PRINT STUDY: ALIGNING COMPONENTS FOR BEST PRINT QUALITY

Practical Guide for Flexible Packaging Printers

In cooperation with

miraclon

COMPLEXITY MANAGEMENT MADE EASY

Flexible packaging printers can chose from a wide range of available process components. To support you in making the right decision when starting new print jobs, we developed a print guide together with Kodak FLEXCEL Solutions by Miraclon to accelerate press set up.

This booklet is divided in two parts. Within the first part we provide a recommendation for best combinations of:

- KODAK FLEXCEL NX plates with different DigiCap NX patterns
- Compressibility levels of tesa® plate mounting foam backings
- Different anilox settings (volume and screen count) when printing screens, combinations, and solids.

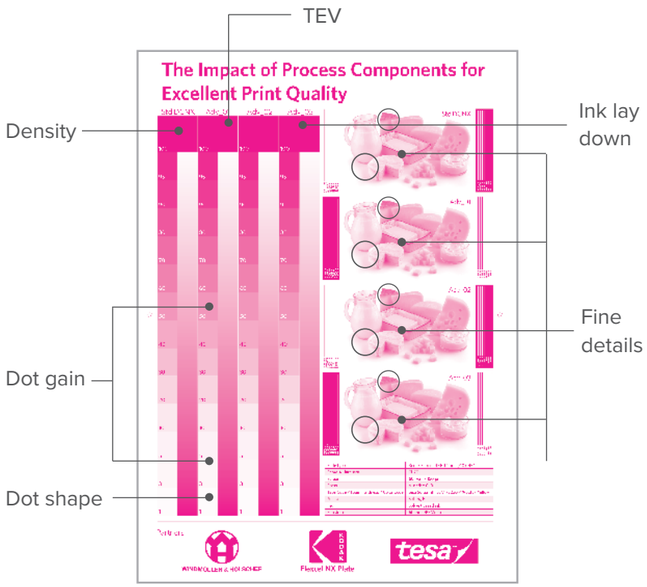
Our recommendations are derived from a print trial at WINDMÖLLER & HÖLSCHER´s technology center in Lengerich/Germany, and the resulting print samples are enclosed with this booklet.

In the second part we demonstrate the impact on print quality when deviating from the recommended process components. Within this comparison we can indicate the impact of each component and provide a tool for troubleshooting of existing print jobs.

Print Trial and Print Evaluation Parameters

Parameter	Test setting		
Printing machine	W&H VISTAFLEX CL 8		
Ink	Solvent-based: Magenta		
Speed	300 m/min		
Substrate	60 µm LDPE film		
Plate	KODAK FLEXCEL NX (74 shore A)		
Kodak DigiCap NX patterns	Standard, Adv_01, Adv_02, Adv_03		
Anilox settings	Setting D	400 L/cm 3.8 cm^3/m^2	1000 lpi 2.5 bcm
	Setting E	340 L/cm 5.5 cm^3/m^2	860 lpi 3.5 bcm
	Setting A	280 L/cm 7.7 cm^3/m^2	700 lpi 5.0 bcm
	Setting B	200 L/cm 10.0 cm^3/m^2	500 lpi 6.5 bcm
	Setting C	160 L/cm 11.6 cm^3/m^2	400 lpi 7.5 bcm
tesa® Softprint	All six hardness levels: from X-Soft to X-Hard		
tesa® Twinlock	All three hardness levels: from Soft to Hard		

Parameter	Evaluation parameter
Fine screen	Dot gain (1%) Fine Details Dot Shape (1%)
Combination	Dot gain (50%) Ink lay down (100%) TEV (Trailed edge void effect)
Solid	TEV (Trailed edge void effect) Ink lay down (100%)



INDUSTRY LEADING PLATE TECHNOLOGY

miraclon

transforming flexo together

Focused on the Future of Flexo

Miraclon is the new home of KODAK FLEXCEL Solutions. For the last decade our people have worked closely with our customers and partners to transform the flexo industry and produce better packaging for consumers.

Now under the Miraclon banner we are taking what we do to the next level. Same global team. Same skills. Same insight and industry knowledge behind us. Added flexibility, focus and ambition.

Through pioneering imaging science, research and development, we ask questions and build solutions that continue to raise standards and transform flexo. All so our customers and the brands they work with can create the very best packaging for billions of consumers worldwide.

Our end-to-end solutions, including our flagship KODAK FLEXCEL NX System, unlock flexo print capability that drives consistency, quality and cost savings in the pressroom. At Miraclon, our team builds best-in-class products by thinking differently. We foster a sense of family that our customers feel part of. And we call on our innovative technology to create a cost-effective flexo process – with no compromises.

For more information please visit: **www.miraclon.com**

A STEP AHEAD

tesa®

With Solutions That Go Beyond Tape

As a leading global supplier of adhesive solutions, we are a reliable partner in the flexographic printing market and understand plate mounting application from development to production and sales.

Our Heart of Innovation

In our international Research & Development facilities, we strive to identify best solutions and think beyond existing standards. As the world of flexographic printing evolves, we develop new solutions to fulfill changing requirements.

Your Global Partner

With over 7,000 products, close to 5,000 employees, and over 125 years of experience as a global supplier of adhesive solutions, we are active in 50 countries worldwide. Our dedicated team of around 100 flexo sales specialists is happy to discuss your specific product and process needs individually.

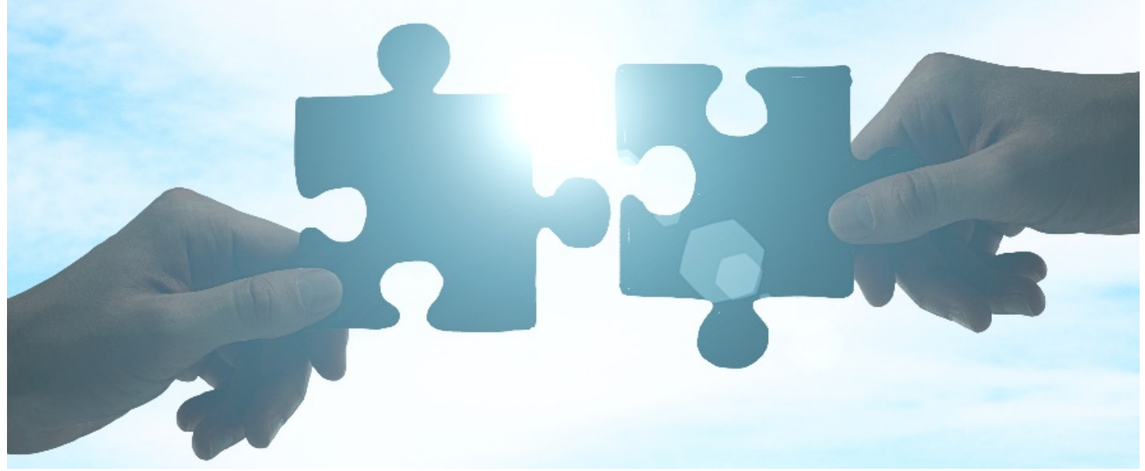
ALIGNED PROCESS COMPONENTS

Best Combinations When Printing with tesa® Softprint

Print motif	Foam hardness	Kodak DigiCap NX patterns	Anilox settings
Fine screen 	Soft	Not applicable: Highlight areas are not affected by Kodak DigiCap NX patterns	D: 400 L/cm 3.8 cm^3/m^2 1000 lpi 2.5 bcm
Combination 	Medium	Adv_01	D: 400 L/cm 3.8 cm^3/m^2 1000 lpi 2.5 bcm
Solid 	Medium-Hard	Adv_01	D: 340 L/cm 5.5 cm^3/m^2 860 lpi 3.5 bcm

Best Combinations When Printing with tesa® Twinlock

Print motif	Foam hardness	Kodak DigiCap NX patterns	Anilox settings
Fine screen 	Soft	Not applicable: Highlight areas are not affected by Kodak DigiCap NX patterns	D: 400 L/cm 3.8 cm^3/m^2 1000 lpi 2.5 bcm
Combination 	Medium	Adv_01	D: 400 L/cm 3.8 cm^3/m^2 1000 lpi 2.5 bcm
Solid 	Hard	Adv_02	D: 340 L/cm 5.5 cm^3/m^2 860 lpi 3.5 bcm



Best print quality is only achievable if all components are coordinated with each other. Changing one parameter has a direct impact on the final print result. Overall, perfect print results can be achieved with the different process components used in our print trial.

We also simulated some very common print defects during our trial and the recommended solutions are shown in the table below.

Key Take Aways and Learnings

Common Print Defects and Our Recommendation

Question	Example of issue	Recommended actions
How to avoid a TEV (trailed edge void) effect?		• Increase foam hardness • Review Kodak DigiCap NX pattern selection in combination with ink volume of anilox
How to minimize dot gain in mid tone area?		• Decrease foam hardness • Review Kodak DigiCap NX pattern selection
How to minimize dot gain in highlight areas?		• High impact: reduce anilox volume • Smaller impact: decrease foam hardness
How to achieve best ink laydown on solid motifs?		• Increase foam hardness • Reduce ink volume in combination with reviewing Kodak DigiCap NX pattern selection

Further Results

After reviewing the best case combinations of process components, we will on the following pages share all details of our print trial: the outcome of every possible combination of process components.

This might help you when encountering a less than ideal print result and you want to get an idea of how to improve the outcome

IMPACT OF SINGLE COMPONENTS ON PRINT QUALITY

For **tesa® Softprint:**
Changes in print quality when deviating from best choice

Best Choice

Impact of Foam Hardness

Plate design	Recommendation Kodak DigiCap NX / Anilox setting	Assesment criteria	X-Soft	Soft	Medium	Medium-Hard	Hard	X-Hard
Fine screen	Kodak DigiCap NX: not applicable D: 400 L/cm 3.8 cm^3/m^2	Dot gain (1%)						
Combination	Kodak DigiCap NX: Adv_01 400 L/cm 3.8 cm^3/m^2	Dot gain (50%) Ink lay down TEV						
Solid	Kodak DigiCap NX: Adv_01 E: 340 L/cm 5.5 cm^3/m^2	Ink lay down TEV						

Impact on print image when increasing foam hardness levels
- Less details and higher dot gain
- Density increase to high
- Improved TEV effects

Impact of Kodak DigiCap NX

Plate design	Recommendation Foam hardness/ Anilox setting	Assesment criteria	STD	Adv_01	Adv_02	Adv_03
Fine screen	Tape: Soft Anilox: 400 L/cm 3.8 cm^3/m^2	Dot gain (1%)	Highlight areas are not affected by DigiCap NX patterns			
Combination	Tape: Medium Anilox: 400 L/cm 3.8 cm^3/m^2	Dot Gain (50%) Ink lay down TEV				
Solid	Tape: Medium-Hard Anilox: 340 L/cm 5.5 cm^3/m^2	Ink lay down TEV				

For combination motifs:
STD: TEV more visible, bad Ink lay down, higher dot gain ▶ no alternative
Adv_02: Worse ink lay down and comparable dot gain to Adv_01 ▶ no alternative
Adv_03: Worse ink lay down ▶ no alternative

For solid motifs:
STD: TEV more visible and bad ink lay down ▶ no alternative
Adv_02: No TEV, density decrease and comparable ink lay down ▶ no alternative
Adv_03: Kodak DigiCap NX pattern visible ▶ no alternative

Impact of Anilox

Plate design	Recommendation Kodak DigiCap NX / Foam Hardness	Assesment criteria	Setting D 400 L/cm 3.8 cm^3/m^2	Setting E 340 L/cm 5.5 cm^3/m^2	Setting A 280 L/cm 7.7 cm^3/m^2	Setting B* 200 L/cm 10 cm^3/m^2	Setting C* 160 L/cm 11.6 cm^3/m^2
Fine screen	Kodak DigiCap NX: not applicable Tape: Soft	Dot gain (1%)					
Combination	Kodak DigiCap NX: Adv_01 Tape: Medium	Dot gain (50%) Ink lay down TEV					
Solid	Kodak DigiCap NX: Adv_01 Tape: Medium-Hard	Ink lay down TEV					

Impact on print image when increasing anilox volume
- Less details and higher dot gain
- Drying and bridging issues
- Uneven ink laydown
- Density increase too high
- More visible TEV effects

* Anilox Setting B and C suitable for white inks printing

For **tesa® Twinlock:**
Changes in print quality when deviating from best choice

Best Choice

Impact of Foam Hardness

Plate design	Recommendation Kodak Digicap NX / Anilox setting	Assesment criteria	Soft	Medium	Hard
Fine screen	Kodak DigiCap NX: not applicable D: 400 L/cm 3.8 cm^3/m^2	Dot gain (1%)			
Combination	Kodak DigiCap NX: p: A Adv_01 400 L/cm 3.8 cm^3/m^2	Dot Gain (50%) Ink lay down TEV			
Solid	Kodak DigiCap NX: Adv_02 E: 340 L/cm 5.5 cm^3/m^2	Ink lay down TEV			

Impact on print image when increasing foam hardness level
- Less details
- Higher dot gain
- Improved TEV effects

Impact of Kodak DigiCap NX

Plate design	Recommendation Foam Hardness/ Anilox setting	Assesment criteria	STD	Adv_01	Adv_02	Adv_03
Fine screen	Foam: Soft D: 400 L/cm 3.8 cm^3/m^2	Dot gain (1%)	Highlight area are not affected by DigiCap NX patterns			
Combination	Foam: Medium D: 400 L/cm 3.8 cm^3/m^2	Dot Gain (50%) Ink lay down TEV				
Solid	Foam: Hard D: 340 L/cm 5.5 cm^3/m^2	Ink lay down TEV				

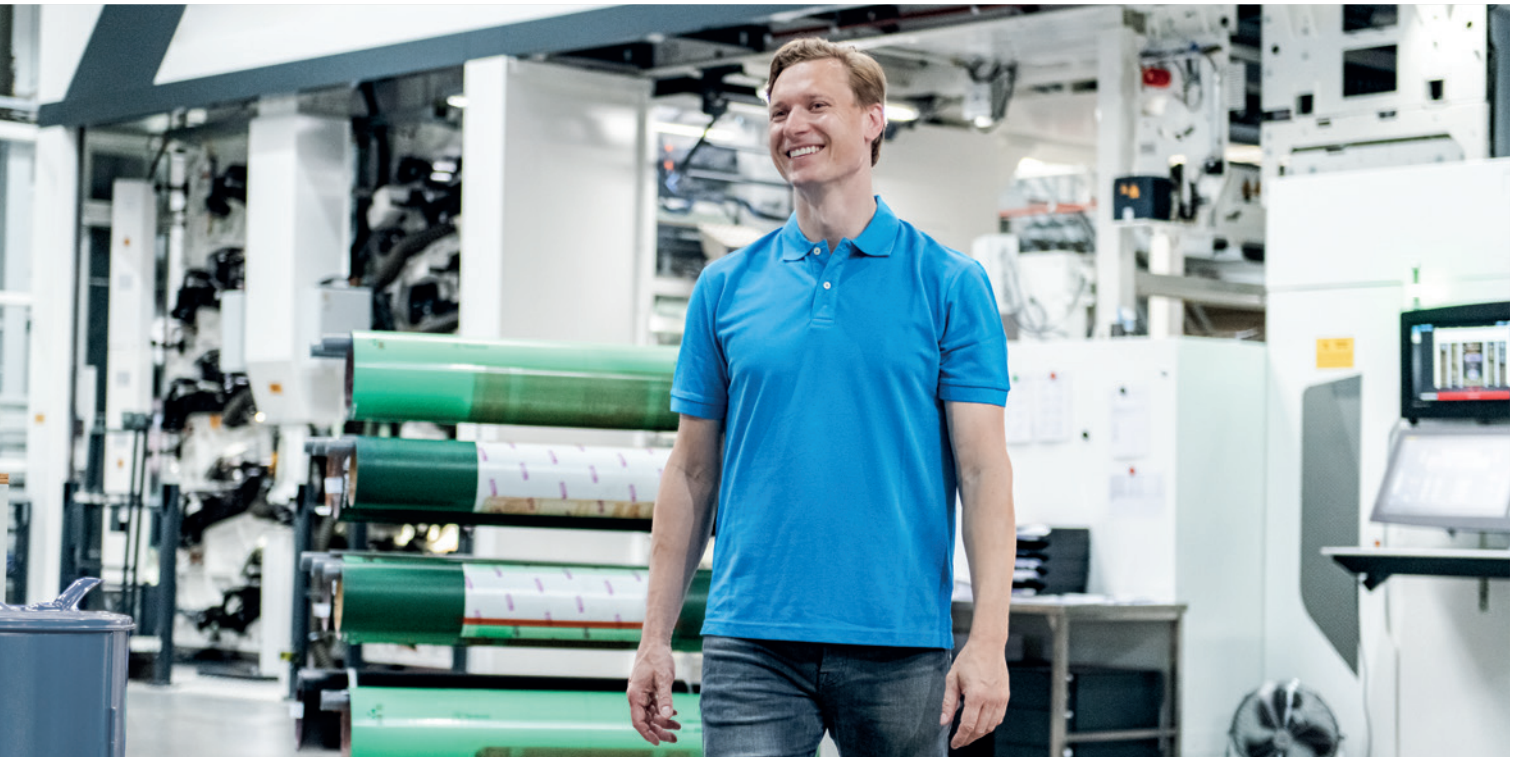
For combination motifs:
STD: No TEV, less uniform ink lay down, slightly higher dot gain ▶ no alternative
Adv_02: Worse ink laydown Comparable dot gain ▶ no alternative
Adv_03: Even worse ink laydown (Kodak DigiCap NX pattern visible) Higher dot gain ▶ no alternative

For solid motifs:
STD: TEV visible and bad ink lay down, comparable density ▶ no alternative
Adv_01: Comparable density and ink lay down ▶ option for specific jobs
Adv_03: very low density, even worst ink laydown (Kodak DigiCap NX patterns visible) ▶ no alternative

Impact of Anilox

Plate design	Recommendation Kodak DigiCap NX / Foam hardness	Assesment criteria	Setting D 400 L/cm 3.8 cm^3/m^2	Setting E 340 L/cm 5.5 cm^3/m^2	Setting A 280 L/cm 7.7 cm^3/m^2	Setting B 200 L/cm 10 cm^3/m^2	Setting C 160 L/cm 11.6 cm^3/m^2
Fine screen	Kodak DigiCap NX: not applicable Tape: Soft	Dot gain (1%)					
Combination	Kodak DigiCap NX: Adv_01 Tape: Medium	Dot Gain (50%) Ink lay down TEV					
Solid	Kodak DigiCap NX: Adv_01 Tape: Medium Hard	Ink lay down TEV					

Impact on print image when increasing anilox volume
- Less details and higher dot gain
- Drying and bridging issues
- Uneven ink laydown
- Density increase too high
- More visible TEV effects



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Our management system is certified according to the standards ISO 9001, ISO/TS 16949 and ISO 14001.

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