

# **Color confidence and quality assurance**

- A never-ending task in print production**

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# Introduction

Why this topic?



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Why this topic?

- Long-burning issues - color fidelity, dot gain, PSO  
ISO 12647-2 old/new - have been topics in IUPD  
planning activities and PAT events for many years
- Need for color fidelity still strong/still problems in  
production – even if the quality level is higher than  
years ago



## **Who will lessons learned be shared with here?**

- Förster & Borries GmbH & Co KG (F&B), Zwickau, Germany
- Established in 1881, 1895 first industrial three-color printing operation, 1934 first efforts at “standardization” with Kast & Ehinger, Stuttgart (now Flint)
- Today approx. 20 employees, “Heidelberg” equipment company, Prinect, MIS PBM, 2x platesetter, 1x CD102, Stahlfolder, Theissen Bonitz, Polar
- Scenarios described taken from real-life production

### Presenter

- Thomas Schubert, MSc.



## Agenda

- Printing and proofing according to standard – but which one?
- Job specifications
- “Correct” color originates at the customer
- Data transfer to the print shop
- Digital proofing
- CtP
- Print checking
- Quality inspection - soft skills



# Printing and proofing according to standard – but which one?

Question from real life - what determines how you print? The standard, of course!  
Which one? "Ehh, hmm the print standard" - worst case, but not unusual  
- Why do we need a standard?

## What is the print standard?

The print standard defines influencing variables and printing conditions (together with optimal setpoint values) for all parameters that influence the color space used for printing.

- What we want - predictability, repeatability, comparability
- Characteristics vary by business model (commercial, publishing, packaging)



## Print standards

- ISO 12647-2 new/old, lab solid tone, dot gain
- System Brunner global standard, gray balance, dot gain, solid tone
- GRACoL G7, gray balance, dot gain
- In-house standard – by values or experience, density, template, eye

**PRINT SHOP must decide on a standard/approach, all subsequent production steps/checks/tolerances refer to it**

- F&B, ISO 12647-2/2013 - F51/F52 + F43 (FM), attention but not on lab values, dot gain more important + gray balance



## Job specifications

- Rarely THE standard jobs, many variables: Data creation, customer expectations, changing contact persons
- Customer advisors (should) have knowledge of the customer's expectations
- Title of a series or single copy
- In case of F&B, check whether advance runs available, if in-house – attach specimen copies from Production archive or archived colored sheet
- Many decisions/a lot of knowledge important for customer contact + job preparation (soft skill)





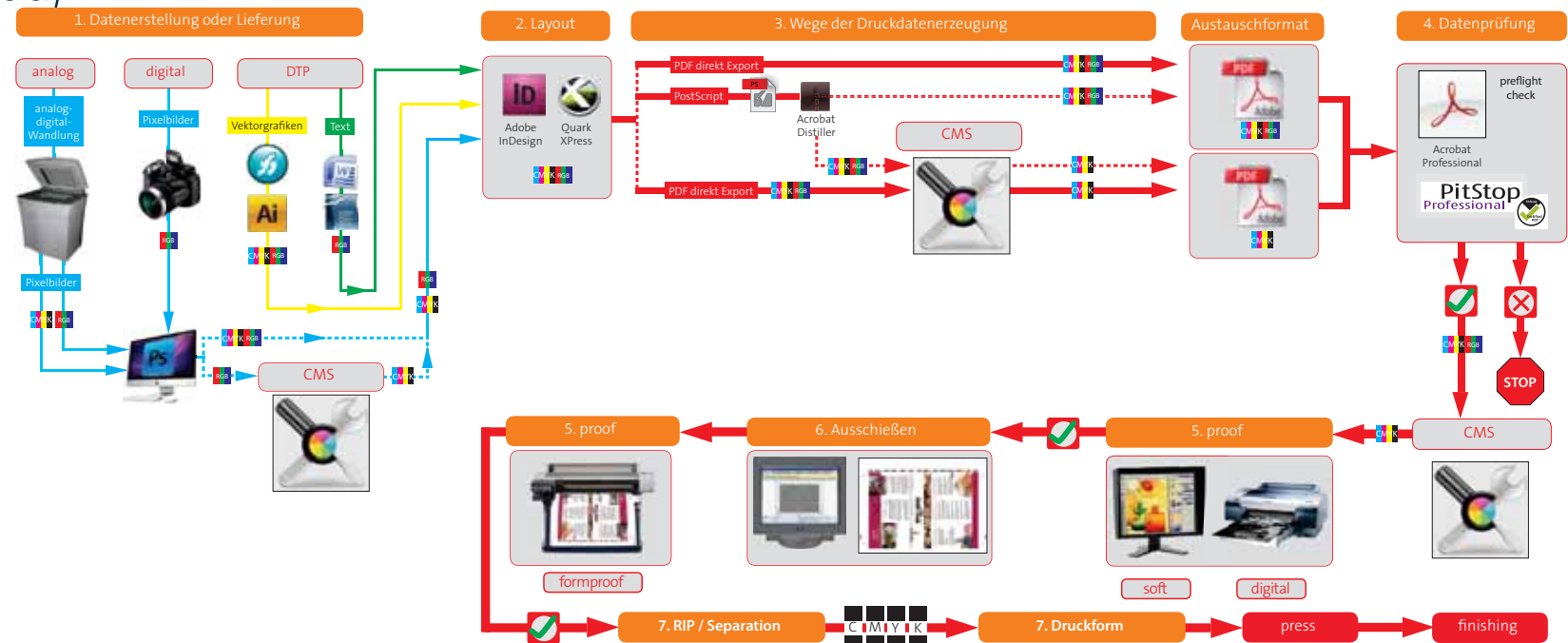
## The “right” color originates at the customer

- Often little knowledge about the subsequent printing process and/or a lack of information about the printing method/substrate (even among professionals!)
- Basic knowledge required about color spaces, ICC profiles
- Correct basic settings for software - InDesign, Photoshop - at F&B Screenshot for ColorSettings PS/ID + current profiles on website
- PDF export (format/color space), preferred PDF format PDF/X-4, preferred color space printing color space (F51/52/43)
- Educate (good) customers, online help, settings/profiles, etc., personal contact (customer retention)



## “Right” color originates at the customer

- Binding methods – when does the conversion to the output color space happen?
  - Early binding – frequently
  - Intermediate binding – increasingly
  - Late binding – rarely, except with DeviceLink adaptations (v2-v3, coated - uncoated)



## Data transfer

- In addition to all preflight checks, ONLY color spaces interesting HERE
- What happens if RGB – sRGB becomes F51/52
- What happens if CYMK – which FOGRA39, SWOP, etc.
  - Manual intervention or rule-based (*Prinect*) and conversion via DevLink to v2-v3 (F39-F51) - coated; (F39-F52) - uncoated, AM – FM (F39-F43)
- Rarely automatic at F&B - frequently product-related decisions:  
pre-print version, comparison product, paper



## Proofing

- Define standard, at F&B F51/52, measuring technology iOneIO (M1)
- For OWN production select suitable paper (white point F52), F&B HD Saphira paper 200 g - F51 + 180 g - F52
- Calibrate proof system
- Check regularly, media wedge/IT8 charts - systems drift (depending on use/aging)
- Ideally halve ISO values, based on measurement ECI2002/IT8.4

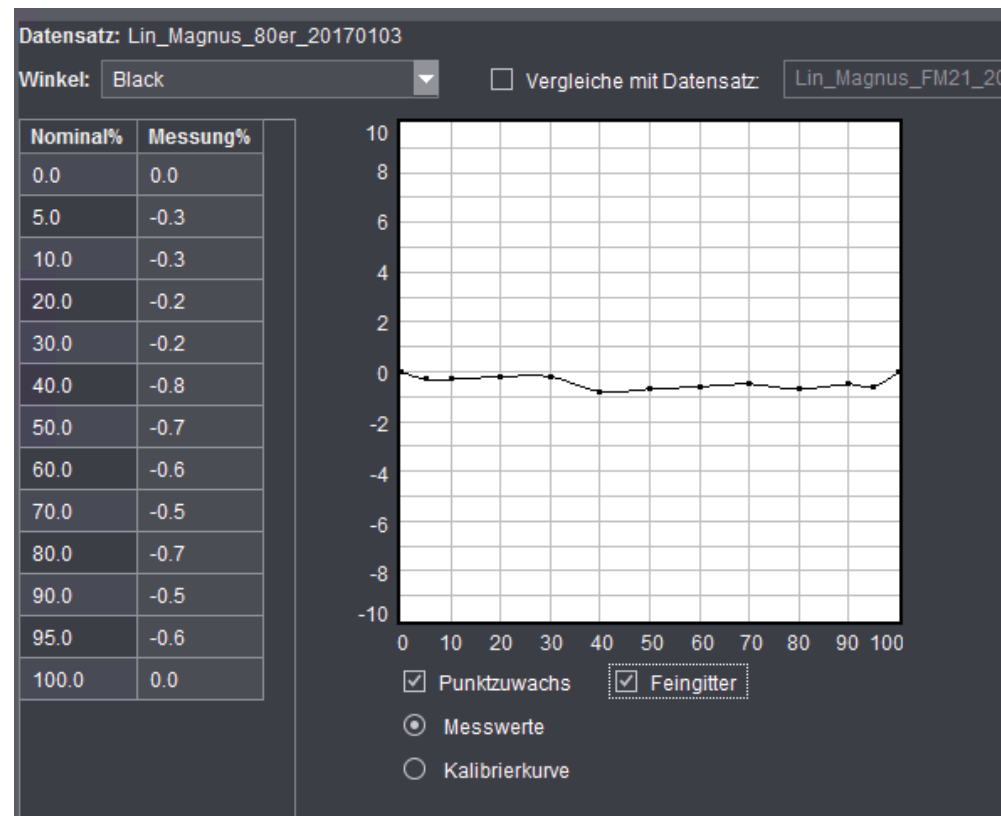
	Lab Reference			Lab Comparison			dE*ab	
	L*	a*	b*	L*	a*	b*		
Papier	95,00	1,50	-6,00	94,52	0,97	-5,84	0,73	
Schwarz	16,00	0,07	-0,33	15,34	0,43	-0,70	0,84	
Cyan	56,12	-34,90	-52,52	56,67	-32,95	-52,95	2,07	
Magenta	48,06	75,29	-5,18	48,28	76,22	-4,48	1,18	
Gelb	88,94	-4,04	92,37	88,52	-4,99	92,75	1,10	
Rot	47,99	69,33	45,87	48,52	69,39	45,76	0,54	
Grün	49,45	-65,93	24,34	49,39	-66,13	23,35	1,01	
Blau	24,74	21,12	-47,45	24,50	21,39	-47,17	0,46	
Overprint	23,26	-1,43	-1,68	23,32	-0,35	-2,69	1,48	

	dE(ab)	Status	Maximum	Field ID's
Papier:	0,73	● OK	3,00	C21
Mittelwert	1,86	● OK	3,00	
Maximum	4,62	● OK	6,00	C14
Primärfarben (Max):	2,07	● OK	5,00	
Maximum dH* Primärfarben	1,87	● OK	2,50	
Mittleres dH* Buntgraufelder	0,83	● OK	1,50	
Schwarz	0,84	● OK	5,00	A21
Cyan	2,07	● OK	5,00	A1
Magenta	1,18	● OK	5,00	A6
Gelb	1,10	● OK	5,00	A11
Rot	0,54	● OK	6,00	B6
Grün	1,01	● OK	6,00	B11
Blau	0,46	● OK	6,00	B1



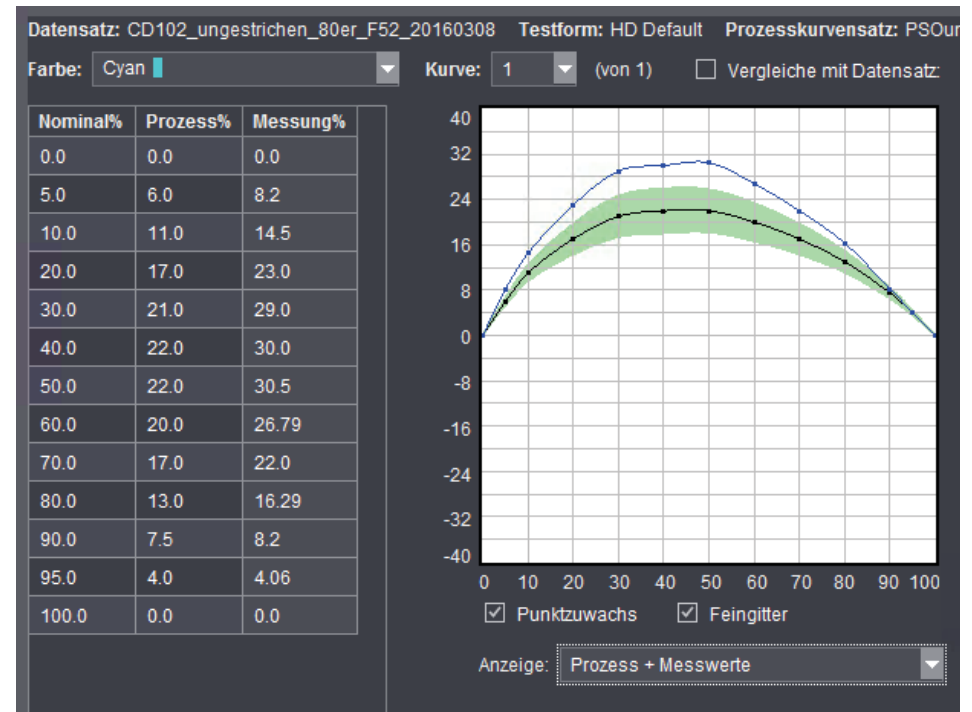
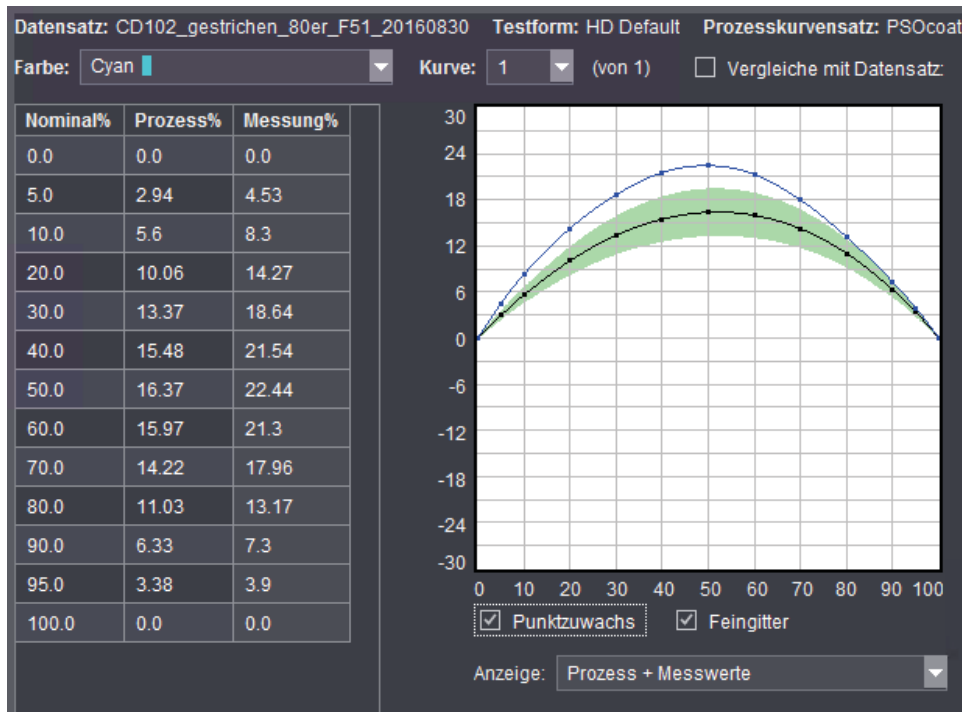
## CtP

- Linearization
- 2x platesetter at F&B, therefore 2x linearization – also check
- Define max. fluctuation margin + observe fluctuation tendencies



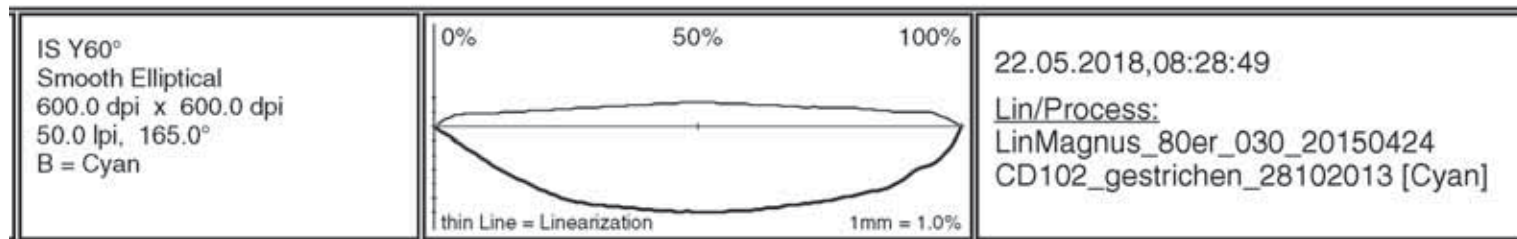
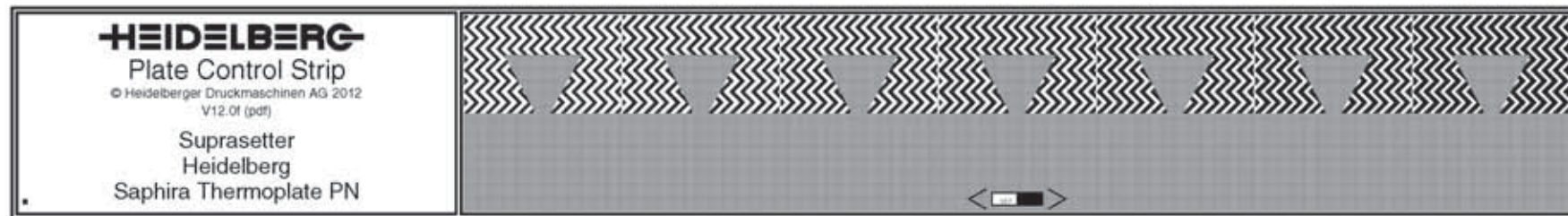
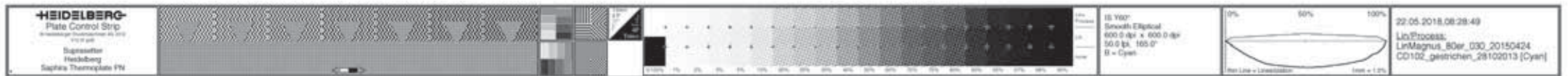
## CtP

- Create calibrations for machines/paper in accordance with selected standards, at F&B, images at bottom F51/52



## CtP checking

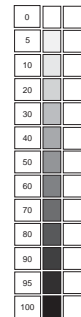
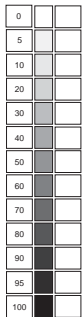
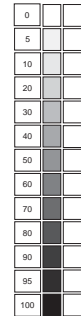
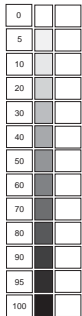
- Continuous optical checking via plate wedge





## CtP checking

- Regular measurement (tonal values) with test plate + optical evaluation (smooth shades)





## CtP checking

- Recording + evaluation via Excel - implementation in *Prinect* would be nice

Nr.	Datum	Uhrzeit	M1 (o.l.)	M2 (o.r.)	M3 (u.l.)	M4 (u.r.)	M5 (50%)	Chargennummer		Ø	
1	04.05.15	08:00	40,7	40,5	40,2	40,5	50,3	284 02:39 V41G 6588		40,48	
2	04.05.15	08:39	40,6	40,3	40,3	40,6	50,6			40,45	FM
3	04.05.15	08:43	40	40,5	40,1	40,2	50,7			40,20	AM 60er
4	12.05.15	10:39	40,7	40,5	40,5	40,8	50,3	109 19:14 F16G 2522R		40,63	
5	27.05.15	08:09	40,6	41	40,8	40,6	50,2	109 19:26 F16G 2521R		40,75	
6	27.05.15	08:09	41,1	40,6	40,5	40,5	50,9	109 19:26 F16G 2521R		40,68	FM
7	08.06.15	07:52	40,3	40,6	40,5	40,2	49,7	109 20:03 F16G 2522L		40,40	
8	15.06.15	07:56	41,3	41,3	41,4	41,4	51,3	305 04:14 V44G 6982		41,35	
9	22. Juni	08:47	41,1	41,4	40,8	41,1	51,1			41,10	
10	30.06.15	10:31	40,9	41,2	41,1	41,2	51	149 16:23 F22G 3545 L		41,10	(-)0,5 im 40%
11	13.07.15	07:54	40,3	40	40	40,4	50,3			40,18	
12	21.07.15	09:54	39,7	39,7	39,9	39,8	50,1			39,78	
13	11.08.15	12:02	41,1	41,4	41,3	41,5	51	145 20:59 F22G3450 R		41,33	
14	25.08.15	12:10	40,4	40,6	40,1	40,1	50,6	149 16:45 F22G 3545 R		40,30	
15	14.09.15	08:49	40,4	40,3	40,2	40,6	50,5	149 16:25 F22G 3545 R		40,38	
16	06.10.15	12:41	40,8	40,6	40,5	40,5	51,1	149 16:43 F22G 3545 L		40,60	
17	26.10.15	09:34	40	40,2	39,9	39,8	50,2	149 16:05 F22G 3545 R		39,98	
18	09.11.15	08:00	40,8	40,6	40,3	40,4	51,3	149 17:12 F22G 3547 R		40,53	
19	14.12.15	09:01	42	42,2	41,7	42,1	52	149 16:01 F22G 3545 L		42,00	FM
20	14.12.15	09:01	40,6	40,3	40,7	40,8	51,2			40,60	
21	22.12.15	11:15	41	40,6	40,9	40,7	51,1			40,80	
22	07.01.16	10:43	40,3	40,8	40,2	40,7	51			40,50	
23	27.01.16	08:35	41,1	41,3	41	40,9	51	201 06:50 F30G 4726 L		41,08	
24	08.03.16	08:19	40,4	40,8	40,4	40,8	50,5	201 06:26 F30G 4726 R		40,60	
25	31.03.16	13:02	41,1	40,7	41	41,2	50,9	201 06:35 F30G 4726 L		41,00	

## CtP checking

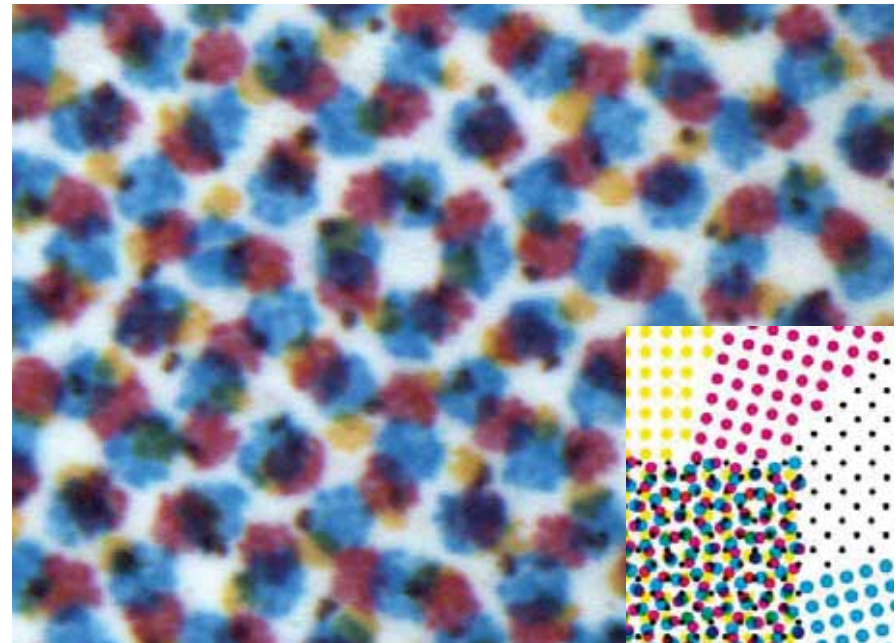
- Plate deliveries from pallet (batch) of 1,200 units (size 702x1030 mm)  
- better handling than package delivery + fewer batch fluctuations
- Strong movement in the market towards low-process/process-free plates  
restrictions on the measurement/opt. evaluation depending on the technology
- At F&B test series with Kodak SonoraXP (June, 2017), positive overall result,  
decision against this for the following reasons: technical uncertainties (lack of  
measuring option + uncertainties relating to printing press rollers, dampening  
solution – emulsion) + not YET reproducible economically



# Print checking

## Main influences of quality in the printing process

- Color trapping – overprint behaviour of the process colors
- Dot gains
- Primary colors – solid tone density/lab values
- Light conditions – according to ISO 3664:2009 (light with defined UV components)
- Substrate (gloss, degree of whiteness)



# Print checking

## Printing press/process in standardized conditions (cleaning, maintenance, provision)

- Changing water hardness, due to water suppliers (usual), at F&B osmosis system with subsequent, controlled hardening dH 10 -12
- Regular checking of water hardness + if need adjustment
- Checking of alcohol (printing with reduced alcohol content) + conductivity
- Defined cleaning/maintenance cycles with log by printer (weekly)
- Continuity with (good) suppliers (rubber blankets, dampening solution additives, etc.)
- But change of suppliers - if quality is poor



## Print checking - Ink

- After many tests and painful (expensive) experience at F&B with different suppliers - now batch acceptance
- Delivery of whole batches (scale) of approx. 300-400 kg (varies by color), highest consumption in yellow (annual tonnage at F&B approx. 7.5 t)
- Test position of 10 kg for each scale color, logged production + function test by printer (viscosity, general appearance, print test in production (dot gain)), upon approval of order batch or controlled proof or batch rejection
- Color certificate (conformity, ISO2846-1:2006) by manufacturer for each batch
- Aim is continuity of color quality - there is always "cheaper" ink available and also better ink available – but more expensive (already a IUPD topic, years ago)



## Print checking - Paper

- Printing behavior “may” vary from pile to pile, low production costs necessitate “cheap” papers, better paper available – but more expensive (already a IUPD topic)
- (Try to) keep temperature and air humidity constant, no air draft
- Bring paper to the correct temperature!
- At F&B, Draabe air humidification, no active cooling in the room, temperature-controlled inking units





# Inspection possibilities in printing

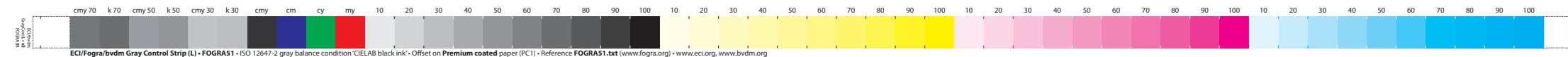
- Optical checks (simple/practical/cost-effective)  
– gray balance fields ECI mini spots



ECI/bvdm Gray Control Strip (S) • FOGRA51 • v3



- Measurement checks, manual, offline, inline (at F&B InPressControl)



- More precise checks, ECI GrayConL in Production with printing, evaluation via *Prinect Color Toolbox*



# Inspection possibilities in printing

- Printout of complete test form, in case of problems or regularly for checking purposes
- In addition to measurement, also better to recognize optical components (faults)





## Quality inspection

- *Prinect* AnalyzePoint + Quality Monitor, good overviews, lots of numbers, interpretation by reader necessary (e.g. color assignment on sheet)
- Conversation with printers/bookbinders about material and processing properties (e.g. coating in printing/folding) and other soft factors (experience of employees)
- Experienced + motivated personnel, mistakes will always be made – by people, but the best thing they can do is recognize them again and NOT repeat them
- CIP (continuous improvement process) at F&B at interdepartmental discussion platform



**Thank you for your attention.  
For questions and suggestions:**

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