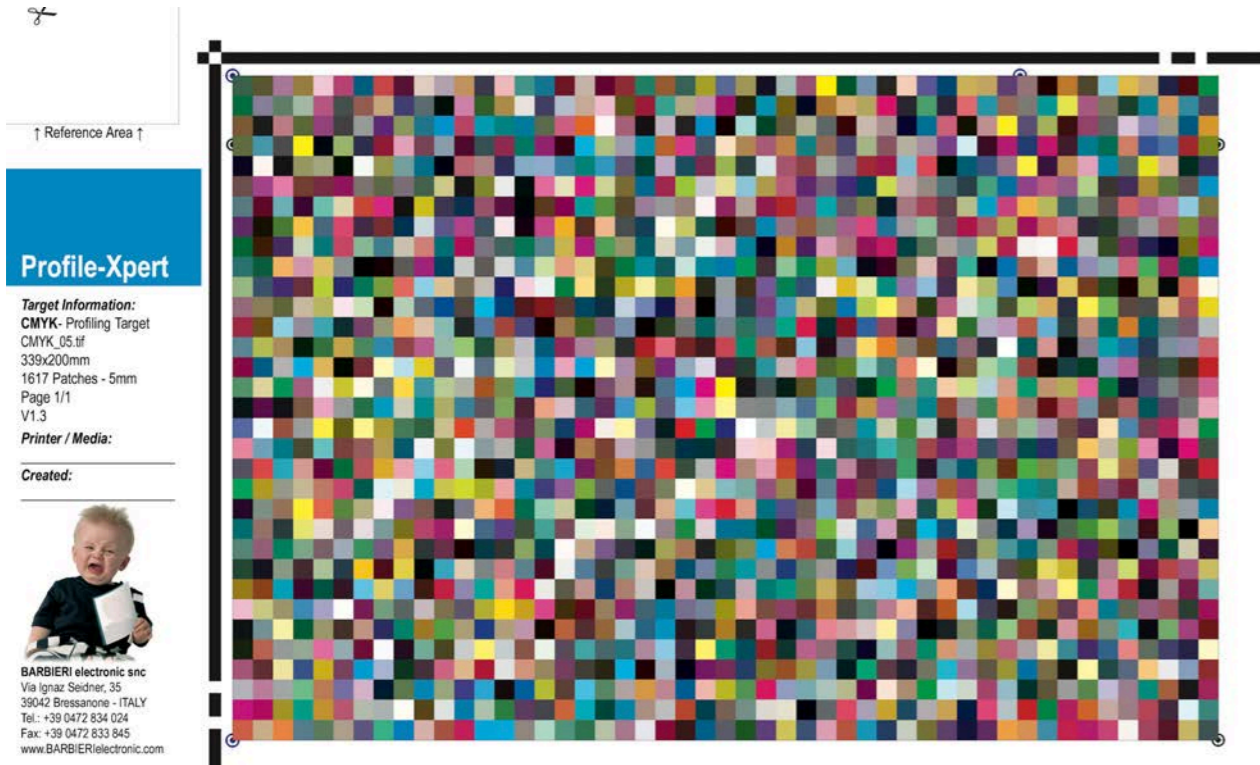
Each Media its Color Target

Media	No. Colors	Patch size (mm)	No. Patches Type Color Target	No. Pages	Media No. Target	TIC For calibration
Paper	4	3	1617 (IT8-7/4)	1	1	330
Corrugate	4	6/8	1288 (CMYK_02)	2	2	300
Plastic/Vinyl	4	6	1617 (IT8-7/4)	1	1	300
Fabric	6/8	8	CLR 2740/3340	7/9	2	350
Laminate /Wood	4	6 (8)	1288 (CMYK_02) 1485 (CMYK_10)	2 6	1	300
Glass/Perspex	4	6 (8)	1288 (CMYK_02)		1	220
Metal	4	6	1288 (CMYK_02)		1	250
Ceramic	4	6 (8)	1288 (CMYK_02)	2	2	250
Leather	4	6	1288 (CMYK_02)	2	1	250
Cake (confectionery)	4	6	356	1	1	200

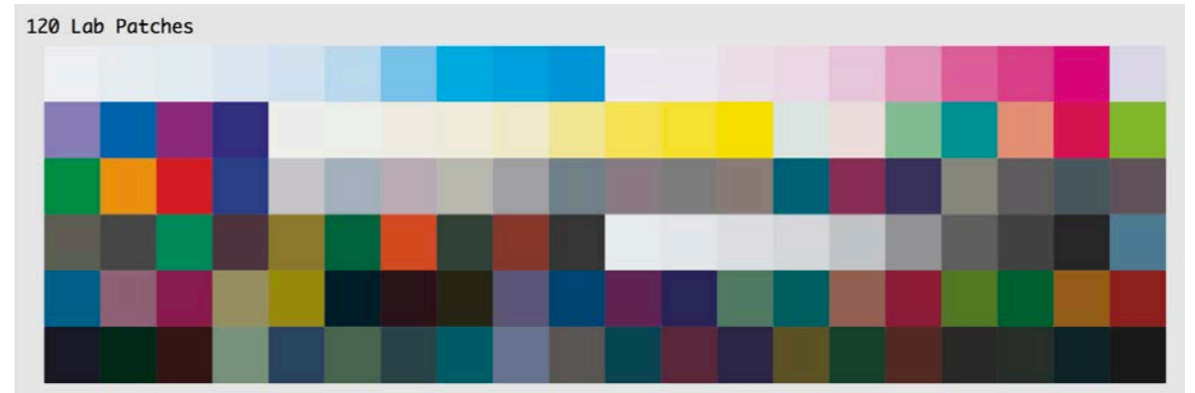
** optimization with Rescaling to no. 1617 patches with ColorAnt*



Color Target: types and number of patches



IT8-7/4: 1617 patches



ColorLogic: 120 patches



Fogra Mediawedge: 72 patches



ColorLogic: 48 patches



ColorLogic: 40 patches



ECI_2002: 1485 patches



Mini-Target for small media and limited print area

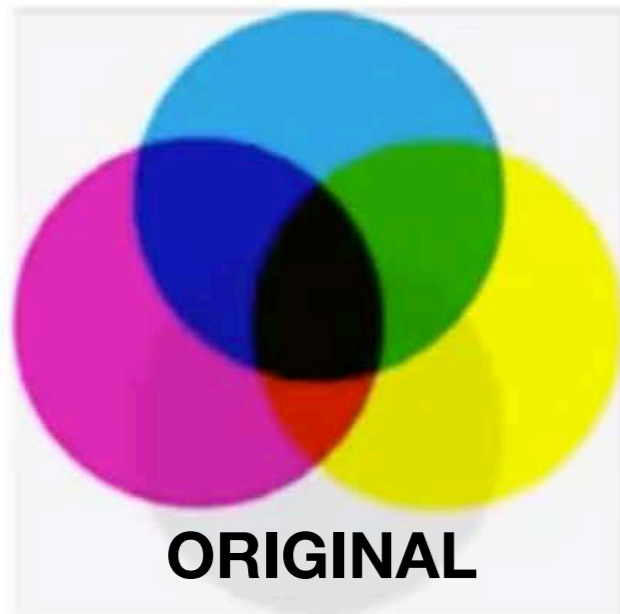
Type of Mini Target	No. Colors	No. Patches	TAC
Barbieri	4	48	270
IdeaAlliance_CW_2013	4	84	300
Fogra Mediawedge_v3	4	72	300
Fogra MediaWedge Multicolor 5C® V1	5	78	300
Fogra MediaWedge Multicolor 6C® V1	6	78	300
Fogra MediaWedge Multicolor 7C® V1	7	104	300
Fogra MediaWedge Multicolor 8C® V1	8	104	300

** optimization with Rescaling to no. 1617 patches with ColorAnt*



Different TAC for different Media

TAC 330



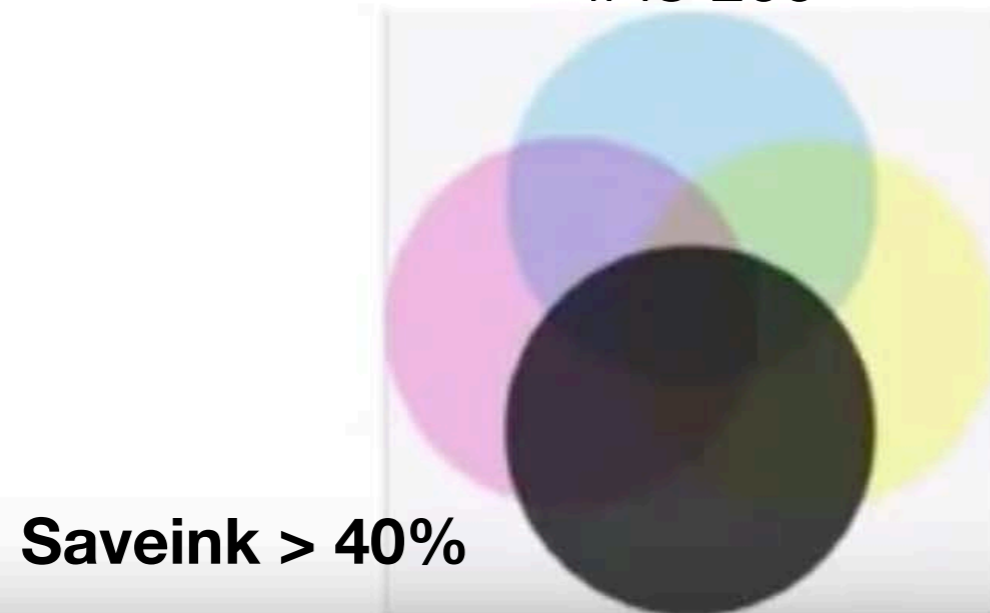
TAC 300



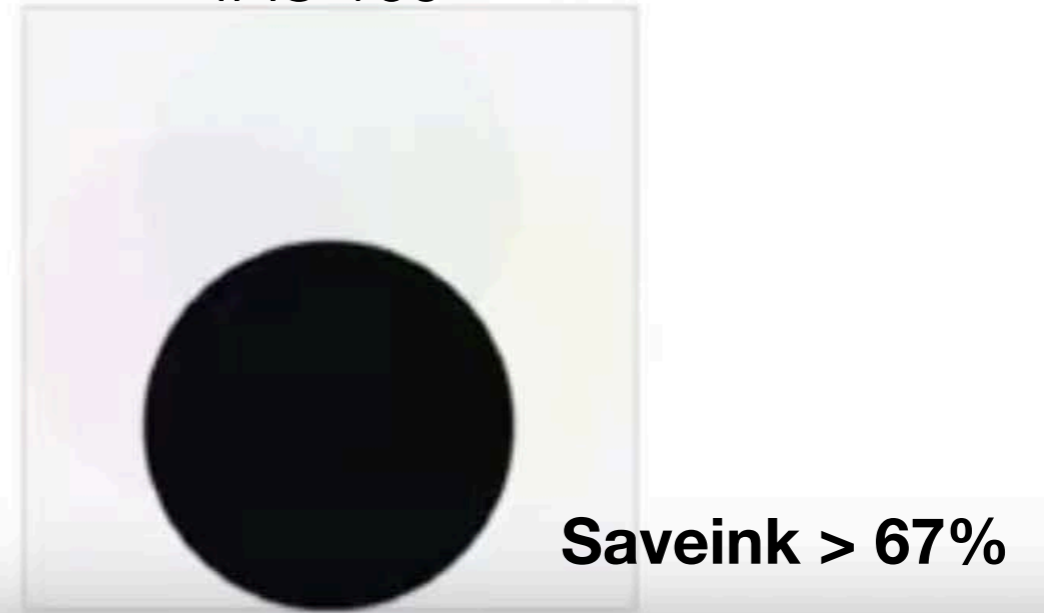
TAC 250



TAC 200



TAC 109



TAC= Total Amount Coverage



TAC for the different Media

TAC	Type of MEDIA	Job type
400	textiles/sublimation	flag with migration on the opposite side
350	textiles/sublimation	flag with migration on the opposite side
325	banner/Forex/foam	Structured media
300	90% of Media for Sign	best price to consumption ratio
275	Wood (brown colors)	UV ink crust reduction
250	Ceramic / Metal	low-drying materials
225	Glass / confectionery	low-drying materials
200	Glass / confectionery	low-drying materials
< 200 (130-160)	Glass dye ceramic ink	Very low ink thickness

Thanks for your attention!



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