



ENHANCED PROBLEM SOLVING FOR FLEXOGRAPHIC PRINTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
POOR ADHESION	improper ink formula / chemistry	check if the correct ink is used for the substrate being run
ink fails tape test	ink thinned too much, binder insufficient	restore and stabilise ink viscosity at optimum level, add fresh ink or resin binder
	insufficient drying, too low temperatures and/or air volumes in the dryers	increase drying temperatures and or air volume and/or air velocity
ink fails crinkle test		Ink requires more surface slip/release agent
	low surface treatment of the substrate	check surface of the material, apply specific varnish
ink fails scuff test	surface of substrate contaminated	check the stock with the supplier, apply wash coat before printing
	substrate requires primer treatment	apply primer prior to printing
BINDING	wrong web tensioning, substrate moves independently of plate movement	adjust web tension, clean and lubricate rollers, check web tension control system
intermittent dark lines of varying density and width, in the printing direction	gear bottoming off pitch line	see ' gear marks'
	intermittent plate slur	run bearers
	too high ink viscosity	adjust viscosity
	non compressive sticky-back	use cushioned sticky-back
	low durometer plates	use plates with the proper hardness
BLEEDING	First down color drying too slowly or second down color drying to fast	reduce viscosity and/or ink film thickness of color, use faster or slower solvent, adjust or check drying stations
Second down color wetting into first color (overprint, trapping application), diffused or migrating colors	poor physical property resistance	use proper ink formulation and pigment grade selection
BLOCKING	improper ink drying	use the suitable solvent mixture
adhesion between two contact surfaces (printed and/or unprinted area)	trapped solvents	adjust drying condition, check solvent balance
	excessive weight in stack	reduce stack weight

BLOCKING adhesion between two contact surfaces (printed and/or unprinted area)	excessive temperature in rewind	reduce dryer heat
	excessive pressure in rewind station	reduce rewind tension
	web rewound too warm	lower drying tunnel temperature or lower chilling roll temp. within ± 10 °C of room temperature
	softening of applied coatings	use solvents that do not attract these coating
	web rewound with high surface moisture	avoid chilling that condenses moisture on web before rewinding
BRITTLENESS ink film substrate breaks or cracks when flexed	excess heat or UV exposure level in drying/curing system causing release of moisture and plasticizer from substrate or ink film	control web or film temperature, reduce heat and /or increase air volume through drying tunnel, reduce UV lamp power
STRONG COLOR excessive color strength or ink transfer to substrate	excessive ink viscosity	reduce ink viscosity solvent
	unstable mixture of solvents	consult ink supplier to establish the optimum solvent mixture
	excessive pigment level	add extender or transparent white
	incorrect selection of anilox cylinder	select anilox roll with lower cell volume (bcm) – less volume of ink
	incorrect selection of fountain roll for ink transfer	select fountain roll with higher durometer
	light setting of fountain roll (if used) nip	regulate fountain roll nip pressure and nip gap
	incorrect set-up of doctor blade system	adjust parallel alignment of doctor blades with the minimum required pressure
COLOR VARIATION inconsistent color throughout the printing process	lack of viscosity control	maintain viscosity, equip the machine with automatic viscometer
	lack of pH control (for water based inks)	maintain pH between 8.0-9.5, use press-side pH meters
	inconsistent press run	stabilize and record the process variables, keep records for every press run
	variation in ink batches	mix adequately the ink from the warehouse, use ex-proof stirs
	color contamination	improve cleanup procedure, filter the used ink
WEAK COLOR thin ink film, lack of color strength	too much solvent or too low ink viscosity	add fresh ink to restore viscosity
	improper setting of ink roller nip (if used)	lower roller nip pressure and allow more ink to be transferred to the anilox roll, check mechanical condition of rubber ink roll
	improper ink roller for ink transfer (if used)	equip the printing station with the correct rollers (with lower durometer)

WEAK COLOR thin ink film, lack of color strength	incorrectly specified anilox roll	select anilox with higher ink transfer (higher volumes)
	worn anilox roll	replace with new or re-engraved roll
	plugged anilox roll cells	clean anilox cells with the proper procedure, advise the manufacturer
	ink settling	thoroughly mix ink in container before adding it in the ink vessels
	ink pump mis-functioning	check and repair ink pump
	excess extender varnish	add pigment concentrate

DOT GAIN excessive increase in the size of a halftone dot from film to the printed image	excessive ink volume	use anilox roll with lower ink transfer while maintaining color requirements
	excessive plate thickness	use thinner plates, check possible variation in thickness
	improper sticky-back	use cushioned sticky-back
	low ink viscosity	increase ink viscosity
	too much pressure between plate cylinder and substrate	reduce pressure
	poor ink metering system	use chambered doctor blade system
	damaged or worn press components	check and replace defected components, establish preventive maintenance system
	dirt on impression and/or plate cylinder	clean impression cylinder and / or plate cylinder

DRYING TOO FAST ink dries on plates and or anilox cylinder ink fails to transfer onto substrate	improper use of solvents	select proper solvent
	low pH lever (for water-based inks)	check pH and adjust to optimum level (8.5-9.5 using pH adjuster/additives)
	uncontrolled air movement in the area of plates and inking rollers	adjust the dryer to avoid any uncontrolled air movement, eliminate air movement due to open windows, door etc.
	excessive preheat web temperature entering print stations	reduce preheat web temperatures (if used)
	improper ink for the material	select the proper ink for the material being run
	dried ink on plates from the set-up of the machine	wash printing plates after the set-up of the machine and before the start of the production in full speed

DRYING TOO SLOW ink fails to properly dry ink bleed into another (improper trapping) ink pick off or transfer to press rollers and/or subsequent plates	use of slower drying solvents	use faster drying solvents
	too high ink viscosity	control ink viscosity, use automatic viscosity meters in the press
	inadequate or unbalanced drying system	use adequate and balanced drying system and establish stable press runs
	improper ink formulation	choose an ink having a more hold out capability

ink offsetting or blocking in rewind or stack	excessive film ink thickness	reduce ink film thickness (see color strong)
ink penetration to paper	pressroom environment consisting of low temperature and / or high humidity	control pressroom environment
tacky surface of the print	Excessive press speeds	decrease press speed

FEATHERING irregular, string like edges around print area	improper pressure between anilox roll and plate cylinder	Decrease pressure
	ink is drying on the plate or on the anilox cylinder	use proper solvents and covers for the inking station
	uncontrolled ink viscosity and / or pH range (for water based inks)	maintain proper viscosity, check periodically pH
	improper set ink metering application	adjust properly the pressure of fountain rolls and or doctor blade system
	poor shoulder angles on plates	use a steeper shoulder angle on the plate with consideration for support
	dust transferred from substrate to plate	clean the substrate when possible, clean plates during the production, reduce tackiness of the ink
	dried ink on plates from the start-up or previous runs	wash plates after color approval in the press and when the run is completed
	excessive static electricity present	Install static eliminator bars in the correct position

FILL IN piling or speckling of excess ink on and around printing surfaces of plates (especially with relation to small type and screen dots)	specks of ink pigments	use well dispersed inks
	contamination of ink	filter ink or replace it, check transport and storage conditions
	excessive fine type or screen for anilox selection	check design or suitability for flexo printing i.e.: sufficient open areas, proper type face etc.
	souring or precipitation of ink vehicle	see SOURING
	too soft rubber roller (when used)	use harder rollers (increase 10 points Shore A the hardness)
	lack of relief height in plate	increase relief height during the plate processing
	uncontrolled ink viscosity and / or pH range	establish and maintain the right viscosity and / or pH range, use fountain rovers
	incorrect set-up of ink metering system	increase pressure of fountain roll or doctor blade assembly
	excessive plate inking	select finer anilox or improve wipe
	ink drying to fast, incorrect solvent balance	use slower solvent, increase printing speed

CURLING	curl towards coated side	excessive moisture, apply heat to edges, use heat guns
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Curl over on edges (usually in coated cellophane)	curl away from coated side	low moisture level, apply moisture to edges
FLAT APPEARANCE IN PROCESS PRINTING		
hazy, milky printing	improper or worn plates	replace, adjust plate making
	too high plate pressure	correct pressure applied to the substrate
	low ink viscosity	increase viscosity
	contamination of ink	replace ink
FOAMING		
ink foaming in fountain vessel and / or ink vessel	excessive agitation of ink	reduce if possible the flow rate of ink pump, check the operation of the pump
	lack of defoamer agents in ink formulation	add defoamer additive to ink
	contaminated ink	replace with fresh ink a.s.a.p. (e.g. iso-propyl alcohol reduces surface tension/breaks foam)
	ink viscosity too high	reduce ink viscosity
GEAR MARKS/CHATTER		
parallel lines of misprint a hazy, colorless image of the print on inline unprinted areas of film	gear bottoming of pitch line	adjust overall plate package thickness to pitch line
	improperly cleaned metering roll moisture or solvent trapped in rewind	thoroughly clean anilox roll and / or fountain roll improve drying with proper drying set-up, reduce tension at the rewind station
HALO		
undesired line surrounding a printed image double edge printing	too much pressure between plate and substrate	correct pressure settings
	poor plates or make-ready	check plates, replace if necessary
	cupped edges of plate	make new plates and new plates mould, avoid cupping
	plate cylinder out of true	inspect plate cylinder roundness and possible wear/damage of gears, bearings
	plate hardness too high	use only recommended rubber plates for printing given substrates
	sticky-back too thin and too firm	use compressible sticky-back
HICKEYS		
	dried ink/particles transferred to the plate	wash plate – filter ink
KICK OUT OF THE INK		
separation, curdling, thixotropic, gelled	incompatible inks or too low/high pH	always use the proper additives
	improper handling of used ink	check with the ink supplier

MOIRÉ' EFFECT	anilox screen count to similar to plate screen count, for example a 165 line anilox used with an 85 line screen plate can cause moiré because of harmonic $85 \times 2 = 170$, to close too 165 line	change anilox, select a screen count appropriate for tone work	
	undesirable dot pattern in process printing	improper screen angles, angles of screen plates must not be the same with angles of anilox	use the proper angles, for example 0° magenta (plate), 15° yellow (plate), 30° cyan (plate), 45° anilox cells, 60° black (plate)
MOTTLING	ink too weak or too thin, loss of tack (excessive reduction of viscosity and /or pH level)	add fresh ink and bring it to proper viscosity, adjust pH level, add varnish to increase tack	
	spotted or speckled appearance of solid print	uneven surface of plates	remake plates if mottled appearance is evident on surface, examine plate mould for the same mottled pattern
	dark or colored intermittent streaks (usually in a light color)	anilox roll cell walls too wide	inspect anilox roll for possible wear, replace anilox
		dirt on plates/impression roller	clean plates, impression roller from inks, waxes and all foreign materials
		ink starvation from metering system	adjust the solvent system of the ink (add slower drying solvent)
		unevenly absorptive substrates	try softer plates, try more opaque ink
		uneven surface of the substrate	try softer plates
		contaminated ink	filter ink or replace by fresh ink
	ink lacks proper flow	consult ink supplier	
PICK-OFF	ink transferring to subsequent plates	first color too slow	add fast solvent to first color, increase drying temperature in that station
		second color too fast	add slower solvent, check dryer conditions
		second color has too high viscosity	increase press speed and/or reduce viscosity of the second ink
		too high pressure of plate cylinder to the substrate	use minimum plate impression pressure
PLATE SWELLING	dimensional changes of plate, plate softening	ink or solvent not compatible with plates	use proper ink and solvents, check quality of plates
		residual solvent left in plate from the processing	establish proper processing according to the manufactures of plates
		improper handling of plates	proper storing, keep plates protected from UV exposure
PINHOLING	small holes in solid printed area (not to be confused with hickeys)	surface roughness of the substrate (irregular or contaminated)	check technical data of the substrate, consult the producer
		failure of the ink system to form a homogenous and continuous film	increase film ink thickness, check dilution rate of the ink, check pressure of anilox and/or plate cylinder, add anti-pinholing compound
		dirty central impression cylinder	clean CI cylinder
		fast ink drying	adjust solvent mixture, add retarder

POOR INK TRANSFER insufficient ink being applied to the substrate	ink reduced too much, too low viscosity – metering system determines appropriate viscosity spec	add fresh ink or thick extender
	problematic surface of the plates	check plates, clean if they are dirty, replace if they are worn
	ink drying on plates and/or in anilox cells	retard system with slower solvent
	surface of substrate not receptive to ink system	check surface tension of the substrate, check suitability of the ink, add wetting agent
	improper pressure among anilox cylinder, plate cylinder, ink rollers	adjust pressure
	low volume transfer of anilox, clogged cells of anilox	use anilox with larger ink transfer capability, clean anilox with the proper solvent mixtures-cleaners, avoid using brushes
SKIPPING PRINT (chatter marks) areas of plate failing to print	inconsistent plate calliper	check plate thickness variation (not greater than 0,02 mm), secure new plates or do necessary make ready
	low printing pressures	increase pressure of anilox roll and or plate cylinder
	plate cylinder bounce	check concentricity of plate cylinder, gears, impression cylinder. Observe the condition of shafts, journals, bearings and gears for cleanliness or excessive wear
	failure to lock down printing deck	be sure that printing stations are locked firmly in place when impression is properly set
	print station out of alignment	re-install printing station correctly
SOURING INK ink exhibits poor flow and viscosity and has a tendency to curdle	low pH due to evaporation bacteria growth in old ink	keep fountain rolls covered maintain pH 8.5-9.5
STREAKS, SMEARS OR SPOTS unwanted ink transfer on web surface or liner	gel particles or un-dissolved particles in ink	filter particles out of ink, clean up plates and anilox, advice ink maker
	ink dripping onto web or sheet	check print stations and ink pumping circuit for overflow or leaks (fountain guards, ink sling rings)
	ink throwing off anilox roll	increase ink viscosity, replace end seals or wipers
	not proper ink drying	see 'Drying too slow'
	excessive foaming	add anti-foam to ink
	uneven plates	check plate manufacturing
STREAKS IN WEB DIRECTION continuous dark lines through print	damaged fountain or anilox roll	replace or refinish defective rollers, depending on extent of damage
	nick in doctor blades	hone or replace doctor blades

<i>STRIATIONS</i>	excessive ink transparency	reformulate ink
parallel thin lines or bands present in solid print area	low ink viscosity	replace or add fresh ink
	plugged anilox roll cells	clean anilox roll
	worn anilox roll	replace anilox roll