

INK, HEART & SOUL



FLEXOGRAPHIC PRINTING GUIDE

Flexographic Printing Guide
for Flexible Packagings



SIEGWERK

Creating the perfect result together

Siegwerk is one of the world's leading printing ink manufacturers and stands for innovative strength, a practical approach and state-of-the-art technologies. With great passion, the people at Siegwerk develop individual printing ink solutions together with their customers. And what is more: they also advise them on the development of new applications and technologies and provide them with rapid and pragmatic help when they have problems.

For the employees at Siegwerk it is always the customers who are the focus of attention. They are on hand when it is important to avoid errors, optimize processes and support customers with all of their knowledge for printing and packaging production.



Who needs a flexographic printing guide?

In spite of the extensive improvements in flexographic printing technology, most printing shops do not make use of the full capabilities offered by their machines.

Studies have shown that 70% of all errors are directly associated with the processes. This guide is intended to help you to solve problems with all aspects of printing:

Fault detection

In order to avoid misunderstandings and misinterpretations, you can identify by means of the illustrated explanations which problems you are facing in your printing shop.

Cause identification and remedies

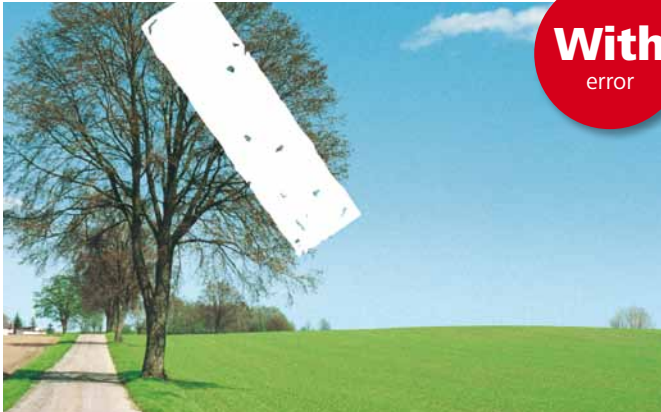
The causes and adjustments for the most important corrections are listed here in order to help you to identify your problem. For further details, please contact your Siegwirk representative.

The flexographic printing guide published by Siegwirk offers you the possibility of quickly identifying and correcting problems so that you can increase your printing productivity.



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With
error



Without
error

Tape resistance

The ink does not pass the adhesive tape test. There is insufficient adhesion of the ink to the substrate.

CAUSES

An inappropriate ink formulation or incorrect ink system was used.

The corona pretreatment level of the film is too low.

The pH value of the water inks is much too low in the case of prolonged printing times.

The adhesion between colors is insufficient.

The film surface is soiled.

The ink viscosity is too low.

Multiple color build-up

The wrong side of the film has been printed.

REMEDIES

Please ensure that the correct ink system is used.

Check the pretreatment and the age of the film.

Please use fresh ink. Ensure that the correct solvents are used.

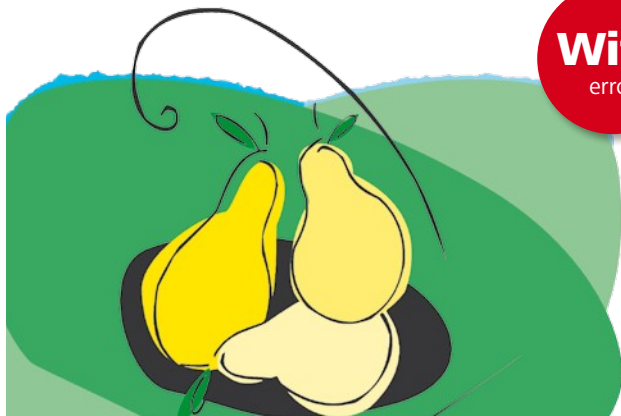
This can occur if two different ink systems are printed one over the other. Ensure that the ink build-up is appropriate.

Apply an appropriate primer before you begin printing or change to a more suitable film batch.

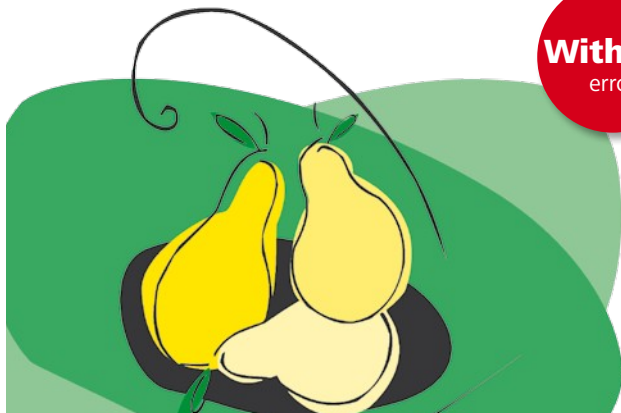
Increase the viscosity with fresh ink.

Please ensure that the ink that is first applied displays good initial adhesion and is not dissolved by the following ink.

Check the side of the film.



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Bleeding – smudging

The terms bleeding or smudging are used in situations when colored constituents of the printing ink become visible in parts of the motif which have not been printed.

(The previous ink must be dry enough to be able to absorb the ink that is to be applied subsequently).

CAUSES

The relative humidity is too high.
Condensation of water into the solvent-based ink.

Too much retarder has been used.

The ink viscosity is too high.

The transferred volume is too high.

The printing speed is too high.

Unsuitable colorants have been used in the printing ink.

There are too many ink layers on top of one another.

REMEDIES

Use fresh ink. Adjust the solvent mixture. Increase the performance of the dryer and check the water content of the solvent.

Replace the ink with fresh ink. Use a faster solvent for the purposes of reduction (accelerated drying).

Add solvent to reduce the viscosity.

Replace the anilox roller.

Reduce the printing speed. Increase the drying speed of the ink.

Create a new recipe to replace the undesirable colorants.

Reduce the layers. Design a new printed motif.



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Blocking

The ink adheres to the reverse side of the film and causes damage when the substrate is unrolled.

CAUSES

There is too much retarder in the ink.

The film temperature at the winder is too high.

The pretreatment level of the film is too low.

Ink drying is too slow.

The ink volume transferred is too high.

The ink viscosity is too high.

The cooling is not working.

Excessive winding pressure at the winder

The moisture of the wound web is too high.

Coating or pretreatment on both sides of the film.

REMEDIES

Replace the ink.

Reduce the temperature of the tunnel dryer and check whether the cooling drum is working.

Check the pretreatment and the age of the film. Use the inline corona treatment.

Increase the performance of the dryer. Use a faster drying solvent. Reduce the printing speed.

Select anilox rollers with a lower transferred volume.

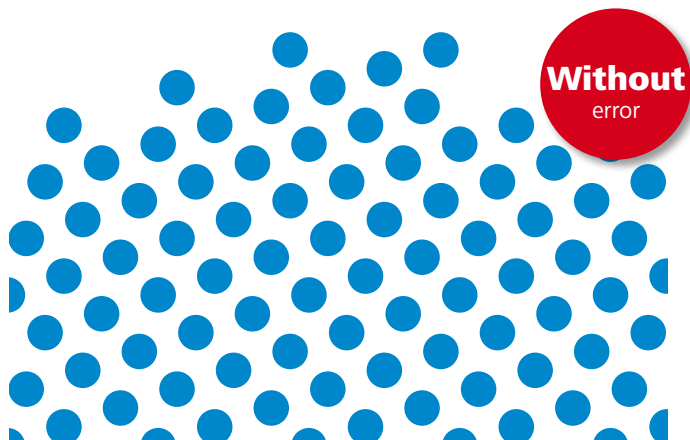
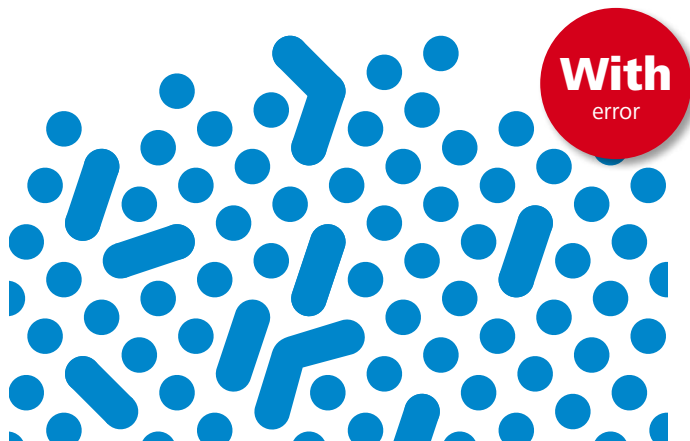
Reduce the ink viscosity by adding solvents.

Please contact the service department.

Reduce the winding pressure.

Increase the performance of the dryer between the printing mechanisms and reduce the cooling.

Check whether the correct ink system is being used.



Bridging

Ink connections between individual screen dots of the printing plate are produced. The intermediate depressions are filled with ink.

CAUSES

The relative humidity is too high.
Water is condensing into the solvent-based inks.

The ink recipe is not suitable for the printed motif.

Incorrect selection of the solvent. The ink dries too quickly.

The ink viscosity is too high.

The transferred volume is too high.

The anilox roller and width of the printing plate raster do not match.

REMEDIES

Replace with fresh ink. Adjust the solvent mixture. Increase the performance of the dryer between the printing units

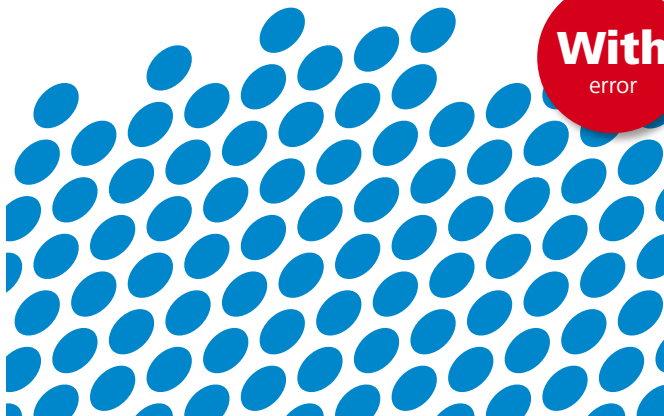
Replace the ink.

Empty the ink tank and adjust the solvent mixture.

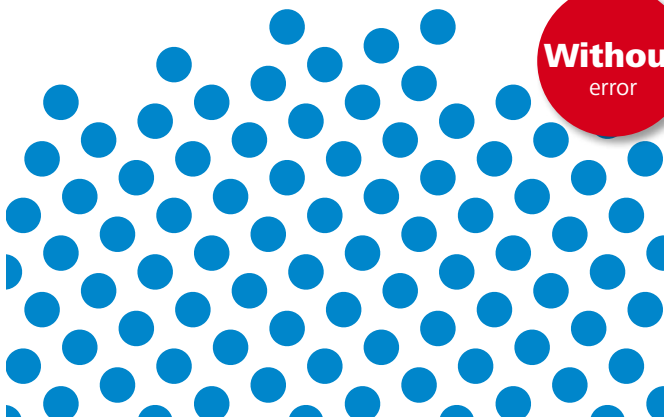
Reduce the viscosity.

For the print job, select anilox rollers with a lower transferred volume.

Use a finer anilox roller.



With
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Deformed screen dot

The shape of the screen dot in the print deviates considerably from the original shape.

CAUSES

The pressure setting between the plate cylinder and the substrate is too high.

The web tension is too low.

Excessive thickness fluctuations of the printing plate or the double-sided adhesive tape.

The relief depth of the printing plate is too high.

There is a speed difference between the plate and impression cylinder.

REMEDIES

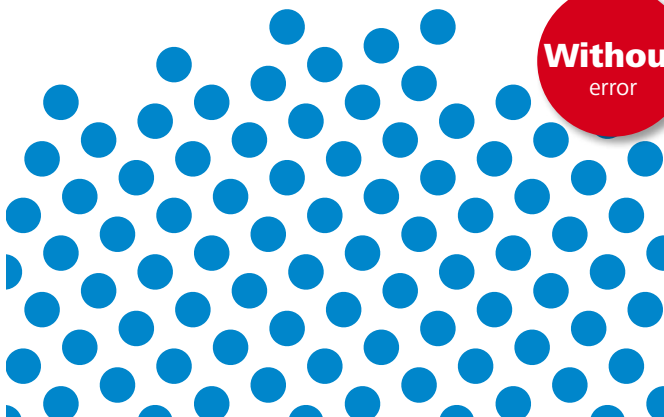
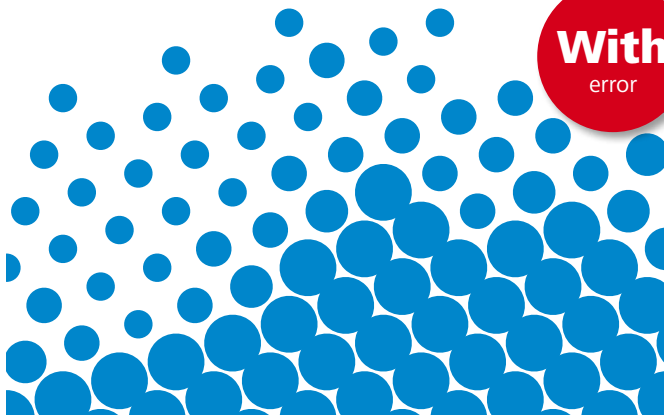
Reduce the pressure setting.

Regulate the web tension.

Change the printing plate or use a different adhesive tape.

Use a printing plate with a smaller relief depth.

Check the thickness of the double-sided adhesive tape and the printing plate.



Dot gain too high

Excessive dot gain on the substrate. This reduces the details and the contrast.

CAUSES

The thickness tolerance of the printing plate or the double-sided adhesive tape is too large.

The printing plate is too soft or the double-sided adhesive tape too hard.

The pressure setting between the plate cylinder and substrate is too high.

The thickness tolerance of the film is too high.

The dot gain has been incorrectly calculated.

The temperature of the central cylinder is too high or too low.

REMEDIES

Change the printing plate or the double-sided adhesive tape.

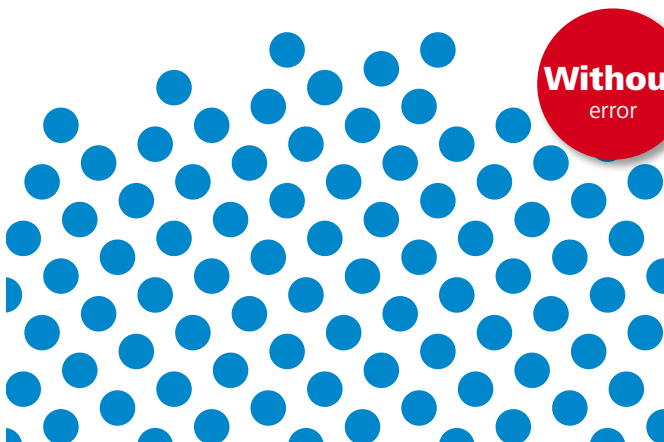
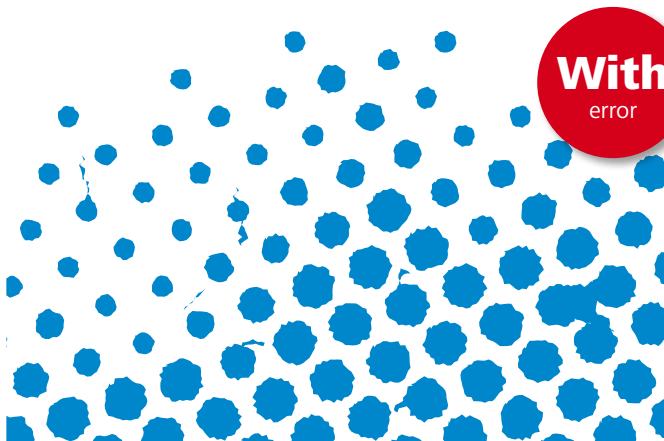
Replace the printing plate or the adhesive tape.

Reduce the pressure setting.

Reduce the pressure of the plate cylinder or replace the roller of substrate.

Adapt the curve of the dot gain accordingly.

Please contact the maintenance service department.



Inaccurate printing of the screen dots

Uneven edges around the screen dot.

CAUSES

The ink dries on the printing plate.

The pressure setting between the anilox roller and the plate cylinder is too high.

The ink viscosity is too high.

The lint particles from the cleaning cloth are on the printing plate.

The ink recipe is not suitable for the printed motif.

The pressure setting between the plate cylinder and the substrate is too high.

REMEDIES

Clean the printing plate and adjust the solvent mixture. Add the retarder. Make sure that the hot air fan is not blowing onto the printing plate.

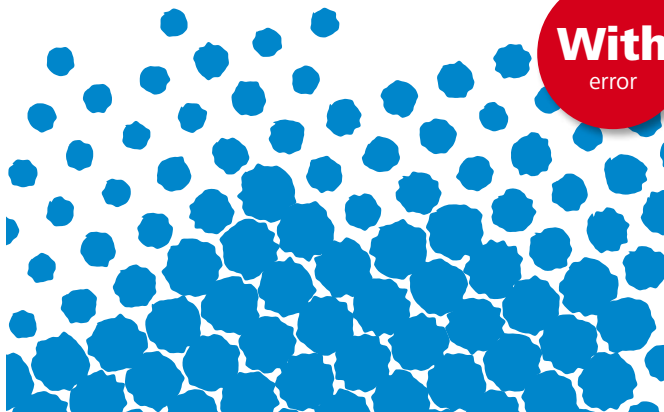
Reduce the pressure setting.

Adapt the ink viscosity by adding solvents.

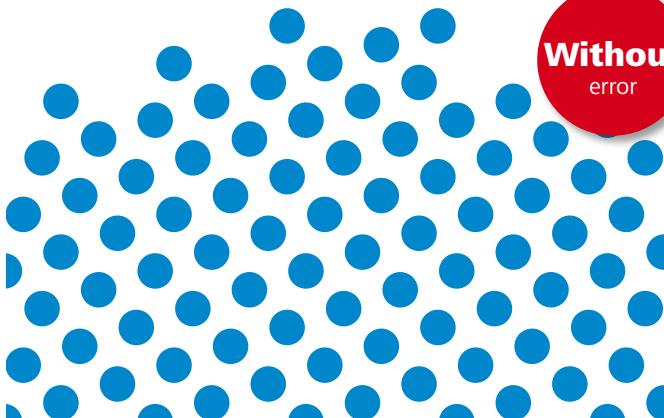
Clean the printing plate. Use a lint-free cleaning cloth or a cleaning brush.

Replace the ink.

Reduce the pressure setting.



With
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Ink build-up on motif edges

Ink build-up on the relief edge of the screen dot.

CAUSES

The transferred volume of the anilox roller is too high.

The printing speed is too low.

The ink viscosity is too high.

The wrong solvents were used.

The pressure setting between the plate cylinder and substrate is too high.

The ink recipe is unsuitable.

The printing plate is worn, the relief depth is too small.

The relative humidity is too high. The water condenses into the solvent-based ink.

REMEDIES

Use an anilox roller with a smaller transferred volume.

Clean the printing plate and increase the printing speed.

Reduce the viscosity.

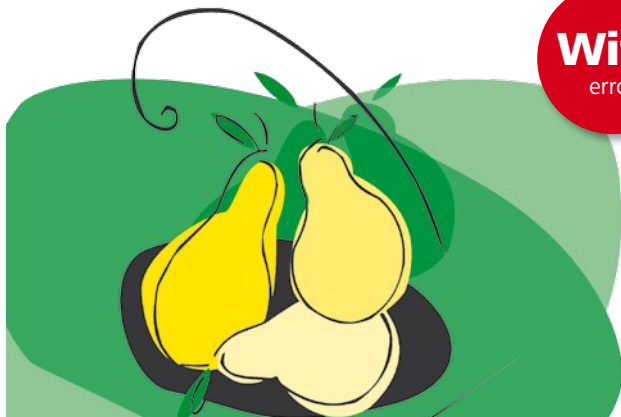
Replace the ink.

Reduce the pressure setting.

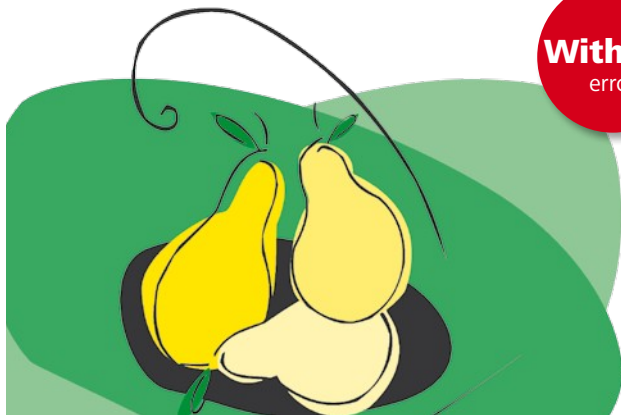
Replace the ink.

Replace the printing plate.

Adjust the solvent mixture – use retarder and anhydrous solvent.



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Without
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Ghosting effect

The ghosting effect is a weak printed image that is visible in one part of the motif where it should not be. Usually this effect occurs in the case of a solid print with negative fonts or with windows.

CAUSES

The amount of ink available is too small as the transferred volume of the anilox roller is too low.

The ink dries in the anilox roller cells

The anilox roller cells are inadequately filled.

The printing speed is too low.

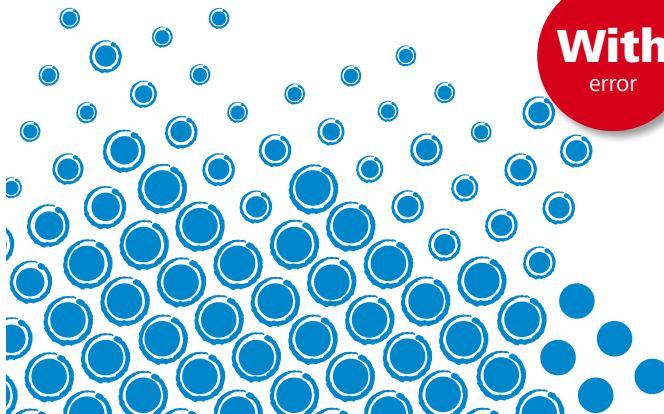
REMEDIES

Use an anilox roller with a higher transferred volume.

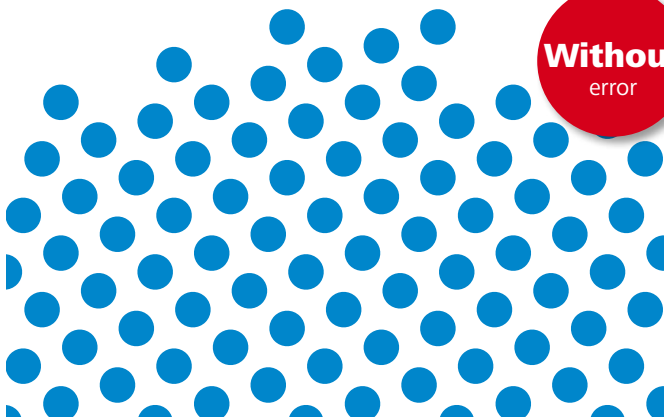
Add retarder to the ink.

Increase the pressure in the chamber doctor blade system.

Increase the printing speed or the viscosity of the ink.



With
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Without
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Halo effect/squeezed edge on the screen dot

The screen dot is surrounded by a line or a ring.

CAUSES

There is a difference in the speed between the plate and impression cylinder.

The transferred volume of the anilox roller is too high.

The pressure setting between the plate cylinder and substrate is too high.

The pressure of the chamber doctor blade system is too low.

The pressure setting between the anilox roller and the plate cylinder is too high.

REMEDIES

Check the thickness of the double-sided adhesive tape and the printing plate.

Select an anilox roller with a lower transferred volume.

Reduce the pressure setting.

Increase the pressure in the chamber doctor blade system.

Reduce the pressure setting.



With
error



Without
error

Minor printing defects

Dust particles on the substrate cause spots and defects. This is the case with solid printing, where dark spots are surrounded by a white 'halo'.

CAUSES

The feed is dirty.

The printing plate is dirty or the surroundings are too dusty.

There are foreign particles in the doctor blade chamber.

The substrate is statically charged.

The substrate is dirty.

The feed rollers are dirty.

REMEDIES

Clean the feed.

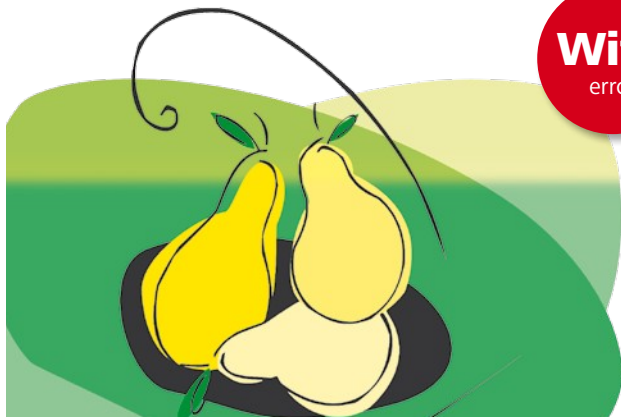
Clean the printing plate.

Clean the ink feed system.

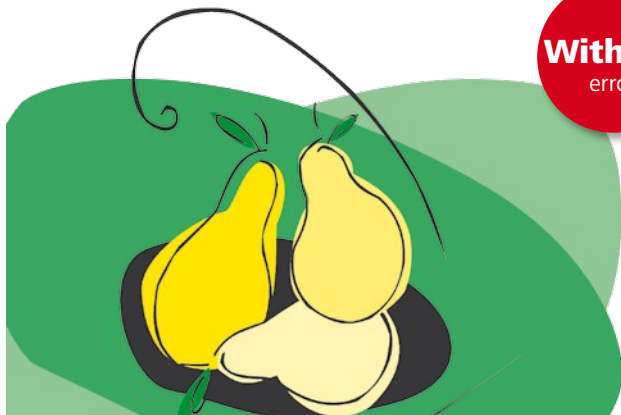
Use antistatic rollers if possible, or replace the reel of substrate.

Change the substrate.

Clean the feed rollers.



With
error



Without
error

Large-area printing defects

Lack of contact between the substrate and the printing plate or between the printing plate and anilox roller results in the poor transfer of ink.

CAUSES

The thickness fluctuations in the printing plate or double-sided adhesive tape are too large.

The printing pressure is too low.

The thickness of the substrate is out of tolerance.

The plate cylinder or the anilox roller are imbalanced.

The transferred volume of the anilox roller is too low.

The filling level of the chamber doctor blade is too low.

REMEDIES

Change the printing plate or the double-sided adhesive tape.

Increase the pressure between the plate cylinder and anilox roller or between the plate cylinder and the substrate.

Increase the delivery pressure of the plate cylinder or replace the reel of substrate.

Check the running of the printing plate cylinder (concentricity etc.).

Increase the anilox roller volume.

Increase the ink level in the chamber doctor blade. Check whether the ink pump is working correctly.



With
error



Without
error

Longitudinal stripes

Printing error owing to parallel lines in the direction of printing.

CAUSES

The doctor blade is worn.

There is dried ink on the doctor blade.

The anilox roller is damaged.

The anilox roller is blocked or the drive of the anilox roller is faulty.

The anilox roller is dirty or the ink on the anilox roller has dried.

There are particles in the ink.

REMEDIES

Replace the doctor blade.

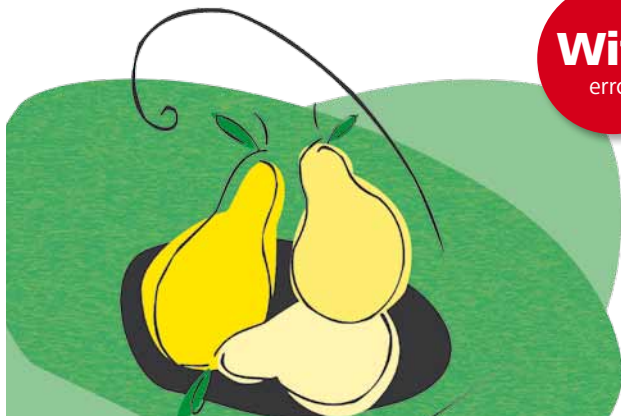
Clean the doctor blade.

Replace the anilox roller.

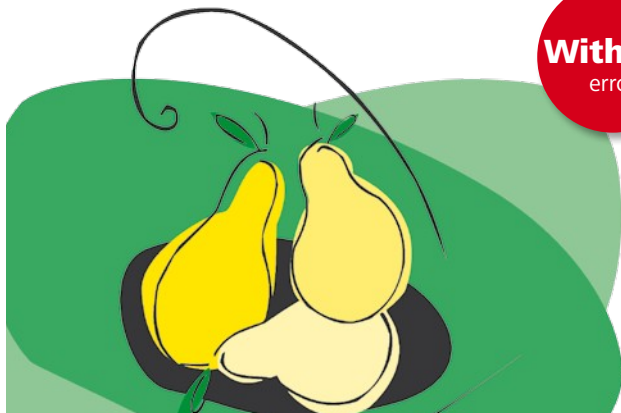
Please contact the maintenance service department.

Clean the anilox roller.

Clean the pump system, printing plates, doctor blade and anilox roller after you have filtered the particles out of the ink.



With
error



Without
error

Ink mottling

Dotted or marbling printed image of the solid printing area. Weak ink strength, grainy large-format printing.

CAUSES

The surface of the printing plate is cloudy/uneven. Damage to the surface of the printing plate can be seen.

The viscosity of the ink is too low.

There are foreign bodies or impurities on the plate cylinder or the anilox roller.

The surface of the substrate is uneven.

The film surface is soiled.

The ink viscosity is too high.

The doctor blade pressure is too high or too low.

REMEDIES

Create a new printing plate.

Add fresh ink and/or a blend of inks and ensure that the resulting viscosity is appropriate.

Clean the plate cylinder carefully.

Use softer printing plates.

Filter the ink or use fresh ink.

Add solvent to the ink.

Adapt to the doctor blade pressure accordingly.



With
error



Without
error

Mechanical damage of the printed image

Insufficient mechanical resistance of the print. Further information can be found in our brochure 'Rapid tests and test methods for production control in packaging printing'.

CAUSES

The ink recipe is not suitable or the ink is damaged.

The transferred volume of the anilox roller is too low.

An unsuitable solvent has been selected.

The corona pretreatment of the film is insufficient.

The abrasion resistance is poor.

REMEDIES

Empty the ink tank, clean the ink feed system and replace the ink.

Replace the anilox roller.

Use fresh ink with the appropriate solvent mixture.

Use inline corona pretreatment.

Add a wax additive to the ink.



Moiré effect

In the overprinting of the process colors (CYMK) the individual grid structures can interact and create a pattern. The type of interaction can create an undesirable interference pattern, the so-called moiré effect.

CAUSES

The screen angle on the printing plate is wrong.

The ratio between the line number of the anilox roller and the screen frequency of the printing plate is too low.

The ink dries on the anilox roller.

The anilox roller angle and the screen angle on the printing plates is incorrectly adjusted.

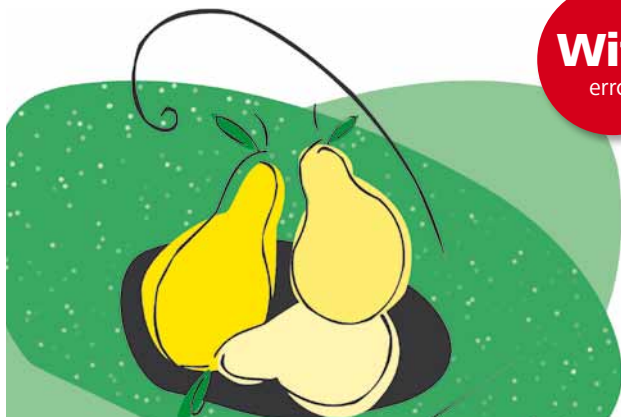
REMEDIES

Adjust the screen angle in the preliminary stage.

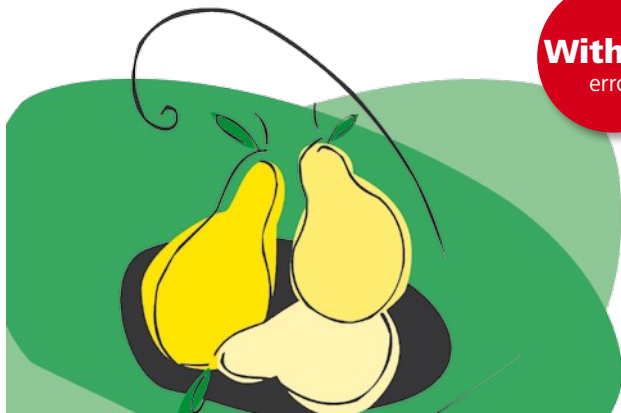
The ratio should be greater than 4; use at least a 200 anilox roller, for example, for a 48 plate raster.

Clean the anilox roller. Add retarder to the ink.

Change the anilox roller or revise the repro with more suitable screen angles.



With
error



Without
error

Pinholes

Small bright points in the solid print area.

CAUSES

The surface of the film or printing plate is uneven.

The substrate is unevenly wetted.

The ink foams.

The pH value of the water inks is too low.

The printing pressure is too low.

An inappropriate white ink has been selected.

REMEDIES

Increase the pressure setting or replace the film or the printing plate.

Use more appropriate material to be printed on or increase the ink layer thickness through a higher viscosity or by exchanging the anilox roller.

Add defoaming agent.

Carry out pH value correction.

Increase the printing pressure.

Use an appropriate white ink.



Color strength too low

The color strength is weaker in comparison to previous prints or samples.

CAUSES

The ink dries on the anilox rollers.

The color of the printing ink being used is too weak.

The ink is too thin.

The anilox roller is worn.

The ink is of incorrect quality.

The printing pressure is too high or too low between the plate cylinder and the substrate or between the anilox roller and the plate cylinder.

The ink has dried because a machine has been at a standstill for too long.

An anilox roller has been used whose transferred volume was too small.

REMEDIES

Clean the anilox roller. The printing pressure is too high or too low between the plate cylinder and the substrate or between the anilox roller and printing plate.

Contact your ink supplier or, if possible, add a concentrated ink.

Increase the viscosity with fresh ink.

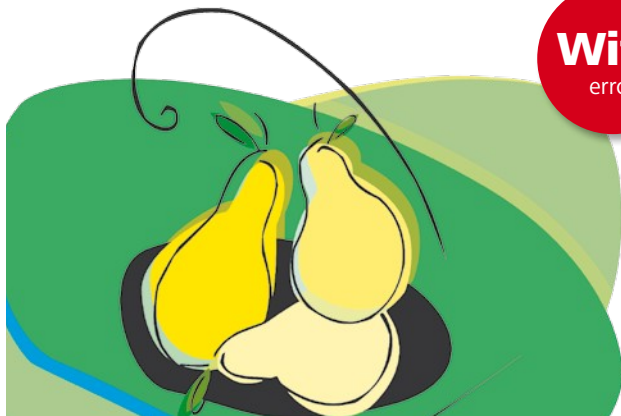
Replace the anilox roller.

Replace this with fresh ink.

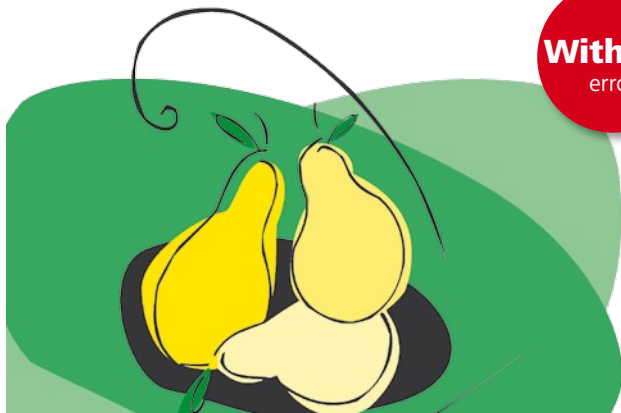
Adjust the printing pressure.

Clean the printing plate and the anilox roller.

Select an anilox roller with a higher transferred volume.



With
error



Without
error

Register

In combined printing the individual colors are not congruent with one another.

CAUSES

The printing plate has been incorrectly mounted.

The dryer temperature is too high.

The tensile stress of the printing substrate web is incorrectly adjusted.

The thickness fluctuations of the substrate are too high.

REMEDIES

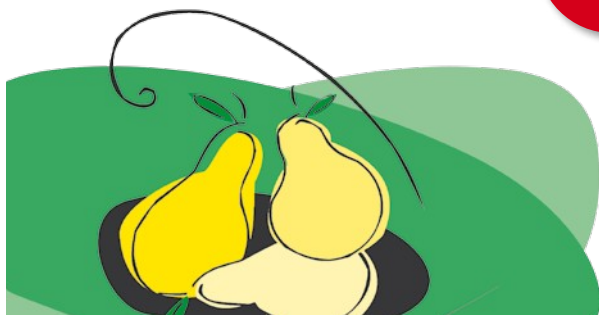
Repeat the mounting procedure for the printing plate.

Reduce the temperature of the Intermediate ink dryer.

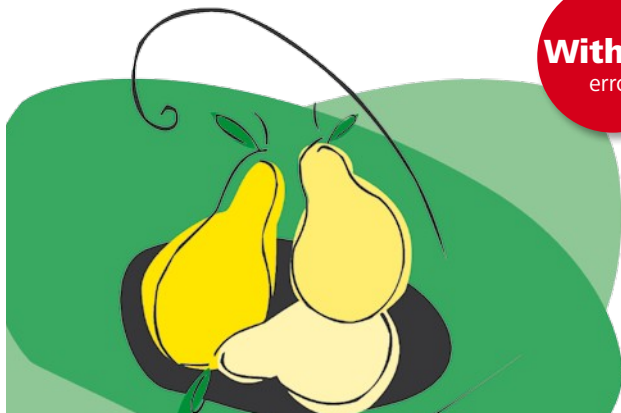
Check the web tension, as well as the feed and the winder.

Replace the reel of substrate.

With
error



Without
error



Repeat length

The printed motif in the direction of printing is too short or too long.

CAUSES

The web tension is too high or too low.

The thickness deviation of the substrate is too large.

The temperature in the tunnel dryer is too high.

REMEDIES

Adjust the web tension in accordance with the properties of the substrate.

Change the substrate.

Reduce the temperature in the tunnel dryer.



With
error



Without
error

Color strength too high

The color strength is too high in comparison to previous prints or samples.

CAUSES

The transferred volume of the anilox roller is too high.

The ink viscosity is too high.

The ink recipe for the color matching is too strong.

The settings of the doctor blade are incorrect.

REMEDIES

Use an anilox roller with a smaller transferred volume.

Add solvent and/or blended inks in order to adjust the ink viscosity.

Add a blend of inks. Optimize the ink recipe.

Adjust the pressure of the doctor blade.



With
error



Without
error

Transverse stripes

Incorrect printing owing to lines that are perpendicular to the line of printing.

CAUSES

The diameters of the printing plate cylinder and the gear used do not match.

The pressure setting between the plate cylinder and the substrate is too high.

The printing speed is too high.

The printing pressure between the anilox roller and the printing plate is incorrect.

There is a mechanical fault.

REMEDIES

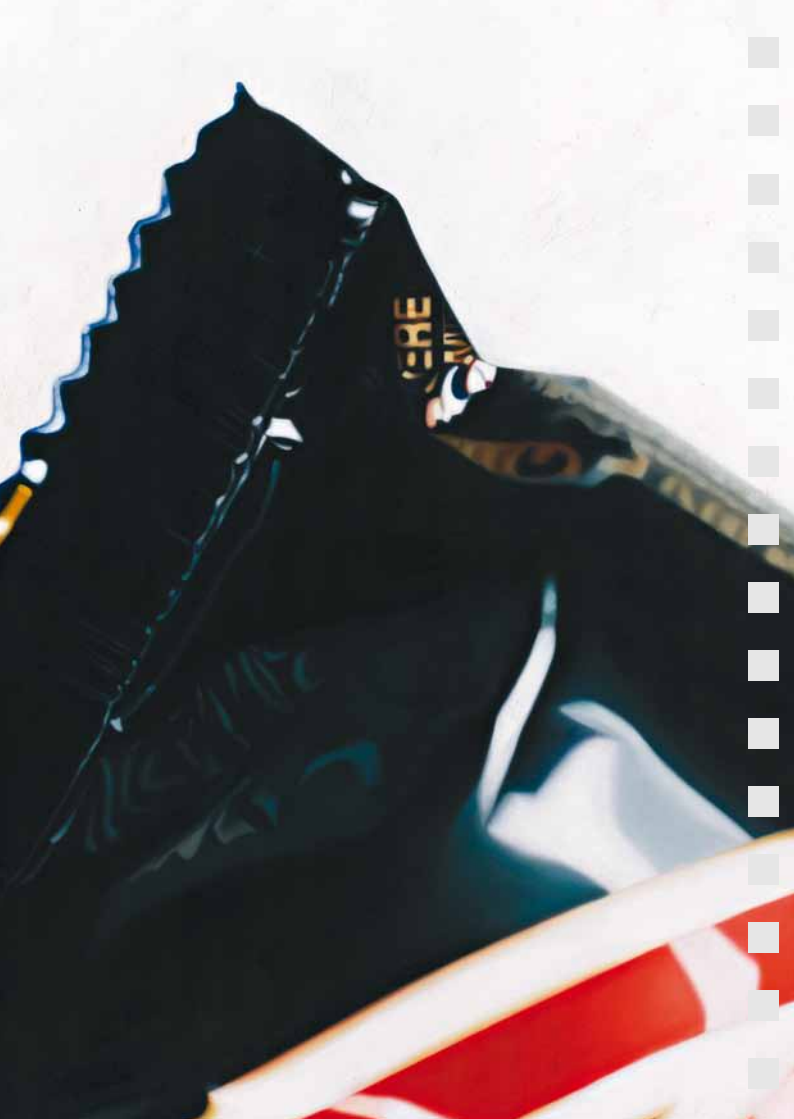
Check the amount of unwound material.

Reduce the pressure setting.

Reduce the printing speed.

Adjust the printing pressure.

Check the mechanical parts of the printing machine.



Imprint

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