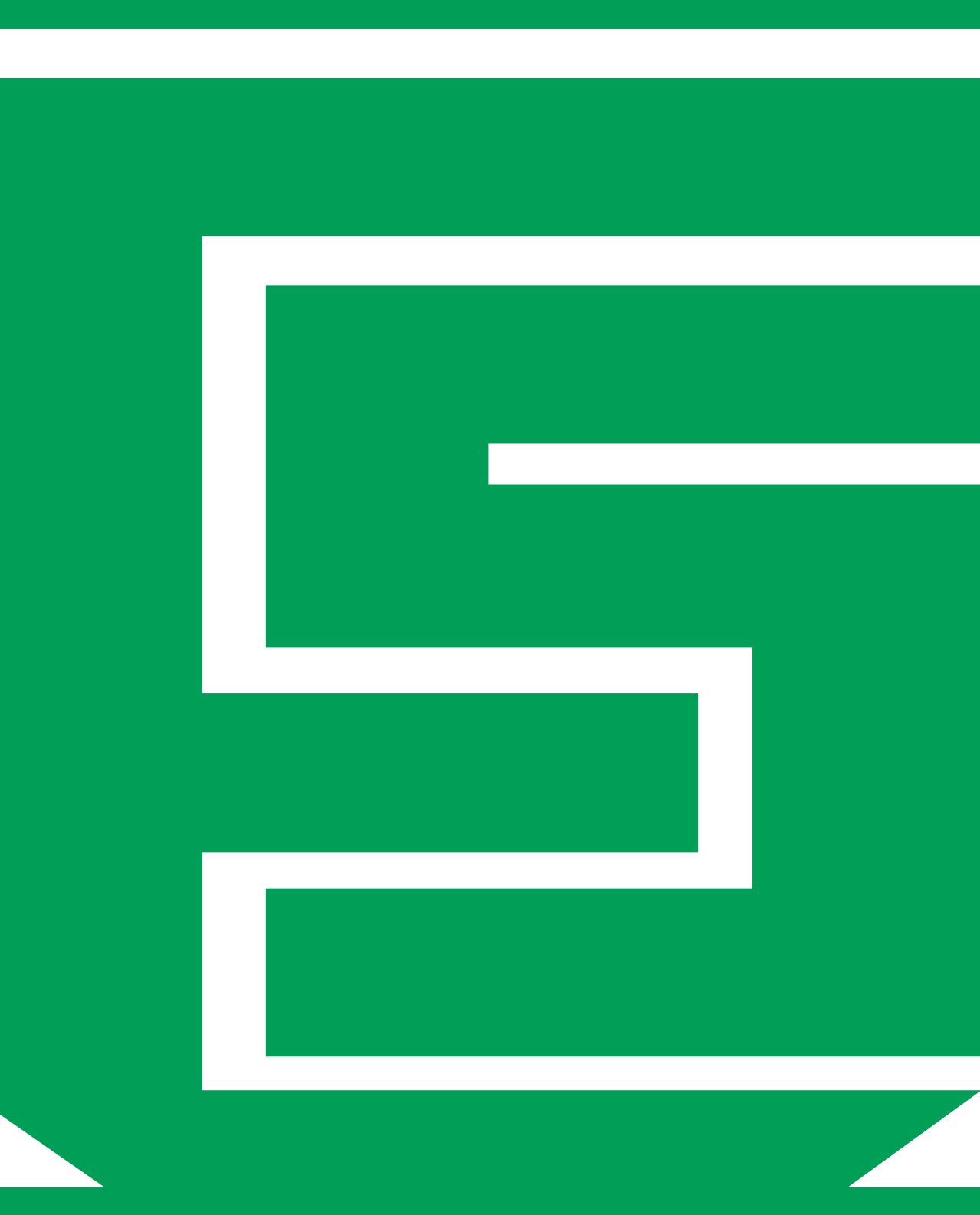




EUROSAC Troubleshooting Guide **Printing Issues**

First edition - April 2008

INTRODUCTION

In 2006, Eurosac ran an inquiry among its members on "Printing Problems".

The survey showed the strong need not only to help the sack manufacturers to find solutions for their printing problems, but also to give them the tools to clearly identify and name the printing defects. On this basis it was decided to elaborate a troubleshooting guide on the most frequently encountered problems which could be easily used in all the sack plants.

We would like to thank all the Eurosac members who have contributed to this guide, and especially the working group members for their valuable input:

Markus Bauschulte, Windmüller & Hölscher

Chris Darnley, Siegwerk Printing Inks

Irene Lindman, Billerud

Lorenzo Livieri, Sacchettificio Corazza

Patrick Muller, Fiorini Industrial Packaging

Erik Segers, Sun Chemical

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In this guide of visual printing defects we tried to be as precise and exhaustive as possible, but there can of course be other causes to printing defects than the ones described here, and opinions can differ.

So we would be grateful to receive your comments and feedback on this guide.

The Eurosac Secretariat.



WINDMÜLLER & HÖLSCHER



SIEGWERK



BILLERUD



FIORINI
INDUSTRIAL PACKAGING

SunChemical®



UPM

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1 DIRTY PRINTING

Description of the Problem:

Excessive ink on relief contours of the plate and transfer to the substrate.
Check also number 7: Bridging

Possible Origin of the Problem	Possible Solution
Machine / Anilox: Volume of ink is too high	- Check wiping of the anilox or replace it by an anilox with a smaller cell volume - Check and/or replace doctor blade
Plate: Plate is dirty, damaged, or worn	Wash or change the plate
Ink: - Ink viscosity is too high - Ink drying too fast (on plate surface)	- Check and adjust viscosity - Retard the ink
Paper: Dust from paper might be one source for "hickies" (central spot surrounded by a white halo) or unprinted spots	Use a paper which does not dust, or clean the plate regularly or install web cleaning equipment
Operator: Too much pressure between the plate cylinder and the impression cylinder	Adjust optimal pressure values



EXAMPLES FOR DIRTY PRINTING



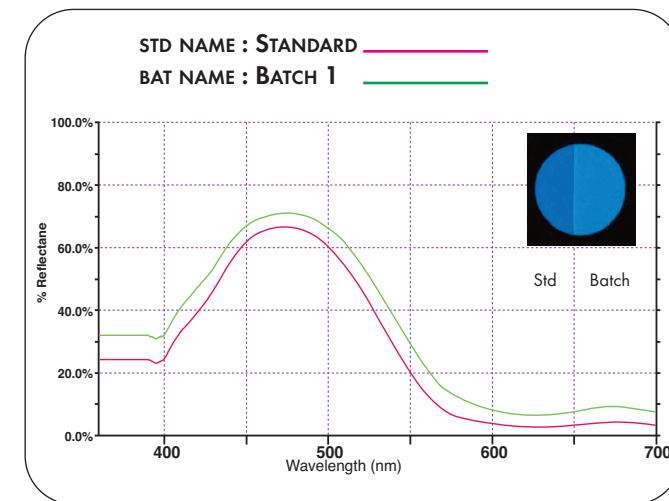
2 COLOUR STRENGTH & SHADE DEFECTS

Description of the Problem:

Colour strength: The optical density values are not correct – too light or too dark.

Colour shade: The L.a.b. - values are incorrect – e.g. too blue or too red, etc.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: The volume of the anilox is not correct	- Change the anilox if worn or incorrect volume - Clean the anilox roller if dirty
Plate / Tape: - Surface tension or hardness of plate incorrect - Hardness of backing tape incorrect - Process printing; adjust dot gain curves according to fingerprint of the press	- Check plate type selected - Check tape hardness - Check plate age and compare to specification - Prepare new plates
Ink: - Ink viscosity incorrect - Strength or optical density is too high - Strength or optical density is too low	- Adjust ink viscosities - Adjust the optical density by adding extender in the ink - Adjust the optical density by adding fresh ink
Paper: - Colour shade of the paper varies (especially brown grades) - Sizing of paper improper or varying too much - Paper surface tension, e.g. greaseproof paper's lowered surface tension - Opacity of the paper is low and brown paper used inside the sack	- Use paper from one source for a special printing job - Change paper - Adjust the ink to get the right colour strength - Change paper - opacity increases with grammage, or with increased filler content in paper (the latter will affect strength properties negatively)
Operator: In two-roll system: rubber roll is not parallel to the anilox	Adjust the parallelism between anilox / rubber roll



COLOUR STRENGTH

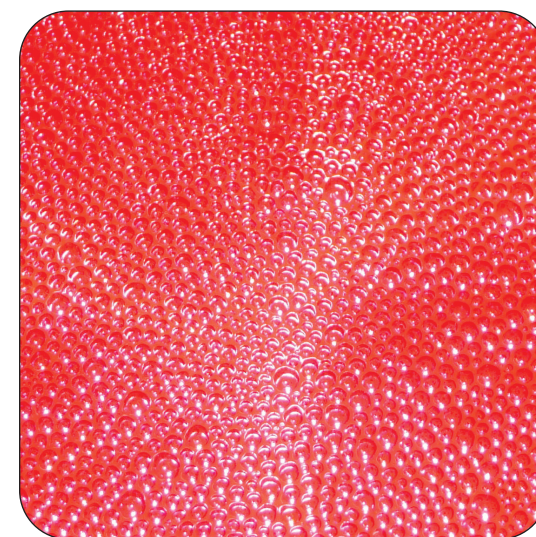
3 FOAMING

Description of the Problem:

Formation of bubbles in liquid inks in the inking system, resulting in overflow of the ink from tray or ink tub or air entrapment in the doctor blade chamber. Foaming can cause inaccurate viscosity measurements and print defects.

Check also number 6: Pinholing and 9: Missing print

Possible Origin of the Problem	Possible Solution
Machine: - Poor sealing of chambered doctor blade assembly - Poor sealing of pipe work and pumps - Excessive agitation of ink causing splashing and aeration	- Check parallelism of the doctor blade. Replace blade frequently, adjust pumping for ink flow - Check for leaking pump seals or hoses on suction side - Reduce pump or mixer speed to minimum required, keeping return lines submerged
Ink: - Viscosity too high or too low - Water is too soft	Change viscosity with water or fresh ink and / or use antifoam with care
Paper: Foaming itself is not paper related, but sometimes when foaming exists in printing, one could make the wrong assumption that paper is dusting!	
Operator: Ink prepared with too much agitation	



FORMATION OF BUBBLES IN LIQUID INK

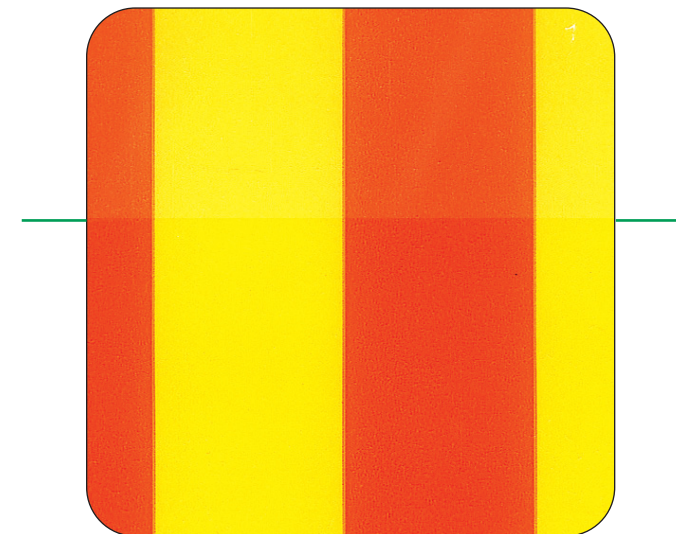
4 GLOSS

Description of the Problem:

Printed result too glossy or too matt compared to specification.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: The volume of the anilox is not consistent across the web	- Change the anilox if worn or incorrect volume - Clean the anilox roller if dirty
Ink: - Wrong ink selected - No varnish or wrong varnish selected	- Change the ink and/or varnish - Use correct primer and/or overprint varnish
Paper: Choice of paper	- Use correct paper to the specification: coated, uncoated and gloss level - Gloss of paper affects the gloss of the final printed product
Operator: Wrong transfer volumes	Adapt aniloxes and viscosity

WITHOUT GLOSS



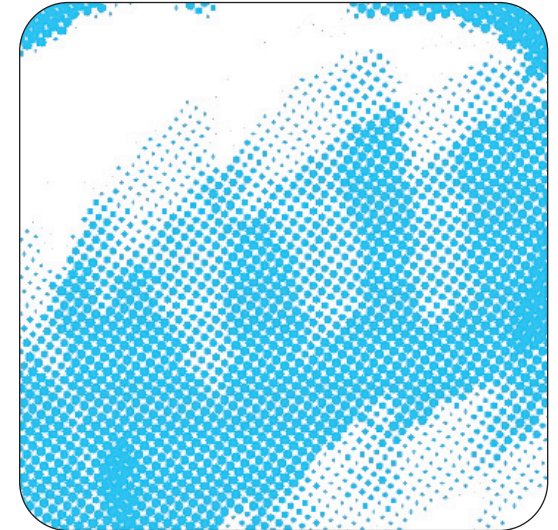
WITH GLOSS

5 DOT GAIN

Description of the Problem:

Dots are larger than specified. Enlargement of the dot may result in filling in.
Check also number 14: Dot deformation, 12: Bouncing and 8: Halo

Possible Origin of the Problem	Possible Solution
Machine / Anilox: - Inconsistent dot gain in the machine direction - Inconsistent dot gain across the machine direction - Anilox roller volume too high - Anilox roller screening too low	- TIR (total incremental run-out) of plate carrier (cylinder-sleeve) out of specification. Check and correct. - Check cylindricity and correct if necessary - Check wiping of the anilox or replace it by an anilox with a smaller cell volume - Check screen ratio plate / anilox
Tape: Hardness of the tape too high	Check and correct to a softer tape if necessary
Plate: - Hardness of plate too low - Incorrect plate thickness - tolerance / relief depth too high - Swollen plate	- Check and correct to a harder plate if necessary - Check and correct plate if necessary - Change plate and check compatibility ink - plate
Ink: - Ink at incorrect drying and/or resolubility - Ink viscosity incorrect	- Use process inks specifically developed for half-tone printing - Adjust ink viscosity
Paper: Paper roughness / absorbency (Paper roughness demands more ink volume which may cause dot gain)	Change to a smoother/less absorbent paper surface or decrease screen-ruling of the plate
Operator: - High printing pressure - Air bubbles trapped between the tape and the plate or the plate and the cylinder	- Check dot gain curve according to press fingerprint - Adjust impression settings to a minimum - Remount the plate



CORRECT PRINT



INCORRECT (ENLARGED) DOT SIZE

6 PINHOLING

Description of the Problem:

Random formation of clear spots in solid printing which may vary in size.
May also be related to trapping (10).
Check also number 1: Dirty printing due to paper dust (known as "hickies")

Possible Origin of the Problem	Possible Solution
Machine / Anilox: Incorrect anilox selection	Optimise screen count and volume of anilox roller according to substrate and design
Plate / Tape: Incorrect plate/tape specification (shore hardness)	Use harder tape and softer plate (may adversely affect dot gain)
Ink: - The ink contains too much additive (wax or antifoam agent) - Ink drying is too fast or the paper has poor wettability	- Use fresh ink and follow recommendations from ink supplier - Speed up press or retard the ink
Operator: Contaminated ink	Check ink for contamination with washing solution or by silicone grease or lubricants



CORRECT PRINT



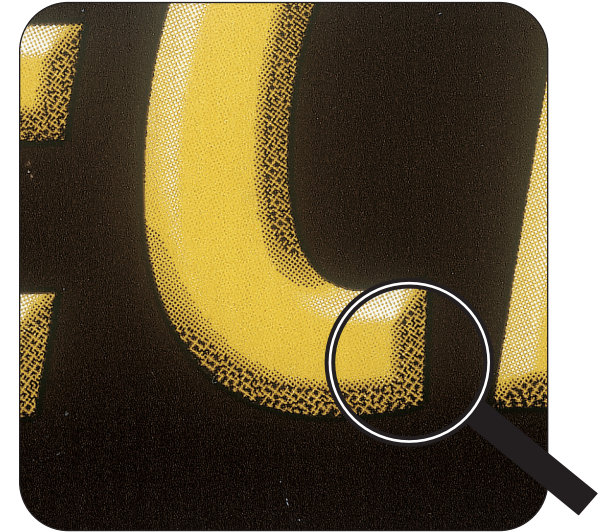
PRINT WITH PINHOLES

7 BRIDGING

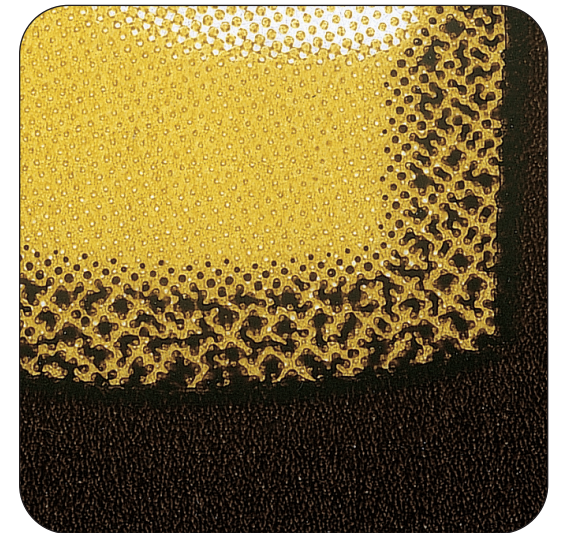
Description of the Problem:

Bridges are created between dots.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: • Ink volume is too high • Screen count too low	• Correct if necessary • Check screen ratio plate / anilox
Plate: • Defective plate • Screen count too high	• Check the plate and change if necessary • Check screen ratio plate / anilox
Ink: • The ink viscosity is too high • Ink not designed for screen printing	• Adjust the ink viscosity • Change the ink
Paper: • Roughness of paper • Paper dust in plate	• Don't use too much ink volume to compensate roughness which may cause bridging • Clean plate or use web cleaner
Operator: • Excessive impressions • Dirty printing plate	• Use separate plates and anilox for screen and solid areas. Reduce plate to paper and/or anilox to plate impression • Clean the plate



EXAMPLE FOR BRIDGING



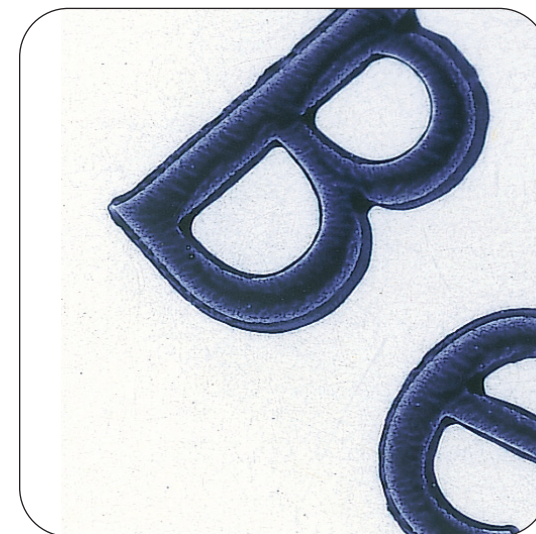
Description of the Problem:

The printing is circled with a undesired line.

Possible Origin of the Problem	Possible Solution
Machine: - Inconsistent impression in the machine direction - Inconsistent impression across the machine direction	- TIR (total incremental run-out) of plate carrier cylinder – sleeve out of specification. Check and correct - Check cylindricity and correct if necessary
Plate / Tape: - Hardness of plate is too high - Backing tape too thin or too hard - Poor plates or cupped edges of plates	- Check and correct to softer plate if necessary - Remount plate using suitable tape - Replace plates
Operator: - Too much ink - Air trapped beneath plate - The pressure between the plate and the paper is too high	- Use anilox roller with lower volume - Remount plate - Reduce the pressure



EXAMPLE FOR HALO



9 MISSING PRINT / SKIP OUT / BACKING OUT / INK STARVATION

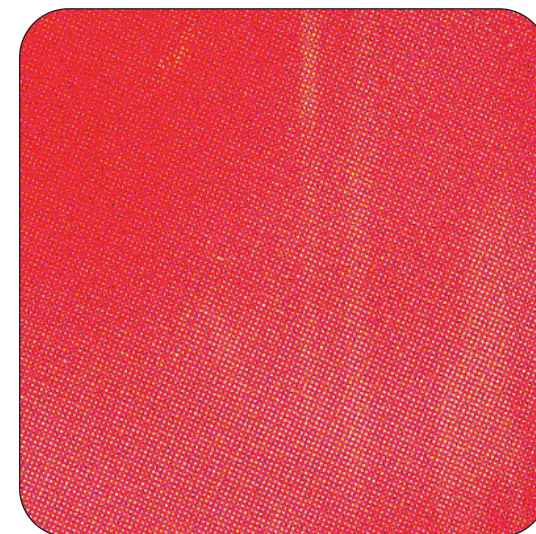
Description of the Problem:

Poor or no ink transfer onto a substrate in parts of the image.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: • Loss of impression at a faster speed • Entrapped air in doctor blade chamber	• Re-adjust impression setting to press speed • Check for leaking pump seals or hoses on suction side and increase ink flow to chamber
Plate / Tape: • Low spot on the plate, tape and/or sleeve cylinder	• Change plate, tape or sleeve
Ink: • The ink is drying too fast	• Change drying speed or type of ink
Operator: • Incorrect impression • The plate is dirty, damaged or worn • Dried ink on areas of the anilox roller • Deck not locked properly	• Use correct impression settings • Wash or change the plate • Clean anilox • Check the deck locking



EXAMPLES FOR INK STARVATION



10 TRAPPING

Description of the Problem:

In areas with a high ink coverage, the colour superimposition is not correct.
OR Incorrect superimposition of a dark colour over a light colour.
Related to solid printed areas.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: Insufficient drying of previously printed colour	- Reduce ink layer thickness, increase drying temperature and air velocity. Use additional drying capacity of empty printing decks between the problem colours - Review repro
Plate: Ink coverage in superimposition is too high	Consider using screened plates
Ink: - Insufficient drying of ink first down - Low viscosity of second ink - Overprintability problem of the first ink down	- Accelerate drying, decrease ink thickness and/or viscosity - Increase viscosity of second ink down - Change colour sequence or change first ink down
Paper: Ink not drying	If grease proof paper check surface tension
Operator: - Colour sequence - Ink viscosities incorrect	- Change the colour sequence if possible for colour transparency - Correct if necessary



EXAMPLE FOR TRAPPING

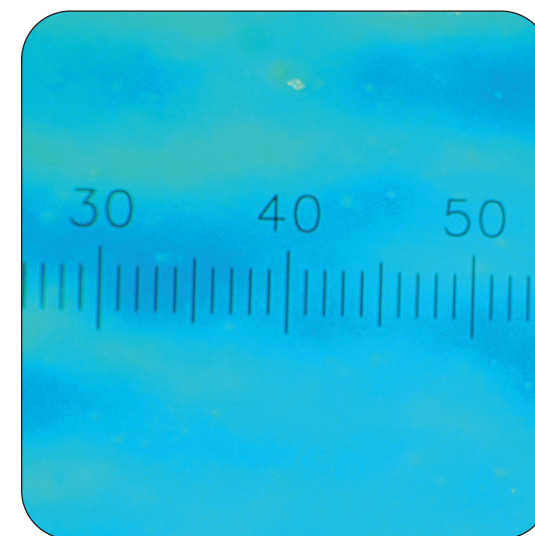


11 LAY/ MOTTLING

Description of the Problem:

Uneven print and/or irregular colour density.

Possible Origin of the Problem	Possible Solution
Plate: • Damaged plate • Plate hardness • Surface tension on the plate	• Wash the plate, change the plate
Ink: • Overdiluted ink, refusal of the ink on the substrate	• Use the correct (higher) viscosity and check the wettability of the ink on the substrate
Paper: • Surface tension (grease proof paper)	• Ink has to be optimised if grease proof paper has to be used
Operator: • Printing speed	• Adjust printing speed



EXAMPLE FOR MOTTLING

12 BOUNCING

Description of the Problem:

Horizontal lines appear on the print along the whole web, sometimes on one edge.

Possible Origin of the Problem	Possible Solution
Machine The printing machine is "hammering" on the substrate	- Change the speed of the machine (vibrations might occur only at certain speeds) - Check and correct if necessary TIR (total incremental run-out) of plate carrier (cylinder – sleeve) and anilox roller
Plate / Tape: Design of printing plate, derives from the printing machine	- Make modification in construction of printing plate (when possible use a second colour to help the background colour) - Run a softer tape / plate material
Operator: - Too high pressure between anilox roll and plate may cause vibrations in the gear drives - A bad joint of the plate may cause defects on the print	- Check /adjust impression pressure between anilox roll and plate - Check joint of the plate - Add supporting strips
Others: Print design	- Rediscuss designs for follow-up orders - Stagger plates if possible



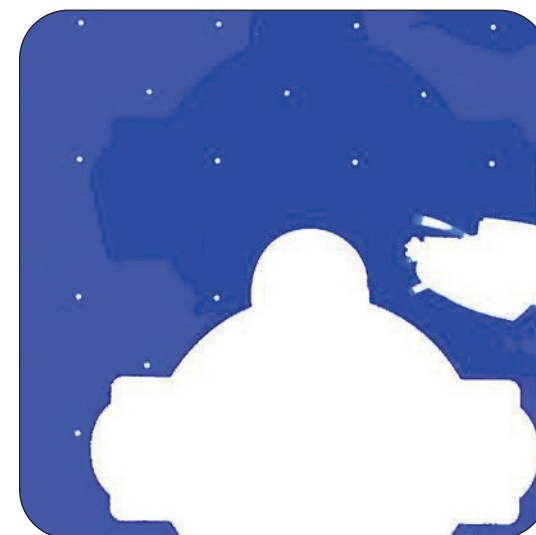
EXAMPLE FOR BOUNCING

13 GHOSTING

Description of the Problem:

Faint image of parts of the print which appears repeatedly where it is not intended on the design.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: - Insufficient drying between the colours - The cells of the anilox roller are not correctly filled by the inking system - Anilox roller is dirty. Areas blocked by dry ink will produce clear spots. Clean areas due to the repetition of a previous printing will cause dark spots	- Check the efficiency of the drying system; increase drying time of the first colour - Check the condition and the working of the inking system - Clean the anilox roller - Protect the anilox from air drafts between colour deck dryers
Plate: A damaged plate (scratches, cracks, foldings, ...) will reproduce undesirable effects	Prepare a new plate
Ink: - The ink dries too slowly or is affected by rewetting - The ink viscosity is too high	- Check with ink supplier for a more suitable ink formulation - Check and adjust ink viscosity
Operator: Printing speed	Adjust the machine speed



EXAMPLES FOR GHOSTING

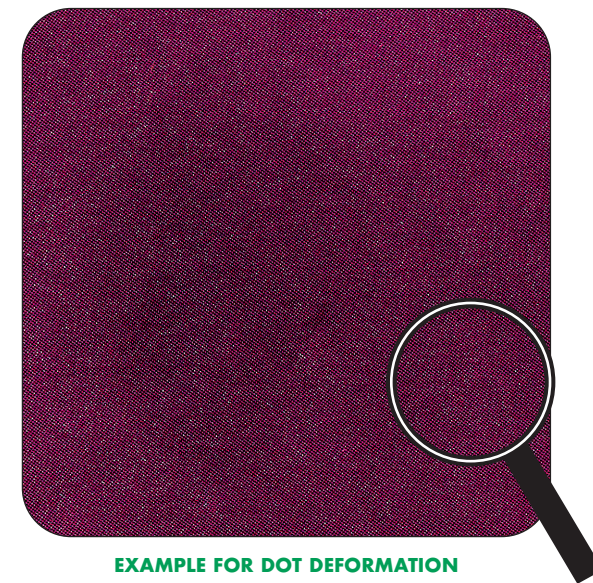


14 SLUR / DOT DEFORMATION

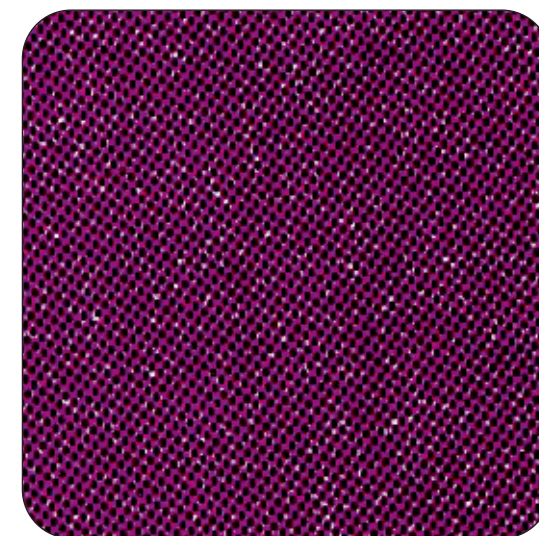
Description of the Problem:

Dots are stretched in the running direction.

Possible Origin of the Problem	Possible Solution
Machine / Anilox: • The speed of the substrate and the speed of the plate are slightly different • Poor tension control	• Check if path rollers are running freely and substrate is not dragging • Check tension control on the machine
Plate / Tape / Sleeve: • Wrong undercut used	• Ensure that the plate / tape undercut matches the sleeve / cylinder undercut
Operator: • The speed of the substrate and the speed of the plate are slightly different	• On gearless machines adjust repeat length settings on all printing decks



EXAMPLE FOR DOT DEFORMATION

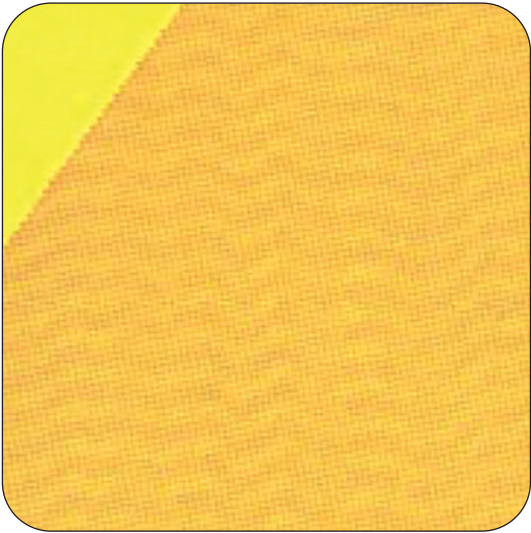


15 MOIRÉ

Description of the Problem:

Formation of a uniform pattern in the print, caused by overlapping of two or more halftone prints.

Possible Origin of the Problem	Possible Solution
Plate: • Anilox screen count too similar to plate screen count • Improper screen angles	• Change anilox • Appropriate screen angles in flexography: Yellow: 82.5°, Magenta: 67.5°, Cyan: 7.5°, Black: 37.5°



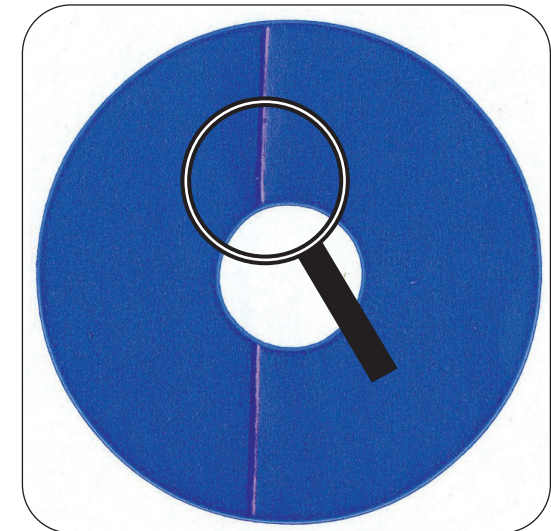
EXAMPLE FOR MOIRÉ

16 SCORING / STREAKING

Description of the Problem:

Continuous dark line in the direction of the print (scoring).
Light line that starts in the print and may extend a short distance into the non-print area (streaking).

Possible Origin of the Problem	Possible Solution
Machine / Anilox • Continuous score line caused by damaged anilox roller or damaged doctor blade • Foreign body stuck in BCD (between colour deck) dryers	• Replace the anilox • Replace the doctor blade • Check and remove
Ink: • Particles or dust in the ink	• Filter or replace ink
Paper: • Dust, hard particles on the paper	• Use web cleaner • Use another paper



EXAMPLE FOR SCORING



EXAMPLE FOR STREAKING

17 GEAR MARKS

Description of the Problem:

Regular dark lines across the printing width in relation to the gear pitch in use.
Independant of design and printing speed.
Do not confuse with number 12: Bouncing.

Possible Origin of the Problem	Possible Solution
Machine: • Damaged gears within the drive chain could be bull gear, plate cylinder gear or anilox gear • Shafts of the cylinders or anilox rollers are bent	• Check and correct • Visibility in the print could be reduced by using a softer tape



EXAMPLE FOR GEAR MARKS



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