



BEST PRACTICE GUIDE FOR WEB OFFSET PRINTERS

# Web break prevention & diagnosis



Guide N°2. Edition N°1. €30.



Aylesford Newsprint, Kodak GCG, manroland, MEGTEC, Müller Martini, Nitto, QuadTech, SCA, Sun Chemical, Trelleborg Printing Solutions



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**Aylesford Newsprint, Kodak GCG, manroland, MEGTEC, Müller Martini, Nitto, QuadTech, SCA, Sun Chemical, Trelleborg Printing Solutions,**

The content and value of this publication have been vastly helped by the assistance of individuals, printers and associations who gave their time and expertise to review and improve this guide.

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In other areas contact your nearest Web Offset Champion Group member or [weboffsetchampions.com](http://weboffsetchampions.com)

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Web breaks : no single simple cause Web breaks and mis-splices are usually caused by the simultaneous occurrence of different disturbances. They are often triggered by a minor change in one factor. Our survey of 50 international printers found that web breaks are a significant problem for 95 % of them ; and what is an important web break cause at one printer may be relatively unimportant to another. This variability is due to different technologies, papers, materials and environments. Data on web break causes are also variable making extrapolation of cause and effect more difficult.

What can be done to minimise web breaks ?

1. Measure and analyse mis-splices and web breaks causes to identify priority areas for improvement.
2. Introduce best practice to reduce web break probability from both individual and combined causes.
3. Train and motivate staff to apply best practice systematically.

This guide provides a diagnosis aid to 140 web break and mis-splice causes and identifies best practice to avoid and minimise them where possible.

The purpose of this booklet is to provide heatset and coldset web offset printers with a base reference to best practice. The contributing companies play a role in an inter-related production chain and the combination of their expertise is a positive way to help improve overall production process performance :

- Avoid predictable problems.
- Correctly use materials and equipment.
- Systematic problem diagnoses with appropriate remedial actions.

Best practices are a tool to improve performance. Ideally they should be available as checklist procedures for operators and maintenance staff.

**IMPORTANT NOTE :**

*A general guide cannot take into account the specificity of all products and therefore we recommend that it is used in addition to information from your suppliers, particularly the manufacturers of equipment whose safety, operating and maintenance procedures take preference over this guide.*

*This guide is produced for printers world-wide. It incorporates existing international standards where appropriate (e.g. IFRA, TAPPI). There are some variations between the US and Europe of materials (e.g. plates, ink, dampening solutions, paper ph), operating procedures, and terminology which for reasons of space and clarity may not have always been addressed.*

**To assist readers we have used a number of symbols to bring attention to key points :**

*Consequences of poor practice :*



**Best practice**



**Poor practice**



**Avoidable cost  
(waste, time, etc.)**



**Safety risk**

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# Economic impact of web breaks

PRESS TYPE	COMMERCIAL	COMMERCIAL	NEWSPAPER	NEWSPAPER
Press size	32 pages	48 pages	Single width	Double width
N° of webs	1 web	1 web	4 webs	4 webs
Web width	960 mm	1400 mm	960 mm	1600 mm
Paper	60 gsm LWC	60 gsm LWC	45 gsm News	45 gsm News
Assigned press hourly rate	€ 850	€ 1000	€ 1000	€ 1500
Paper + ink waste per break costs	€ 52	€ 77	€ 13	€ 19
Cost: 20 minutes press time + paper + ink	€ 335	€ 410	€ 346	€ 519
Cost: 30 minutes press time + paper + ink	€ 477	€ 577	€ 513	€ 769
Cost: 40 minutes press time + paper + ink	€ 618	€ 743	€ 679	€ 1018

Hourly rate includes capital, running and staff costs. Web break waste = paper web lead length x 3 + start-up waste (700 commercial, 200 newspaper).

Sources: Eurografica GmbH and Champion Group members.

 The economic impact of web breaks are illustrated above using fictional new press installations to show their relative importance (naturally every plant will have variations of operating and material costs). Assumed time lost through web break ranges from 20 to 40 minutes depending upon complexity and plant variables. This assumes optimum equipment conditions and staff competence, in many plants times are much greater.

Web break frequency varies enormously between plants and types of printing. Newspaper plants tend to have lower web break rates because they have a narrow range of paper and product types. Commercial plants printing on light weight papers with frequent format changes will have more web breaks than those with medium to high paper weights and infrequent format changes. Typical web break ranges per 100 rolls are:

Performance range	Good	Average	Poor
Newspaper	1-2 %	2-3 %	3-8 %
Commercial	2-3 %	3-5 %	5-8 %

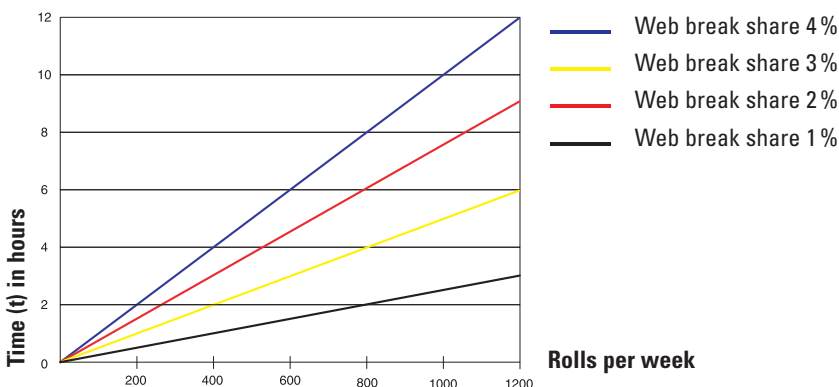
For many plants a 1 % web break reduction target is achievable. The potential cost savings are enormous, their calculation may help your company to devote resources to a web break reduction programme.



## What can be done to minimise web breaks?

- 1 Measure and analyse missplices and web breaks causes to identify priority areas for improvement.
- 2 Introduce best practice to reduce web break probability from both individual and combined causes.
- 3 Train and motivate staff to apply best practice systematically.

Another method of assessing economic impact is the additional production time available from reducing web break frequency. The assumed lost time per web break is only 20 minutes.





# Analyse web break data

*"Two keys for management of web productivity are measurement and people. Measure the right things and communicate the measurements to people in a manner that encourages corrective response."* War on Waste II (Roger V. Dickeson GCA).

Experience shows that only systematic analysis of web break data on each press will identify areas to reduce web break probability to improve productivity, reduce waste, maintain on time delivery and improve financial performance. (Print quality consistency also improves under more stable running without breaks.)

Web break recording systems can be manual (forms) or automated (press console). What is essential is that this data is exported to a data base where it can be analysed every week or month. This will allow statistical profiles to track overall performance to identify and prioritise problems; to assist remedial action; and to measure the effect of improvement programmes. Clear and consistent data on web break causes provides a sound base for positive discussion with both staff and suppliers. The type of data required includes paper manufacturer, roll number and ø at time of break, press running conditions (speed, acceleration, deceleration, splice, folder format), location of break and comments.

## Unknown causes

Frequently 20-50 % of web break causes are "unknown" due to the available time and knowledge of press crews. Many plants overcome this by simply recording a break and saving the tail ends of the broken web for later analysis. The diagnosis charts in this guide will help you identify cause(s).



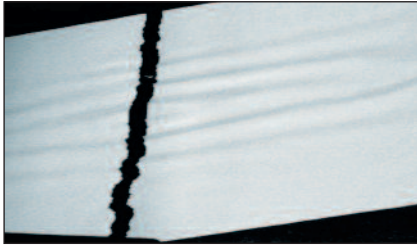
*The envelope is also a form to record adequate information for staff and suppliers to make efficient diagnosis and action following a web break.*



## Actions when there is a web break or missplice

- 1 Diagnose cause(s)
- 2 Take corrective action
- 3 Clean-up thoroughly: Debris from one break may trigger another.
- 4 Record details: Use a form or enter details into press management system.
- 5 Keep section of break or splice: These are essential to confirm diagnosis and discuss with suppliers.
- 6 Repeated web break in same roll: After 3 breaks in same roll change to a different batch or manufacturer to verify if problem is paper related.

# Web breaks and missplices



1

## Web breaks

Usually occur when press tension variations become excessive and coincide with local area weaknesses in the web. Web wander, web touching (in the dryer) and blanket tack-out are other web break causes.

Folder jams can be included with web breaks because they have similar productivity consequences and may be the result of a splice fault.

## Splice faults

### missplices

Any failure of the splice during the cycle from when the splice arms start to move (or zero speed festoon begins to fill) to the moment the splice leaves folder without disturbing the web, resulting in a press stop or excessive waste. During the splice cycle there will be a change in tension profile and any weak spots in the web or splice will be subjected to extra stress and a web break or splice failure may occur.

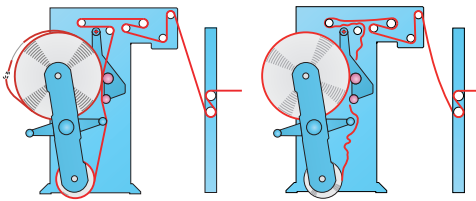
Two types of splice faults which occur during the splice cycle are classified separately to help diagnosis:

### Burst splice

When the new roll bursts open prior to splicing.

### Failed splice

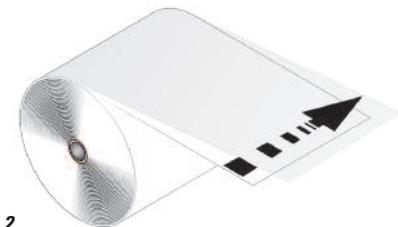
When the new roll does not paste to the expiring web.



Burst splice

Failed splice

# Web wander and web shift



2

## Web shift

A movement of the web to one side of the press. Will create a web break if excessive.

Causes:

- Tapered roll of paper, or excessive variation of web tension across roll width.
- Web guide blocked at maximum correction, over tensions one side of the web.
- Paster cocking roller incorrectly set, over tensions one side of the web.
- Blankets Dirty, uneven thickness or incorrectly adjusted.
- Excessive dampening volume difference between operator and drive side of press.
- Incorrect web tension synchronisation or nip pressures.
- Press or web roller misalignment.
- Dryer incorrect alignment, adjustment, air flow, or constant excessive exhaust.
- Incorrect air pressure of air turner bars.

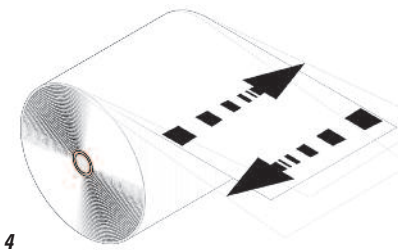


3

## Web wander (weave)

A cyclic movement from one side of the press to the other. Causes:

- Excessive paper web tension variations across the roll width which changes sides during unwinding.
- Uneven tension profile of press line.
- Low web tension.
- Badly set nip roller.
- Debris build up on roller edges.
- Incorrect cylinder rolling and impression setting.
- Uneven blanket packing between units.
- Press or idler rollers misaligned or out-of-level.
- Incorrect press drive synchronisation.
- Blanket washing procedures or fluid mixture incorrect.
- Dryer or oxidiser flow variations.



4

1- High speed photograph of a web break.

2- Web shift

3- Tapered roll

4- Web wander

# Creases and Wrinkles

ORIGINS OF CREASES AND WRINKLES	CREASE	WRINKLE
Loose or tight paper edges or winder wrinkles		●
Baggy rolls, non-uniform tension or caliper profile, winder misalignment	●	
Incorrect web tension anywhere in the line	●	●
Paster generated creases (have no image on the underside of overlap)	●	●
Incorrect impression setting or cylinder rolling	●	
Uneven blanket packing between units	●	
Chill rolls creases (generally occur during start-up in the web direction)	●	
Nip roller adjustment fault (parallel or uneven pressure)	●	
Debris build up on edges of idler and compensator rollers	●	●
Press or idler rollers misaligned or out-of-level <i>(Persistent diagonal wrinkles in any web span indicate misalignment)</i>	●	●
Folder incorrect former angle, turner bar air pressure setting	●	
Excessive inching the press with all nips on	●	

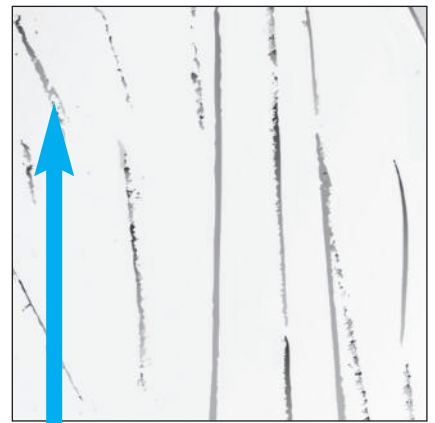
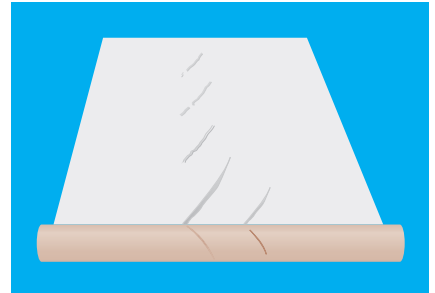
Both may cause severe runability problems leading to web breaks. The two terms are frequently confused but what is important is to work systematically through the line to identify their origin.

## Creases

Are generally at an angle to the web direction. Creases are strongly related to web wander and consequent web breaks. Many printers use a spreader roller at the paster exit to reduce creasing.

## Wrinkles (hard crease)

Caused by the foldover of a section of the web making a permanent crease.



1- Creases are generally at an angle to machine direction  
2- Exception is chill roll crease in machine direction

## Glossary & abbreviations

**EU:** Euro (1 Euro = \$1 approximately)

**<:** up to    **>:** more than

**∅:** Diameter

**m/s** metres per second

**fpm** feet per minute

**N/m** Newtons per metre: Measurement of force of tension 1 N/m = 0,00571 pli (pounds linear inch)

**BURST SPLICE** See pages 64 and 72.

**BUTT ROLL** (alternatively butt roll) core with some white paper left on it after a splice.

**CALIPER** Average thickness of a single sheet of paper.

**CHILL ROLLS** Chilled cylinders after heatset dryer sets ink resins and cools paper to ambient temperature.

**COLDSET (CSWO)** Cold Set Web Offset: Printing process where ink dries by evaporation and absorption.

**CREASES** See Page 65.

**DRYER** Used in heatset printing, using hot air to evaporate water and ink solvent.

**EMULSIFICATION** Dispersal of dampening water into ink.

**FAILED SPLICE** See page 64.

**DAMPENING SOLUTION (FONT)** Solution of chemicals and water to prevent image acceptance on non image areas of a printing plate.

**GRAMMAGE** Metric weight of paper: Grammes per square metre (gsm).

**HEATSET (HSWO)** Heat Set Web Offset: Printing process where ink is dried with assistance of a hot air dryer.

**IDLE(ER) ROLLER** Undriven web support roller.

**INFEEED** Fine control of tension after the paster and before print unit.

**MILL JOIN** Splice made at the paper mill during rewinding or after a web break.

**MISSPLICES** See page 64.

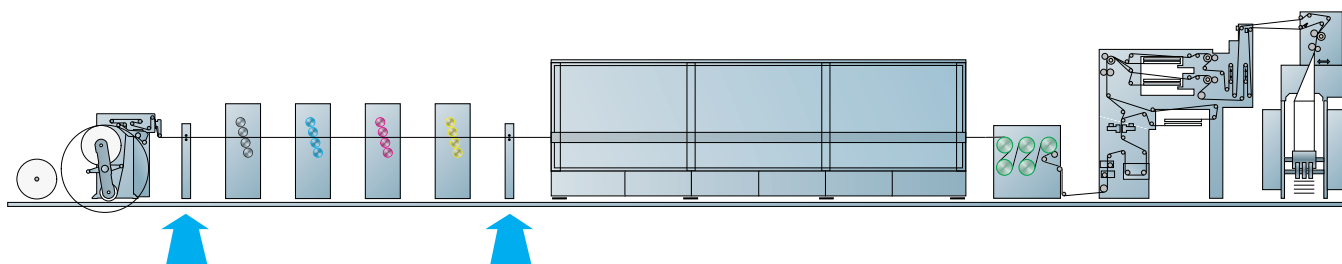
**SUITE page 6**

# Minimise web breaks

Whilst it is possible to reduce the frequency of web breaks through best practice, some will inevitably occur. Therefore it is highly recommended to install detection and control devices to minimise their consequences. They are a form of assurance which will provide a return on investment during the press lifetime by reducing the risk of press and blanket damage along with the time to clear web breaks. A web break control system has a rapid payback on investment from a 1-2% web break rate.

A web severer cuts the web to minimise the length which can be wrapped in print units; a catcher cuts the web and re-winds it to avoid wrapping in units. This system minimise risk and permits rapid re-starts.

Web break consequences	Non controlled	Detection & Severer	Detection & Catcher
Break type	Complex	Moderate	Simple
Unit wrap around risk	High	Moderate	Low
Minimise down time	30 min to 2 hours	20-60 min	15-30 min
Blanket replacement	High probability	Moderate probability	Low probability



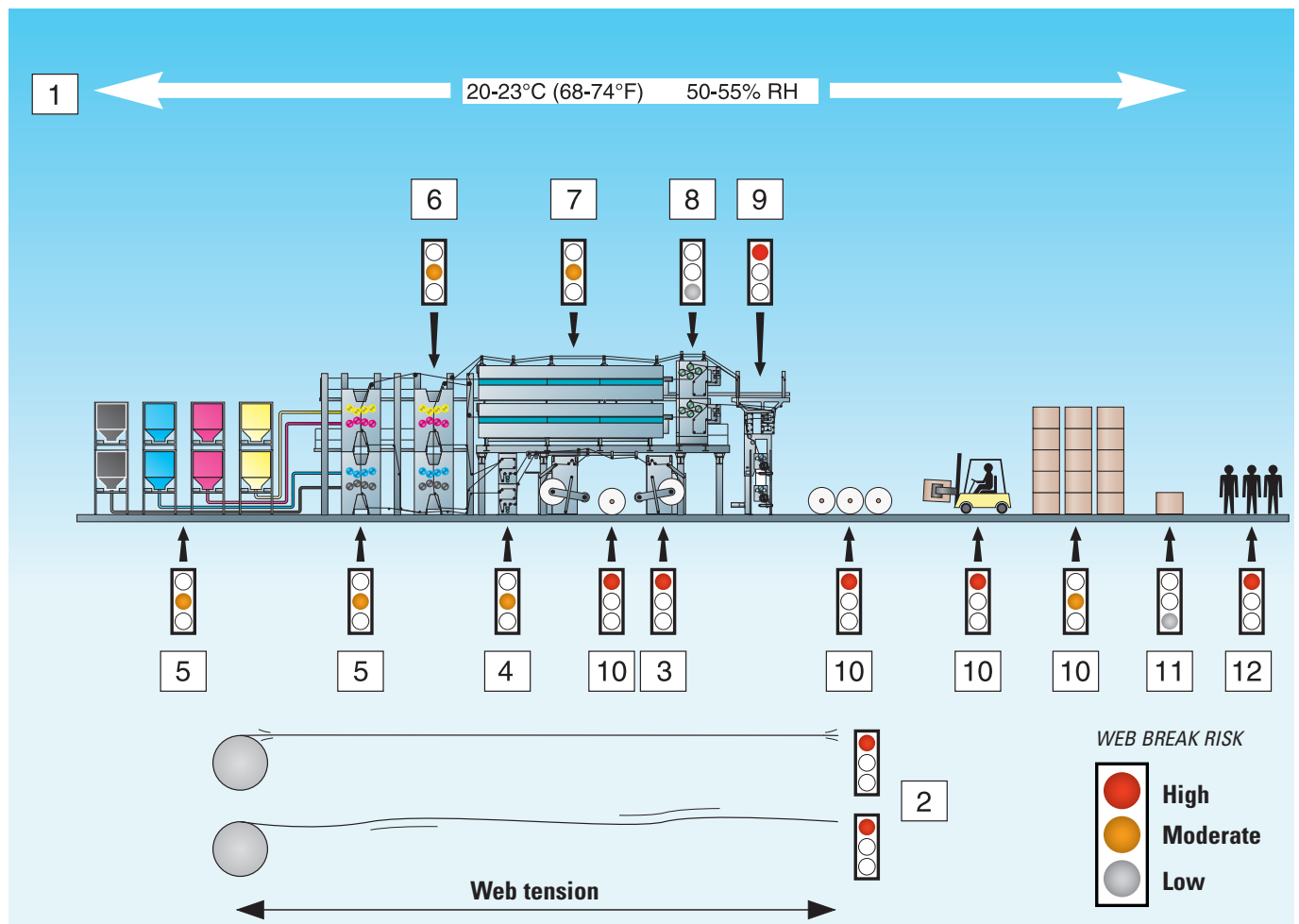
Web severing devices are generally positioned in front of first printing unit and after the last printing unit. Photo cells located at strategic points of the press line to detect a web break sending signals to operate severing device and make an emergency press stop.

## Glossary & abbreviations (following)

- MOISTURE CONTENT** Percentage of water in a paper, varies from 4-10 %.
- NIP** Area of contact between two cylinders or rollers.
- PART ROLL** Roll which has been only partly used and can be re-run.
- PASTER** (alternatively flying paster) pastes new roll to running web at printing speed.
- PSA** (Pressure Sensitive Adhesive) double sided splice tapes
- RH** (Relative Humidity) amount of moisture in the air as a % of amount required to saturate atmosphere at a given temperature.
- RTF** (Roller Top of Former) driven folder outfeed roller usually with an idler roller
- ROLL** (alternatively reel) of paper
- SPLICE** (alternatively paste) crossways join between new roll and running web
- SPLICE CYCLE** Total time from when flying paster arms (or zero speed festoon) begins to move until their return to normal running position after splice is made.
- TAMBOUR** (alternatively Jumbo roll): Roll of paper at the end of a paper machine 6-10 m wide.
- WEB GUIDE** Fine control of lateral web position prior to entry to print unit and folder.
- IDLER ROLLERS** (alternatively web lead, pipe or path rollers)
- WEB TENSION** Adjustable pulling force exerted on paper calculated by web width x thickness.
- WINDER** Rewinds tambour rolls and simultaneously cuts them to width and  $\phi$  required for printing.
- WRAPPER** External protection of roll.
- WRINKLES** See Page 65.
- ZERO SPEED SPLICER** New roll is joined to running web at zero speed whilst a paper storage festoon allows press to continue printing.



# Web breaks in relation to the production system

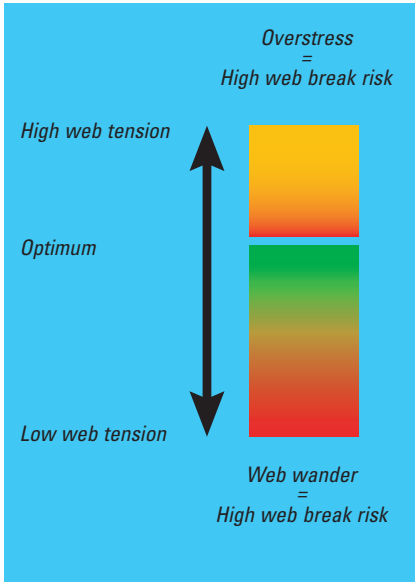


The press, its environment, materials, maintenance and operating staff constitute a system in which all elements have an impact on web breaks. Some elements apply to the entire system, e.g. web tension and ambient operating conditions; others are more specific to one components but the behaviour of which frequently influences others.

KEY SYSTEM ELEMENTS	WEB BREAK RISK*	PAGE
1 Temperature and humidity impact	High	10
2 Web tension throughout line	High	8
3 Paster	High	12
4 Infeed and web guide	Moderate	17
5 Ink and water	Moderate	18
6 Press units	Moderate	20
7 Heatset dryer	Moderate	22
8 Chill roll tower	Moderate	24
9 Folder	High	25
10 Manual roll and paper handling	High	
Automated roll and paper handling	Low	
11 Paper manufacturing defects	Low	27
12 Operating and maintenance staff competencies & training	Moderate-High	

\*Web break risk level may vary from plant to plant.

# Web tension impact on web breaks



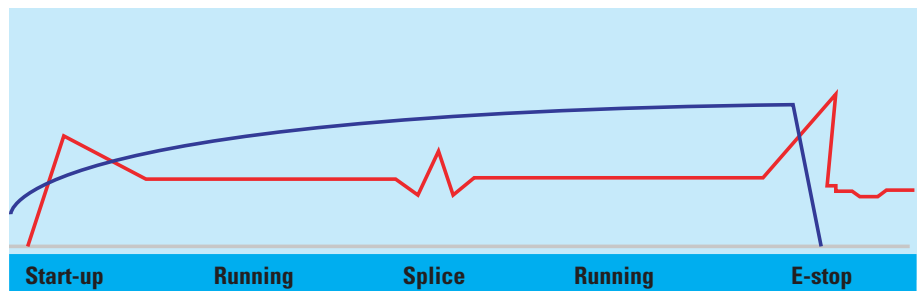
A major key to minimising web breaks is optimising web tension which allows many paper defects to run through the press without causing a break. Web break risk is high when web tension is abnormal, and/or there is a tension peak, coinciding with a local area weaknesses in the web.

⊘ Too high tension increases web break risk by putting excessive strain on the paper, it can also change print length and cause wrinkles.

⊘ Too low tension causes web wander leading to web break risk from creasing, tearing (if web edge adheres to ink build-up on blanket and roller edges) and even running off the edge of cylinders or touching the edge of the press units.

Web break risk increases during rapid web tension changes when press starts up (as impression comes on) and to a lesser extent at normal press stop. The splice cycle creates tension peaks and troughs from the pasting action, the thickness of the splice running through the press and the possible change of the new web's mechanical characteristics (cross web tension).

— Press speed  
— Web tension  
Variation of web tension profile is normal during different running states.



Press line tension settings are specified by the press manufacturer and are variable from press to press. These are generally about 5 times lower than the breaking tension of the paper. These tensions need to be optimised over time for variables of different papers, blankets, ink and dampening. Web tension control should be smooth and slow.

## Tension needs to be coherent throughout the press line

The starting point when setting press line tension is always the press cylinders and blankets, to which the other control points are then referenced:

- 1 Paster should have a low tension (in relation to the infeed) to remove excessive tension fluctuations.
- 2 Infeed reduces remaining tension variations to a very narrow band for the printing units.
- 3 Blankets and packing can make huge differences to web tension. The limit of blanket compressibility means their speed marginally increases when they are at contact in the nip (particularly non bearer presses).
- 4 Chill roll tower is an outfeed which must exert a slight positive gain to ensure the web is pulled correctly out of the print units and dryer.
- 5 Web leads and air turns. (Each undriven idle roller is responsible for a loss of tension due to its friction and inertia as the paper passes over it.)
- 6 RTF and nipping rollers require a slight gain to draw a flat web into the folder.

## Paster and infeed tension



Experience identifies these starting points to develop optimum settings on each press (in conjunction with those of the manufacturer).

### Commercial start-up tension settings

<b>Paster</b>	40-120 gsm	120-150 N/m (0,68-0,86 pli)
<b>Infeed</b>	30-60 gsm = (...gsm x 10 x 90 %) = ...N/m	
	60-90 gsm = (...gsm x 10 x 80 %) = ...N/m	
	90-120 gsm = (...gsm x 10 x 70 %) = ...N/m	

### Newspaper start-up tension settings

<b>Paster</b>	70-90 N/m	0,4 - 0,5 pli
<b>Infeed</b>	200 N/m	1,142 pli
	1 N/m = 0,00571 pli (pounds linear inch)	



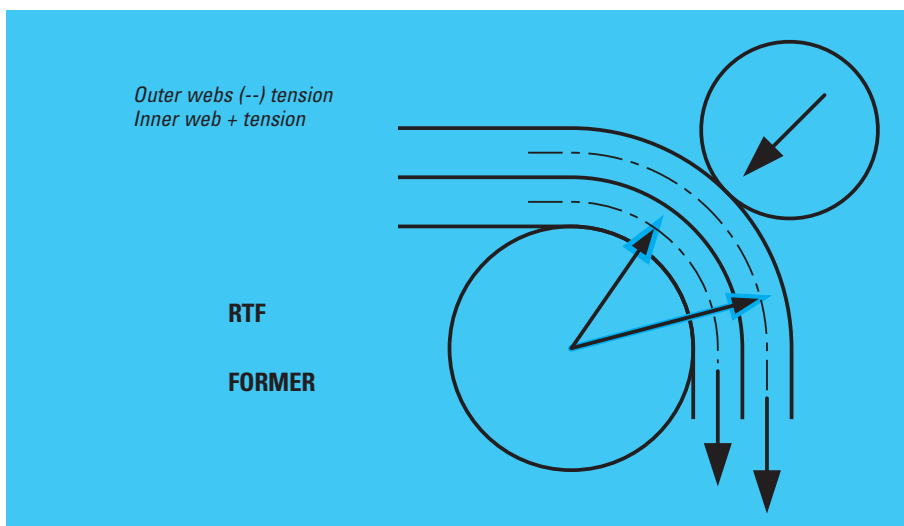
- Always reset tension when changing paper weight.
- Set low start-up tension level (to minimise risk of web break at low speed).
- Fine tune tension during makeready and running.
- Record settings for each paper and web width for faster future set-up with less waste.

## "Wet" and "dry" tension tensions

Web tension for printing takes into account paper elongation from ink and water with a lower "wet" tension than for a "dry" web. When impression is switched on (during start-up) or off (emergency stop) there is a rapid change between "wet" and "dry" tension which may lead to a web break. Extreme dry tension also occurs when excessively inching a press, or if blankets are overpacked.

## Former web tension

Multiple web presses use a system of formers to gather multiple webs together. New press designs use a straight feed from the upper guide rollers allowing all webs to run into the former at the same tension. The older RTF (Roll Top of Former) designs have been replaced by upper and lower drag rollers similar to folder nipping rollers. Older press designs have formers with an RTF outfeed roll forming a nip with an idling roller. The inner web should have a higher tension than the outer webs which should progressively have lower tensions to improve runability. This also compensates for the fractional differences in radius between the inner and outer webs around the former infeed roller.



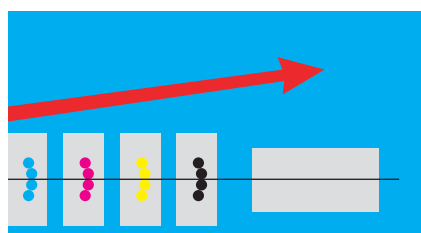
**To ensure smooth folding**  
The tension of each web at the former infeed should be graduated in small steps. This prevents wrapping around the RTF infeed roller causing the outer webs to squeeze off the lower webs which drops their tension, causing web wander and breaks.



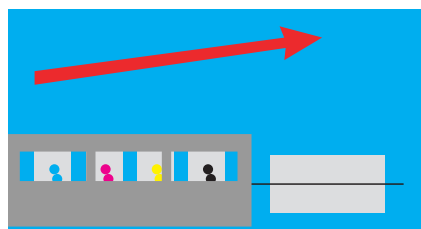
**The press line web tension control** should be matched to the web tension of the lowest web at the former infeed roller.

# Ambient press environment

ENVIRONMENT RISKS	TEMPERATURE				HUMIDITY	
	LOW	OPTIMUM 20-25°C (68-77°F)	HIGH	LOW	OPTIMUM 50-55% RH	HIGH
● = OUT OF OPTIMUM INCREASES RISK OF						
Piping paper rolls						●
Shrinkage on open rolls			●	●		
Burst splice			●	●		●
Splice failure	●		●	●		●
High ink tack (web break)	●					
Low ink tack (ink fly/web break )			●			
Static electricity	●			●		●
Brittleness			●	●		
General web break risk				●		●



Open print units dissipate heat to surrounding environment.



Enclosed print units = excessive temperatures to be controlled.

Operating temperatures and humidity outside a standard range increase web break risks as well as overall running problems. Non standard temperatures negatively effect all process elements (press, ink, paper, pasting tabs and tapes) and increase paper waste and press down time.

## Sources of heat

When a press starts up, the web's motion creates large and rapid air movement which quickly change humidity and temperature. If the replacement air is too cool it can create local cold spots and operating problems. Heat is generated by the press, its electronic equipment (and dryer if fitted) and the glass roofs and walls of the building. Poor ventilation can add up to 20°C (68°F) and the difference between summer and winter internal temperatures can also be up to 20°C (68°F). Optimum printing conditions may only be obtained in some locations by factory wide climatic control. If RH (Relative Humidity) is low, a moisturising system should be added, particularly if rolls are prepared a long time in advance of splice.

On a heatset press the temperature around the yellow unit next to the dryer is up to 15°C (59°F) higher than the comparatively open first unit. The unit temperature of an enclosed press can be 10-20°C (50-68°F) higher than an open line. Soundproof booths should be equipped with a balanced air control system to provide reliable running conditions by introducing cool air around the press base and extracting hot air from above the line (systems which only push cold air in can cause serious ink/water balance and static problems).

## Temperature modification of ink performance

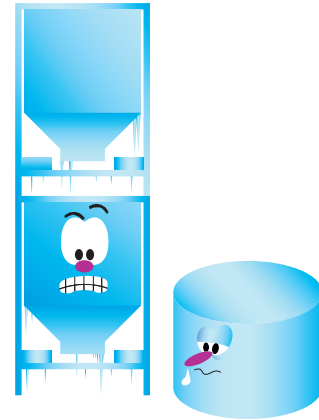
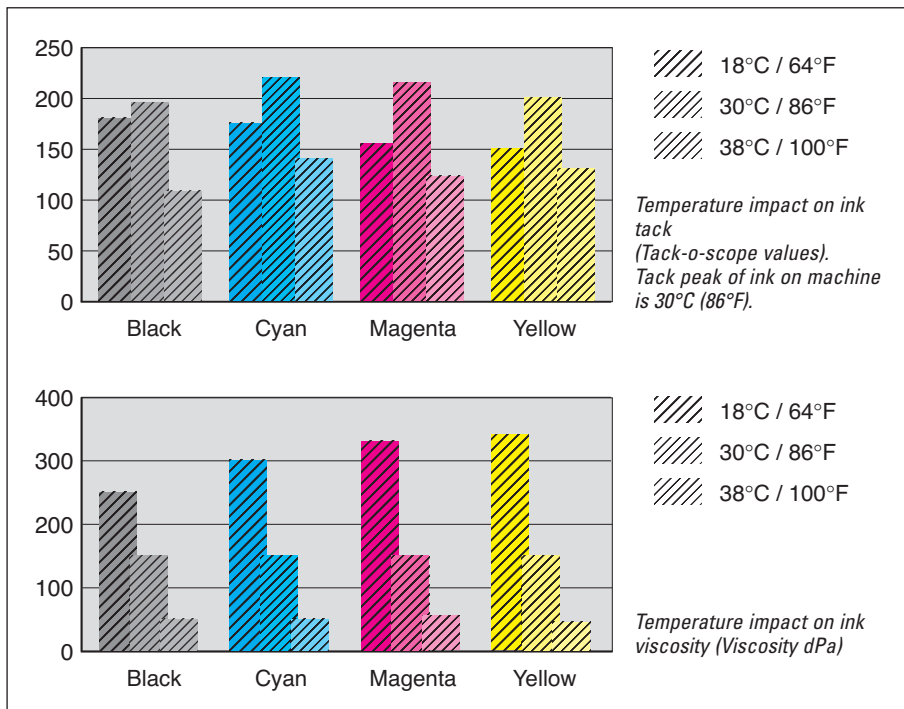
Evaluation of web break data confirms that running at recommended temperatures minimises web break risks, optimises printing conditions and reduces down time. Different types of printing blankets generate heat variations of up to 15°C (59°F). High ink temperatures causes over inking further compounding running problems.



Cooling of dampening circulating system and ink ductors should be standard.



- Cold ink has high viscosity causing excessive web breaks, linting and piling.
- Cold ink puts strain on pumping systems and flows poorly in the duct leading to ink starvation.
- Warm ink has low viscosity, it pumps poorly and will mist and drip in the press.



⚠ Ink temperature below 18°C (64°F) raises ink viscosity which increases web breaks. Cold rolls have a high splice failure rate when paper temperature near the core is below 10°C (50°F).

## Ink storage

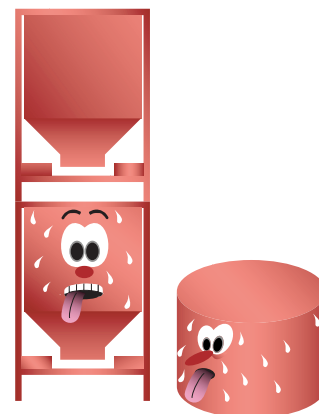
Bulk ink silos can dictate press performance if they are located in a non temperature controlled factory or outside. Ink matches the temperature of its environment, because it is a poor heat conductor, it will heat up or cool down slowly. Below 18°C (64°F) ink viscosity rises causing pumping difficulties and excessive pump stress leading to wear and failure; at over 30°C (86°F) the viscosity drops leading to running problems.

- ✋ • Maintain silo temperature at 25°C (77°F) ± 20%
- ✋ • Ensure ink supplied to press is not below 20°C (68°F).
  - Keep silos out of direct sunlight.
- Ensure correct ink and dampening system temperatures on press, see page 78.

## Paper (see also "Roll to web processing")

Stability is achieved at 20°C-23°C (68-74°F) and 50-55% RH. If relative humidity is low a moisturising system should be added, particularly if rolls are prepared a long time in advance of splice.

- ✋ • Keep the protective roll wrapping on as long as possible to minimise risk of atmospheric humidity and dynamic roll expansion.
- Store the paper in the press room for a few days before use. Paper delivered at 0°C will take 2-4 weeks to recover a temperature permitting trouble-free printing and splicing.



⚠ Warm ink creates ink mist and drips leading to web breaks. Paper edges warmer than the pressroom can shrink causing them to become tight with a high risk of tearing.

## Tapes & Tabs

- ✋ Adhesive properties are influenced by temperature and humidity.
- ✋ Store in their packaging away from direct UV exposure, at between 15-35°C (59-96°F) and maximum RH 70%.
- ✋ Humidity can create a moisture film on top of the tape leading to aquaplaning and a failed splice.
- ✋ Leave protective liner on tape as long as possible, rotate open splice to underside of roll.
- ✋ If paper temperature near roll core is below 10°C (50°F) use a low temperature glue to avoid splice failure as standard tape adhesives become rigid with low tack at low temperatures.



# Paster diagnosis

## PROBABLE CONSEQUENCES

Splice preparation	Burst	Fail	Mis	Break	Flying	Zero
1 Failed roll fault inspection prior to loading		●	●	●	○	○
2 Rolls unwrapped too early	●	●	●		○	○
3 Excessive vibrations		●	●	●	○	○
4 Wrong roll unwind direction (flying paster)		●			○	
5 Incorrect splice pattern type		●	●		○	
6 Splice pattern bursts open before splice					○	
Air pockets	●				○	
Dynamic roll expansion (see also 2)	●				○	
Rupture tabs applied too tightly	●				○	
Open tape in acceleration belt path	●				○	
Too fast acceleration tears paper			●			○
Splice shields not fully closed or no vacuum		●				○
7 Failed splice					○	
Inadequate splice tape pressure (see also 21)		●			○	
Uneven tape profile from overlaps		●			○	
Tape protective strip not removed/No tape applied		●	●		○	○
Dust, moisture, solvent on open splice tape		●			○	○
Glue unsuitable (tack, temperature, humidity)		●			○	○
Cold roll (temperature near core below 10°C)		●			○	○
Rupture tabs incorrect or turned over covering detection tab		●	●		○	
No splice detection tab, sensor dirty		●	●		○	
8 Tape or glue overlaps edge of roll			●		○	○
9 Tabs come loose & stick to expiring web or blanket			●	●	○	
10 Splice detection tab in wrong position		●	●		○	
11 Tab in path of folder slitter			●		○	
12 Too long paster tail causes folder jam (see also 10, 22, 23)			●		○	
13 New roll not aligned to expiring roll or variable roll widths			●		○	○
14 Cocking roller setting incorrect			●	●	○	○
15 Zero speed splicer incorrect alignment to nipping roller		●	●			○

Setting and maintenance	Burst	Fail	Mis	Break	Flying	Zero
16 Debris build up on roller edges				●	○	○
17 Sensor defective or dirty		●	●		○	○
18 Roll not up to speed		●	●		○	
19 Roll will not go to splice position (paster status problem)		●			○	
20 Tension/drive belts: Incorrect tension, burred, worn	●	●	●	●	○	○
21 Pasting brush/roller dirty, worn, incorrect pressure (see also 7)		●	●		○	
22 Knife cut too early (see also 10)		●	●		○	
23 Knife cut too late (see also 10)		●	●		○	
24 Knife failed (see also 10, 17)		●			○	
25 Improper adjustment or malfunction of paster carriage		●	●		○	
26 Roll runs off core		●			○	○
27 Incorrect brake load/tension setting			●	●	○	○
28 No low tension makeready setting (start-up break)				●	○	○
29 Press stops in splice cycle (no web break but no splice)		●			○	○
30 Press speed change during paste cycle		●	●	●	○	
31 Oscillation of compensating roller (pumping)			●	●	○	○
32 Erratic tension near end of roll			●	●	○	○
33 Excessive tension during splice			●	●	○	○
34 Brakes fail to transfer correctly		●	●	●	○	○
35 Air supply failure cause loss of tension				●	○	○
36 Drops of oil, water, ink falling on to web				●	○	○
37 Overpacked blanket explodes splice in printing unit			●		○	○
38 Zero speed splicer head rollers out of alignment		●	●			○

## PROBABLE CONSEQUENCES

39 Faulty zero speed dancer operation	Burst	Fail	Mis	Break	Flying	Zero
Web break during Deceleration				●		○
Dancer cylinder ports closed	●			●		○
Chain sprockets worn	●			●		○
Dancer brake malfunction	●	●		●		○
Web break during Splice: Insufficient air pressure		●		●		○
Web break during Acceleration	●			●		○
Dancer rollers out of alignment		●		●		○
Dancer bottoms out:				●		○
Inadequate air pressure on dancer	●	●		●		○
Inadequate acceleration signal (air flow volume or electrical signal)	●	●		●		○
Leaking dancer cylinders	●	●	●	●		○
Dancer not at maximum position prior to splice ( runs-out of paper)	●	●		●		○
Dirty or glazed acceleration roller	●	●	●	●		○
Loose, dirty or worn acceleration belt	●	●	●	●		○
Dancer does not fill prior to splice	●	●	●	●		○
Dancer tension too low	●	●	●	●		○
Brakes set too tight	●			●		○
Air leaking from brake interferes with running roll solenoid			●	●		○
If dancer fills out before or after splice				●		○
Speed signal incorrect				●		○
Incorrect brake transducer adjustment	●	●	●	●		○
Incorrect or faulty dancer POT/encoder setting	●	●	●	●		○

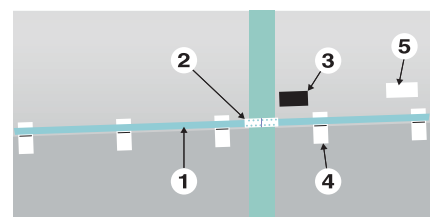
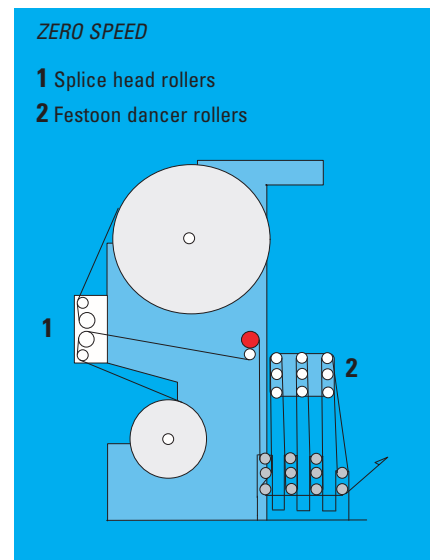
## Splice preparation best practice *See also «Roll to Web Processing»*

### Loading

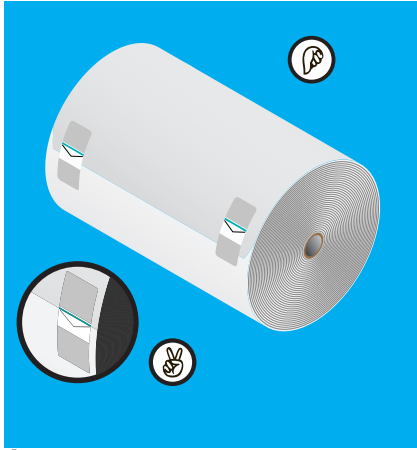
- Inspect every roll for faults prior to loading, either repair faults or reject roll.
- Prevent excessive vibrations which generate tension variations during unwinding which increases risk of web break, creasing and misregister:
  - Ensure chuck jaws are fully inserted and expanded into core (if soft cores are used there is a risk that the chucks will settle into core).
  - Ensure roll is in correct lateral position using location scale on shaft.
  - Expand shafts before the roll is loaded into the paster arms or hoist otherwise the roll will be off centre.
  - Air shafts may loose pressure which allows the roll to turn on the shaft.
  - Out-of-round rolls, should either be rejected or run the press slowly and "nurse" with slow speed splice.

### Preparation

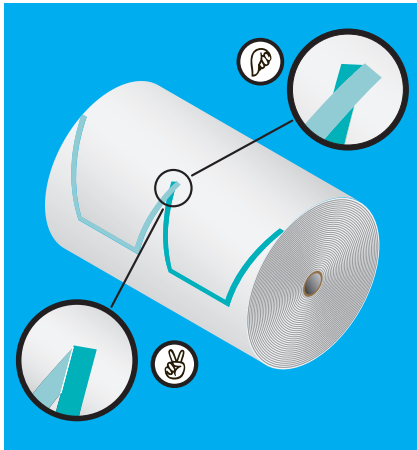
Remove belly wrapper only after loading on to paster to reduce risk of moisture wrinkle and dynamic roll expansion. Use a splice pattern appropriate to the paper grade, weight, width and press speed. Expel air between the external paper layers (spires) so that they lie smoothly as wrinkles cause tearing and separation of the top layer during acceleration. Close the splice with rupture tabs, but not too tightly or they may break in advance of splice. The distance between tabs is related to paper weight and press speed. Outer tabs should be 25 mm (1") from the edges. Ensure there are no tabs in the path of folder slitler wheel path (high web break risk). Apply PSA tape along the splice profile 2 mm (0,08") from the edges on all sides (overhangs can cause missplice). Apply a uniform pressure across the length and width of the tape using a tape applicator card to ensure optimum adhesion (hand application risks poor contact of tape to paper). Tape width is determined by the type and speed of pasting.



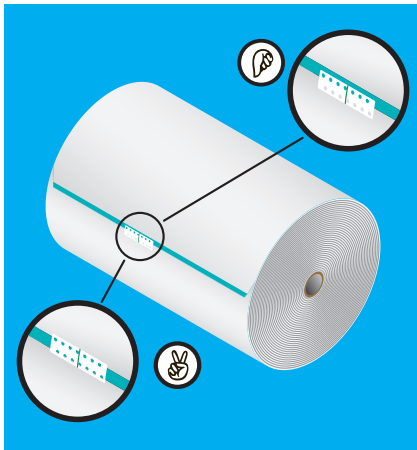
- 1 PSA Splice tape
- 2 Belt bridge tab
- 3 Splice detection tab
- 4 Rupture tab
- 5 Exit detection tab



A



B



C

### Rupture tab position - A

- Incorrect rupture tab position increases breaking strength and may result in a failure to open.
- Use line printed on the tab to position adhesive-free zone under the line pointing to the inner spire of the roll for easy opening at pasting.

### Overlapped PSA tape - B

- Overlapped tape creates thickness peaks reducing the adhesive contact surface in a splice area; thick splices may also cause folder jams. e.g. overlap risk on a W pattern.

### Belt bridge position - C

On belt driven pasters apply a bridge tab in the belt path which overlaps its width. Do not use tape liner cover because its adhesion is so low that it will be torn off by the belt which will then destroy the splice preparation.

- Holes in belt bridge tab allow correct positioning on to exposed PSA tape, the width of which must be fully covered.

Correct detection tab position is vital to initiate splice cycle and minimise tail length. Ensure tab suitability for detection system otherwise no splice signal will be made. A common no splice fault is dust on the sensor. On pasters with mechanical timing indicators the suppliers instructions should be followed.

Remove PSA tape protection strip just prior to the splice cycle. Rotate roll to position open splice on underside of roll to avoid dust and condensation on the tape surface reducing its adhesive qualities.

### Setting

At each job change, ensure correct tension setting to new paper weight. Preferably use settings recorded from running similar jobs previously (this also reduces start-up waste).

Set lateral roll edge alignment of new roll to the running web before every splice (unless an automatic system is fitted). Misalignment is responsible for very high web break probability with wrap-up around a print unit.

If new roll width is different to the running roll, apply splice tape to the narrowest web, otherwise the overlap of adhesive will stick on to rollers or blanket causing a break.

If the paster has a cocking roller, reset it to zero position at each splice. If not it can create massive instability in the new web.

### Zero speed splicer

Ensure lead edge of tape aligns with bottom of nipping roller; otherwise leading edge of tape does not completely adhere and may fold back and stick to festoon rollers.

- Trim off tape leading edges at an angle on both sides of the web so that even if splice is not perfectly aligned the tape will not stick to any rollers.
- Ensure holding brake is "on" and there is not excessive slack hanging off the prepared roll.

### Tabs and tapes

Need to be temperature resistant for heatset printing otherwise they will not resist the tension loading in the dryer. Low tack zero speed tapes do not work on flying splicers. Excessive moisture or solvents in the pressroom can condense on to an open tape reducing its adhesive performance.

A- Rupture tab position  
B- Overlapped PSA tape  
C- Belt bridge position

## Paster/splicer setting and maintenance

### 16 Debris build up on roller edges (idler roller, compensators)

Frequent cause of creasing leading to web breaks.

- Regularly clean all rollers and check they rotate freely. Periodically check alignment and bearings.

### 17 Sensor defective or dirty

Paster splice cycle will fail.

- Regularly clean sensors or replace if defective.

### 18 No speed match of new roll

If the paster splices there will be an immediate web break as the speeds of each roll will be different; alternatively the splice cycle will be blocked by the paster control system. Action: Verify with service technician.

### 19 Roll will not go to splice position

A fault in paster status blocks cycle (e.g. chucks not fixed, no roll loaded). Check preparation and loading is correct, if OK and the fault persists, verify with service technician.

### 20 Drive belts

Incorrect belt tension, burred or worn belts create a high probability of splice faults and web breaks.

- Regularly check, adjust or replace.

### 21 Pasting brush/roller

If dirty, worn or setting incorrect will not apply enough pressure to the splice tape to make it paste on to the new roll. (Splice failure risk also increases with excessive paper roll piping, inadequate pressure applied to splice tape and overlapped tape.)

- Regularly clean, check, adjust or replace.

### 22 Knife cuts too early

Cuts running web before new web is pasted.

- Ensure splice detection tab is correctly placed, if OK, verify with service technician.

### 23 Knife cuts too late

Causes very long paster tails which frequently cause a folder jam and high waste.

- Ensure splice detection tab is correctly placed, if OK, verify with service technician.

### 24 Knife fails

Running web is not cut and it runs through the press with the new web creating a high break and damage risk.

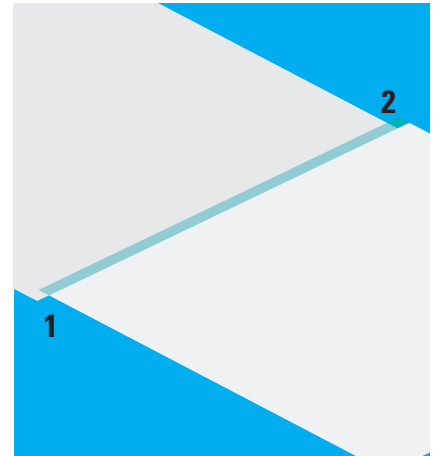
- Ensure sensor is clean, if OK, verify with service technician.

### 25 Paster carriage malfunction

Check adjustment setting. Verify with service technician.

### 26 Roll runs off core

Incorrect presetting of paper to be left on the core at time of splicing. Other causes may include roll turning in chucks, error in calculation of roll  $\varnothing$  and press speed, verify these with service technician.



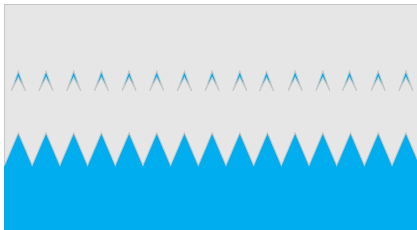
- 1 Overlapped paper edge sticks to ink build-up on blanket edge tearing the web.

- 2 Exposed adhesive will stick on to rollers or blanket causing a break.

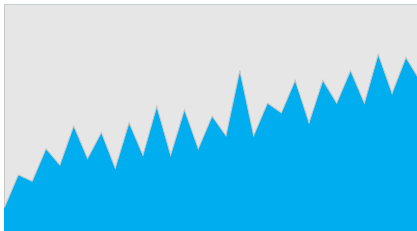
### Knife patterns left in splice tail



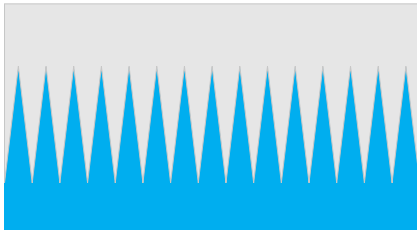
1



2



3



4

- 1- Correct knife cut
- 2- Knife bounce
- 3- New roll too slow or high web tension
- 4- Incorrect speed match



To optimise core waste, reset when changing paper thickness. Attention, the external  $\varnothing$  of cores are variable.



Zero speed splicers will run off the core if the brake-mounted roll sensor is faulty or dirty.



Unless splice head shields are fully closed and vacuum on there will be no splice.

### 27 Incorrect load on brake/Incorrect tension setting

A loss of paster or infeed tension at splice may cause a break anywhere in the line. New roll should always have a tension equal to the outgoing roll.



At each job change ensure correct tension setting to new paper weight.

### 28 Excessive vibrations

Roll shafts not centred in core, loose chucks or a deformed roll generate vibrations and tension variations during unwinding causing increased risk of web break, creasing and misregister.

### 29 Press stops in splice cycle

Variable with paster and press model, it may not allow a splice to be made, it may not necessarily cause a web break.

### 30 Press speed decreases during splice cycle

Old technology pasters require press speed to be blocked for more than 1 minute to complete the splice cycle. If press speed changes the cycle will need to be restarted but only if there is enough paper left on the roll, otherwise there will be a failed splice. On modern pasters there is no restriction providing there is enough paper left on the roll to paste.

### 31 Excessive oscillation of compensating roller (pumping)

Causes highly fluctuating tension. Service technician to regulate.

### 32 Erratic tension near end of roll

Service technician to regulate.

### 33 Excessive tension during splice

Service technician to regulate.

### 34 Brakes fail to transfer correctly

Service technician to regulate.

### 35 Air supply failure

High web break failure risk as air is continuously required for compensator regulation of tension.

### 36 Drops (oil, water, ink) falling on to web

A problem which may occur with pasters installed underneath presses.

### 37 Splice explodes in printing unit

May be caused by an overpacked blanket or a blanket losing its compressibility on non bearer presses.



# Infeed and web guides

## PROBABLE CONSEQUENCES

INFEED		BREAK	WANDER	SHIFT
1	Incorrect tension	●	●	
2	Excessive movement of compensator (pumping)	●		
3	Debris build up on roller edges		●	
4	Badly set nip roller (pressure and parallelism)	●	●	●
WEB GUIDE				
1	Tension incorrect	●	●	
2	Reaction too fast, excessive movement of carriage	●		
3	Debris build up on roller edges		●	
4	Mechanical defect in web guides, carriage jam creases			●

## Infeed

*Controlled tension infeed for high quality 4 colour printing*

### 1 Tension incorrect



At each job change, reset tension setting to new paper weight.

### 2 Pumping



Excessive movement of compensator may lead to web break (service technician to regulate).

### 3 Debris build up on roller edges

Can cause creasing leading to web breaks.



Regularly clean all rollers and check they rotate freely. Periodically check alignment and bearings.

### 4 Badly set nip roller

If draw across the web is uneven it will cause excessive web wander.



Check adjustment to make sure it is parallel with correct pressure.



Rubber coated nip roller surface becomes harder with age leading to unstable tension with slippage. Check surface hardness with a Durometer.

## Web guide

*Generally for high quality colour printing to control lateral web position*

### 1 Tension too high inline

Break may occur in guide. Check infeed, chill speed and folder tension settings and nips.

### 2 Reaction too fast (pumping)

Web guide movement needs to be gentle because excessive oscillation causes high tension fluctuations. Service technician to regulate.

### 3 Debris build up on roller edges

Can cause creasing leading to web breaks.



Regularly clean all rollers and check they rotate freely. Periodically check alignment and bearings.

### 4 Carriage jam

Web guide stuck at maximum correction causes creases and excessive web shift leading to a downstream web break. Causes may include incorrect position of roll in splicer, loss of tension at any press drive point, or a defect in the web guide.

# Ink and dampening related

## PROBABLE CONSEQUENCES

INK AND DAMPENING		PILING	EMULSIFICATION	DROPS/SPRAY
1	Ink to paper selection	●	●	
2	Excessive inking	●	●	●
3	Excessive water feed		●	●
4	Ink tack too high	●		
5	Ink viscosity too high	●		
6	Ink mist, fly, drips falling on web			●
7	Press line settings, temperatures, maintenance	●	●	●

### 1 Correct ink to paper selection

Difficulties generally occur when changing from a high paper grade to a lower grade with a weaker surface and/or loose fibres (e.g. from LWC or SC to Improved Newsprint). High tack systems used on uncoated papers cause picking, linting and piling, often leading to web breaks. Ink tack for Improved Newsprint should be matched to the paper, particularly black which is normally the first unit to damp and ink the paper. (In Europe a single universal ink is available for printers frequently using varying grades of paper to provide more consistent settings and running conditions, less variable ink water emulsion, less piling to reduce blanket washing; and reduced web break risk.)

### 2 Excessive inking

May cause a wrap within the print unit and problems at dryer or chill roll tower.

### 3 Excessive dampening

May cause a start-up web break or wrap within the print unit. Avoid reducing the wet tensile strength of paper by minimising dampening levels: Match the dampening solution to the ink and press and ensure it is correctly dosed. Excessive dampening can also retard drying causing ink to build up on the chill roll cylinders resulting in a web break (also reduces ink gloss, paper blistering and creates chill roll fumes.)

### 4 Ink tack too high

Causes excessive variations in the wrap of the web on the blankets in areas of solid images. These local tension variations effect register and may lead to a web break in or after first print unit.



Actions: Reduce ink tack, increase web tension, reduce web speed, use quick release blanket.



Ink tack may increase from residual heat evaporation of ink solvent during a press stop, at re-start the web may wrap around the blanket. This condition worsens during hot weather (cold set inks use a more stable solvent and do not generally suffer from this problem.)



An interim solution is to spray small quantities of de tack solvent on to ink rollers and blankets to reduce ink tack web breaks at start-up.

Some printers who print only on newsprint put black down last to reduce linting.

### 5 Ink viscosity too high

Caused by cold ink which flows poorly in the duct leading to ink starvation, linting, piling and excessive web breaks.

### 6 Mist, fly and drips

#### *Ink mist* (from ink rollers)

Usually caused by rollers which have become too warm at high press speeds, high roller speed or rollers set too heavy.

### **Ink fly**

Emulsified ink moves to the end of the ink and dampening rollers. When a large volume builds up it crosses the gap between the nip of the rollers and is thrown off. If it lands on the web it may cause an instant web break; or it can be carried by the web to detach on to the chill rolls where it builds up to cause a web break. Uncoated papers usually carry more ink which increases the level of water to the plate; if the wrong ink is used this will cause emulsification.

### **Ink drips**

Ink seeps through the duct landing on the web causing it to attach to the blanket where the web will break. (Ink fly may also build up on the press frames and guards and then drip on to the web.)



- Choose the ink with the right tack for the paper.
- Keep guards and rollers ends clean.
- Use duct dividers on part webs to reduce ink build up on roller ends.
- Check roller pressures and alignment regularly to avoid heat build up and uneven delivery.

## **Optimum ink performance**

Research demonstrates that overall ink performance on the press is determined by the temperatures of the ink roller train, dampening solution pans and rollers, blankets and plates. They determine ink transfer and dampening efficiency, run length between blanket washes, press speed, quality and web break probability.



Best practice is to systematically monitor temperatures with an infrared heat gun whilst the press is running. If press performance deteriorates then re-measure all temperatures to isolate the problem source. Hundreds of heatset press audits have established recommended temperatures for consistent high production with low web breaks. Presses running outside these guidelines will suffer predictable problems causing poor performance. See also the press manufacturer's recommendations.



### **Weekly maintenance**

For optimum water receptivity of dampening solution tanks and pans:

- Drain system pans, lines and tanks. Refill with hot water.
- Add prepared dampening solution system cleaner, and pump into pans to circulate.
- Maintain flow of cleaning solution through system until only discoloration of the solution is visible, and no large particles are left.
- After system is clean, drain, flush with clean water, drain, wipe out pans and tanks.
- Change all filters before refilling with dampening solution.
- Before dampening solution is pumped into pans, clean all damper rollers and etched chrome rollers.
- Desensitise roller surfaces by cleaning and etching them (rubber, chrome and ceramic rollers).



### **Recommended temperatures for heatset printing**

<b>Dampening solution pans</b>		
	12-16°C	54-61°F
<b>Ink</b>		
	26-34°C	79-93°F
<b>Plates</b>		
	28-35°C	82-95°F
<b>Blankets</b>		
	28-35°C	82-95°F

### **Water-cooled ink vibrators**



26°C (79°F) ± 12% recommended surface temperature.



> 30°C (86°F) = increased ink tack caused by faster solvent evaporation, risk of ink mist or fly.



< 26°C (79°F) = increased ink viscosity and reduced ink transfer. May also cause emulsification in high humidity conditions.

### **Dampening solution pan**



12-16°C (54-61°F) set the recirculating tank to low temperatures to achieve these readings.



> 16°C (61°F) Higher temperatures increase evaporation (also contributes to Tone Value Increase (TVI) dot gain).

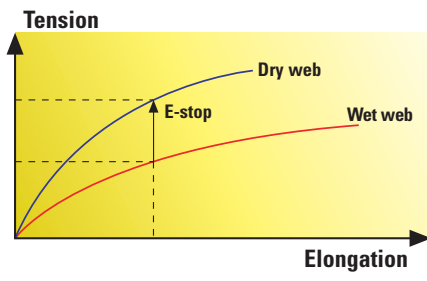


> 12°C (54°F) Lower temperatures reduce ink transfer from the plate.

# Printing unit related breaks

## PROBABLE CONSEQUENCES

PRINTING UNITS	TENSION	WANDER	CREASE	WRAP
<b>1 Start-up breaks:</b>				
Tension peak at impression on	●			
Excessively tacky ink may cause web tearing				●
Water or cleaning solvent in cylinder lock up gaps	●			
Plate gum left on plate causes web to wrap on start-up				●
<b>2 Emergency stop: Wet to dry web tension change</b>	●			
<b>3 Sympathy break: One broken web creates others</b>	●			
<b>4 Water, ink or foreign object falling on web</b>				
<b>5 Impression setting: High, low or uneven</b>	●	●	●	
<b>6 Incorrect cylinder rolling/blanket bearer to bearer press</b>		●	●	
<b>7 Blankets:</b>				
Uneven packing between units	●	●	●	●
Overpacked (bearer to bearer press)	●			●
Incorrectly fixed	●			
Ink tack and blanket release incompatible				●
Damaged blanket				●
Ink and paper debris build-up on blanket	●			●
<b>8 Idler rollers and compensators</b>				
Ink and debris builds up on edges		●	●	
Out of alignment or worn bearings with excessive play		●	●	
<b>9 Press misaligned or out-of-level</b>		●	●	



1

### 1 Start-up breaks

When impression is switched on there is a tension peak up to the last unit, with a corresponding drop through the remainder of the press, which may result in a web break. On newspaper presses acceleration has to overcome the inertia of undriven lead rollers; high start-up speeds increases tension peak and web break risk.



- Minimise dampening quantity to avoid weakening paper at start-up which may cause a web break. (Reduce dampening flow to the minimum to keep non image areas of plate clean, if necessary let the plate catch-up during start and clean-up when press is at running speed.)
- An interim solution is to spray small quantities of de tack solvent on to ink rollers and blankets to reduce ink tack at start-up.
- Always ensure cylinder gaps are dry before start-up because water or solvent in cylinder gaps will deposit on to the web as the press rotates causing a weak wet strip across the web.
- Make sure prepress plate gumming is not excessive otherwise it may cause a wrap on start-up.
- Make sure web is straight at start up, turn roll to take up slack to avoid risk of wrapping.
- Always follow correct start-up sequence or a web break may be caused in or after the first printing unit.

### 2 Press stop

As impression is thrown off the paper immediately becomes dry decreasing its elasticity which may lead to a break. Non driven (idle) rollers are braked by web tension further increasing paper stress. On modern presses an emergency stop should not cause a web break (even as a result of power or air supply failure) because switching from wet to dry web is controlled automatically. On older presses there is no compensation for dry and wet tensions and risk of a web break is higher.


### Safe stop

Triggered by push button, web break or jam sensors brings press to a stop in 11-12 seconds.

1- When impression is switched off in an emergency stop there is a rapid tension increase from "wet" to "dry" paper which may lead to a web break. (WAN-IFRA graph: Report 1.18 page 14, fig. 11)

### Emergency stop



Activated by red push button with yellow collar, stops press in 6-7 seconds on older presses; newer presses with single drives stop in 11-12 seconds. In both cases the main breaker at the switch cabinet is turned off after the press comes to a complete stop.

-  Unless there is a real emergency, always use regular or safe stop.

### 3 Sympathy break


Mostly on multi web newspaper lines when a single web break triggers breaks in other webs. This can be caused by the emergency stop change from wet to dry tension; and more commonly, the broken web touches, falls or jams other running webs. The sympathy break often occurs in a press section with too high tension, it is important to identify this location to make necessary adjustment.

### 4 Water, ink or foreign objects falling on to the web (see also start-up breaks and ink sections)

-  • Install drip pans to prevent ink drops falling on to the web.
-  • Insulate water pans to prevent water condensation drops falling on to the web.
- Do not have tools or other objects in open pockets which allow them to fall out and on to the web.


### 5 Incorrect impression setting

Web tension variations caused by wrong impression setting. If too low the web will wander and may lead to a web break.

-  Observe manufacturer's setting recommendations.

### 6 Incorrect cylinder rolling (non bearer presses)

Inadequate or excessive blanket packing.





-  Observe manufacturer's setting recommendations.

### 7 Blankets

All blankets should be evenly packed to the same height from unit to unit to equalise the draw between units. Different blankets have variable transport behaviour which need to be checked by testing.


#### Blanket washing systems

The main purpose of blanket washing is to maintain good print quality and reduce down time. A secondary purpose is to prevent ink, paper lint and dust build-up which can lead to an increase in tack and web break risk (and blanket damage from over pressure). Washing programmes should correspond to paper and printing needs: On uncoated paper the first unit picks up most paper lint and therefore needs more water in the washing cycle; on coated paper this occurs in the cyan and magenta units where ink tack is highest.

-  Washing water saturating and weakening the web creates high web break risk.
-  Wash with impression off (cloth and brush systems) to minimise water weakening the paper. This also avoids solvent weakening the splice adhesion causing a missplice; reduces washing time as no solvent is absorbed by paper; and is safer because there is no overloading of solvent on to paper before entry to dryer.
-  Tack-out web breaks occur when washing frequency is too low. This allows excessive piling to build up on the blanket which exceeds the capacity of the washing system to completely clean it. This leaves a very high tack surface to which the web sticks and breaks.
-  Wash blankets at every splice. This eliminates splice waste because it is included in blanket wash waste.

### 8 Idler (pipe) rollers and compensators

May cause creasing leading to web breaks.

-  Regularly clean all rollers and check they rotate freely. Periodically check alignment and bearings.

### 9 Press misaligned or out-of-level

Persistent creasing leading to web breaks may be the result of misalignment. Verify entire press line level and alignment.

### Blankets



- Overpacking can excessively increase web tension leading to a break.
- Overpacked blanket (or a blanket losing its compressibility on non bearer presses) can explode the splice in the first printing unit.
- Underpacked blankets pile rapidly increasing risk of web break.
- Incorrect attachment may create a tension peak across the web.
- Damaged blanket not immediately replaced.



- Ensure ink type and blanket release type are compatible.
- Use blankets from the same manufacturer and of the same type in a press.
- Change at end of normal life (news-paper 8-12 million impressions; commercial 5-15 million).
- Change only blanket damaged if others are in good condition with low impressions.
- On double width newspaper presses change both blankets in unit after paper jams.
- If damage is in bottom couple of a newspaper press then change all unit blankets.

**Some printers running light weight papers with high ink coverage have found that tack-out breaks may be reduced by washing units in the reverse order (e.g. from yellow backwards to black).**



# Heatset system related breaks



## PROBABLE CONSEQUENCES

AIR TURNS (COLDSET AND HEATSET)		WANDER	TOUCH	MARKING	BREAK
1	Incorrect air pressure settings	●	●	●	●
2	Start up "impression on" before air turns are switched on		●	●	●
3	Dirty or damaged air slots	●	●	●	●
HEATSET DRYER					
1	Excessive tension variations (not a dryer cause)	●	●	●	●
2	Excessive web shift in dryer				●
3	Touching and tearing of web		●	●	●
4	Drying temperature too high makes paper brittle				●
5	Tar condensate drops on to the web			●	●
6	Splice separates in dryer				●

## Air turns

Air turns are used on both heatset and newspaper presses.

1 Web breaks will result from incorrect air pressure settings:

-  • Too low = web touching and tearing.
-  • Too high = web break/wander risk progressively increases as lateral stability decreases.



2 Before putting impression on at start-up, make sure the air turns are switched on, if not the web will drag across the surface and break.

3 Dirty or damaged air slots may allow the web to touch and tear on the air bars.

## Heatset dryer


After a web break first check to see if the web in the dryer is intact, if yes, the problem is elsewhere. However, many web breaks in the dryer may be caused by other problems e.g. too much dampening water weakening paper often combined with a tension peak.

### 1 Excessive tension variation

-  Poor web tension synchronisation between infeed, chill and folder, or incorrect nip pressures.
-  Optimum dryer operation requires a constant tension during acceleration, deceleration and running. Tension must be high enough to avoid web wander and touching and low enough not to over stress web in the long mechanically unsupported dryer length. Chill roll gain setting is the key for the system with adjustment via the infeed for variations; the chill and folder tension relationship is also important.

### 2 Excessive web shift

May result in web breaks if the edge of the web moves laterally to touch the side of the web exit slot or tunnel, or runs over the edge of a chill cylinder. Of the several different causes, only one is found in the dryer

-  • Excessive web tension variation across paper web width. Check by using a roll from a different batch.
- If the web guide is at its maximum correction it will over tension one side of the web. A mis set paster cocking roller will have a similar effect.
- Blankets which are dirty, of uneven thickness or incorrectly fixed.
- Large dampening volume difference between operator and drive sides of press.
- Dryer air bars out of alignment or level. If the shift is constant and none of the above apply, then a technician should make a series of white paper and printed tests to isolate the cause which may be misalignment, incorrect tension control or a dryer problem.

### 3 Web touching and tearing

A common cause of dryer web breaks and marking is paper debris entering the air bars from the air recirculation system. The higher the incidence of web breaks (for any reason) increases the risk of dryer breaks. This is because after each web break loose pieces of paper may find their way into the dryer, these are then sucked into the recirculating system and become stuck on the protective filter screen. As the dryer temperature increases this paper burns and disintegrates into fine particles which pass through the screen and into the air bars. Consequences are:

- Paper-ink debris projects out of the air bar slots building hard and sharp growths which cause smearing and eventually tear the web causing it to break.
- Build up of debris inside the air bars reduces their pressure and causes web touching. Progressively ink builds up on the air bar surface. Web touching may also occur if the air bars are incorrectly set and without allowance for temperature expansion.

It is impossible to completely avoid paper debris entering the air bars. It can be minimised by:



- Thorough cleaning of paper debris from the dryer after a web break (an industrial vacuum cleaner increases efficiency and reduces time).
- Use a scraper to remove build-up of paper-ink debris from the air bars.
- Periodically remove air bars and clean their interior (normally each 6-12 months).

#### Edge touching

Printing close to maximum paper width frequently creates edge moisture problems in the dryer. The paper fibres swell making web edges loose and prone to touching and the ink may deposit on to the air bars (usually on one side) and progressively build up a sharp and hard growth. If the web wanders this tears the web causing a break.



- Minimum recommended distance between web edge and image area is 10-15 mm. Less than this rapidly increases risk of web touching and web break risk. The resulting loss of productivity may exceed the paper saving from elimination of adequate margins.

**Some printers have found that printing mourning bands on web edges outside of the image to within 2 mm (1/16") of the edge makes web edges tighter and reduces touching risk. These bands are a 20% screen of each colour run at varying widths in the edge trim areas. Some dryer manufacturers may be able to minimise this problem with special air bars and dryer air flow modification.**

### 4 Drying temperatures

Web exit temperatures on old dryer types is 125-140°C (257-284°F), on new types 100-120°C (212-248°F).



- Set temperature control at minimum necessary to evaporate the solvents.

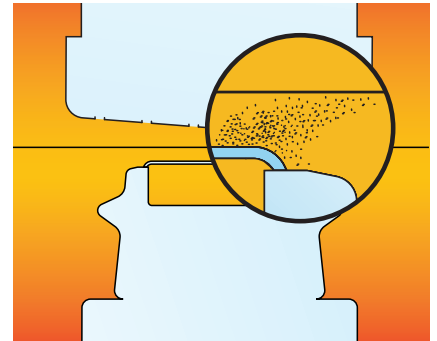


- Too high temperatures reduce paper moisture content making it brittle and likely to break. Symptoms include yellowing of paper and blisters.
- High temperatures may cause ink resin components to begin evaporating leaving a thick dark deposit around the cool air entrances to the dryer.
- Too high exit temperature encourages ink deposit on to chill roll surface to which the web adheres causing a web break (the same effect will be caused if chill roll temperatures are too high).
- Too low drying temperature may cause the light weight ink solvent to condense with drops falling on to the web, causing a break in the dryer or at the chills.

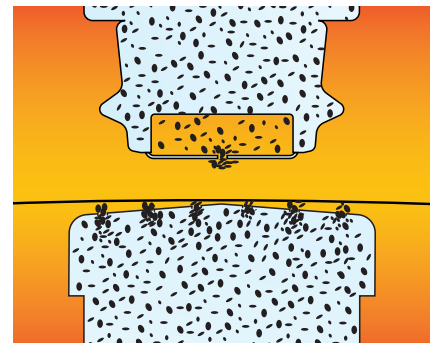
### 5 Splice separates in dryer, if PSA splice tape is:



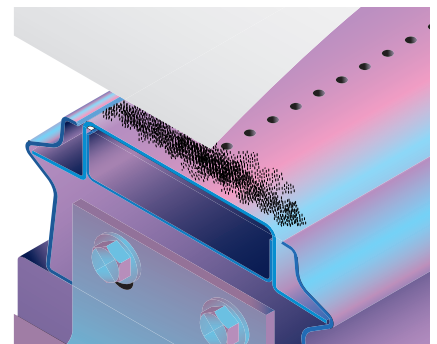
- Unsuitable type for high temperatures.
- Tape not applied with adequate pressure.
- Tape contaminated by dust prior to splice.
- Tape contaminated from solvent during blanket washing.



1



2



3

1- Paper-ink build up touches and tears web leading to web break

2- Blocked air nozzle web and ink build-up causes web touching

3- Edge touching

# Chill roll stand

## PROBABLE CONSEQUENCES

CHILL ROLLS	WANDER	MARKING	BREAK
1 Deposit on chill roll surface		●	●
1.1 Tar & resin drops from dryer		●	●
1.2 Ink fly from print units		●	●
1.3 Solvent boundary layer condensation		●	●
2 Incorrect temperature setting		●	●
3 Gain (tension) incorrect	●		●
4 Incorrect nip roller setting	●	●	●

### 1.1 Resin drops (tar, dryer condensate)

Are volatile heavy ink resin components which combine with paper debris in the dryer to create a thick dark tar like substance.

This may condense inside the dryer and smoke tunnel falling on to the top of the web which deposits them on to the second chill cylinder (most common chill configuration).

⚡ Avoid too low or high dryer temperatures, minimise air entry through dryer slots.

### 1.2 Ink fly

Emulsified ink projected off the ink and dampening rollers on to both sides of the web. They are mostly deposited on to the first chill, with some on second chill cylinder. Scratching the deposit's surface should reveal several ink colours, the origin is the first ink colour deposited on the surface.

⚡ See Ink and Dampening, pages 78 - 79.

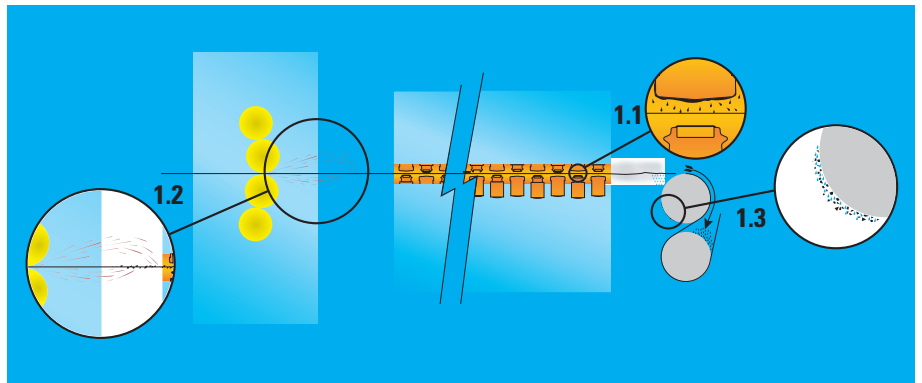
### 1.3 Boundary layer solvent condensation

A boundary layer of light residual oil solvent vapour is carried close to the web surface which can deposit on the first chill roll lowering its heat transfer and cause marking. Inks with a non-uniform solvent blend may make this problem worse.

⚡ For persistent problems check the formulation and solvent blends with an ink manufacturer.  
• Install a cleaning or tacking device on first and second chill cylinders.

## 1 Deposits on chill roll surface

These will eventually create sufficient tack to tear and break the web.



## 2 Chill rolls temperature settings

- ⚡ Too low chill roll temperature allows moisture condensation on the surface of cylinders during a press stop. This wets and weakens the web causing a start-up break. If combined with low tension, creasing occurs in the web direction leading to a web break.
- Too high chill roll temperatures may cause deposits on to chill cylinder surface to which the web will stick causing a web break (the same effect will be caused if the dryer exit temperature is too high).
- Excessive heat removal by the first roll shocks the ink film and leads to delivery marking.
- Last chill roll web exit temperature below 21°C (70°F) = static problems.
- Last chill roll web exit temperature above 32°C (90°F) = delivery marking.
- ⚡ Optimum ink setting is obtained by gradual temperature reduction from one roll to the next.
- Water supply temperature to first roll should not be below the dew point of the pressroom air.
- Last chill roll exit temperature should not be below the pressroom air dew point or over 30°F (86°F).

## 3 Gain (tension) setting

The chill acts like an outfeed and regulates the web speed by gain of a driven cylinder.

- ⚡ Gain must be coherent with the infeed and folder tension settings during acceleration, running and deceleration.

## 4 Incorrect nip roller setting

Check adjustment to make sure it is parallel otherwise draw across the web will be uneven leading to excessive web wander.

# Folder related breaks

## PROBABLE CONSEQUENCES

FOLDER	JAM	CREASE	WANDER	TEAR
1 Paster tabs in path of slitters	●			
2 Folder jam from too long paster tail	●			
3 Superstructure draw rollers pull incorrectly	●		●	●
4 Badly set nip rollers		●	●	
5 Slitter assembly incorrectly set, dull blade				●
6 Former angle incorrect		●		●
7 Turner bar angle incorrect			●	
8 Air pressure incorrect		●	●	
9 Debris build-up on former and turner bars		●	●	
10 Web tension incorrect		●	●	
11 Cutting or folding incorrect	●			
12 Delivery fan dirty damaged or poor adjustment	●			
13 Guide settings incorrect	●			
14 Dirt on sensor of folder jam detector	●			
15 Transport belt incorrectly set or damaged	●	●		
16 Collecting/tucker blade cylinder adjustment				
17 Stacker or mailroom conveyor speed does not match press	●			

### 1 Paster tabs in path of slitters

Ensure splice pattern avoids tabs in path of slitters. See page 73.

### 2 Folder jam from too long paster tail

Minimise tail length at paster. See page 73.

### 3 Superstructure draw (drag) rollers

Adjust trolleys to just touch the web.

- Too high pull causes tears in the ribbons.
- Too low pull makes web tension uneven and causes web wander.

### 4 Nip rollers

Ensure they are parallel with even pressure across web. When setting place a second piece of the paper into nip and pull it until it tears to determine correct pressure.

### 5 Slitter

Make sure slitter assembly is correctly set and blade sharp. Check weekly, or if cut is poor. Correct blade setting should be just contact free from the cutting block.

Poor cutting may result in a jam.

### 6 Former angle incorrect, nose worn

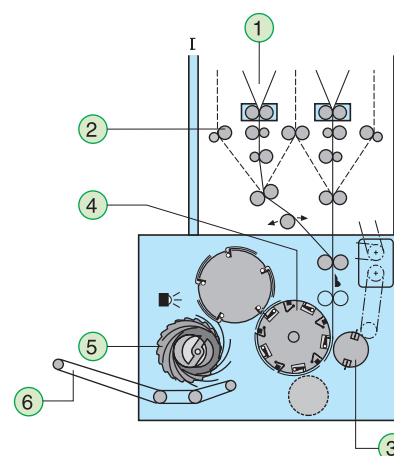
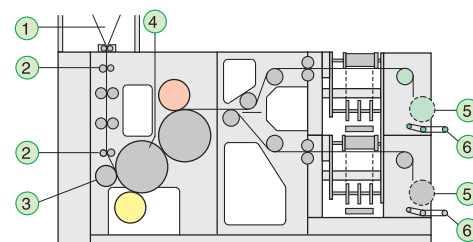
Do not alter the manufacturer's setting.

- Incorrect former angle leads to creasing and high web break probability.
- Worn or damaged former nose has the same effect.
- Incorrect setting of nip rollers (pressure and parallelism)

### 7 Turner bar angle incorrect

Risk of web wander high

Mark correct settings (with a marker pen) on to the bars.



- 1 Former
- 2 Nip rollers
- 3 Cutting or folding cylinder
- 4 Collecting or tucker blade cylinders
- 5 Delivery fan
- 6 Transport belts

**Most folder web breaks can be avoided by a common sense approach to observe what is happening on the press, correct faults as they occur, note abnormal occurrences, follow preventive maintenance routines and instruction manual.**

### 8 Air pressure incorrect

- ✋ Adjust pressure correctly at turner bars and former plates: Too high pressure leads to wandering; too low pressure causes ribbon creasing. Newer presses use special coatings on the turner bars and no air is needed.

### 9 Debris build up on former and turner bars

- ✋ Frequent cause of creasing leading to web breaks.
- ✋ Clean regularly.  
On heatset presses marking commonly caused by poor contact between web and first chill roll allowing solvent to condense on to the chill roll. The web continuously carries this downstream.

### 10 Web tension incorrect

- ✋ For new presses use the automatic setting devices.
- ✋ For older presses use proven values developed from experience.
- ✋ On heatset presses incorrect chill roller speed will cause tension disturbance.

### 11 Cutting or folding incorrect

- ✋ Follow the manufacturer's instructions for set-up and replacement parts.
- ✋ Any cutting or folding fault may lead to a jam. Caused by incorrectly setting or damaged parts (folding blade and rollers, cutting rubber, jaws, knife pins).

### 12 Delivery fan (fly)

- ✋ Follow maintenance schedule.
- ✋ Dirty, damaged or incorrect adjustment may result in a folder jam.

### 13 Guide settings

- ✋ Ensure they are always correctly set.
- ✋ Incorrect setting may lead to a jam.

### 14 Dirt on sensor of folder jam detector

- ✋ Clean regularly.

### 15 Transport belts

- ✋ Make sure they are correctly set, replace when worn or damaged.

### 16 Collecting or tucker blade cylinders diameters

- ✋ Adjust correctly. On models which are designed to allow it (refer to instruction manual) adjust whilst the press is running to ensure correct tension and no creasing.

### 17 Stacker or mailroom conveyor does not match press speed

- ✋ It is important that this is synchronised to eliminate delivery jams.  
✋ Maintain and test regularly.



# Paper diagnosis

		<i>Normal source of problem</i>			
<b>PAPER AND ROLL DEFECT CLASSIFICATIONS (based on TAPPI/WAN-IFRA)</b>		<b>Mill Paper defect</b>	<b>Mill Roll body</b>	<b>Mill Core</b>	<b>Transport Printer handling</b>
<b>1</b>	Holes in the web	●			
<b>2</b>	Cuts in the web	●			
<b>3</b>	Winding defects:	●			
	Slack start	●			
	Winder wrinkle	●			
	Burst in roll	●			
	Convex/concave	●			
	Run together at core	●			
	Loose paper	●			
	Edge cracks	●			
<b>4</b>	Slitter defects:	●			
	Poor cut	●			
	Foldover	●			
<b>5</b>	Mill splicing defects: Protruding splice, stuck splice	●			
<b>6</b>	Non-uniform rolls:		●		
	Soft end		●		
	Baggy end		●		
	Rope marking		●		
<b>7</b>	Core defects			●	
<b>8</b>	Wrapping defects: Glue on end		●		
<b>9</b>	Roll handling and storage damage				●
	Crushed core				●
	Out of round				●
	Starred roll				●
	Body damage				●
	Edge damage				●
	Head damage				●
	Water damage/Stuck				●
	Moisture wrinkle				●

These standard classifications have been developed from those of TAPPI and WAN-IFRA and are useful for detailed diagnosis of problems if they become frequent. Some classifications have been simplified to make them easier for more printers to use.

Paper quality is generally consistent and excessive web breaks due to paper faults are rare (5-10 % of causes). The proportion of breaks from poor handling and storage represents 5-25 % of causes (automated roll handling considerably reduces risk). For this reason we recommend web break causes should be treated in two classifications:

- Paper defect (manufacturers responsibility)
- Roll handling and storage damage (transport and printer responsibility)

A single defect does not necessarily impair runability, however the combination of two or more will impact press performance. Many faults are rare and unlikely to be repeated throughout the roll (e.g. holes, cuts). The standard procedure after a web break is to re-start with the same roll. If there are 3 breaks in the same roll then change it for a new one which has a different position in the tambour (jumbo roll), or a different manufacturing batch. Contact your paper supplier to deal with problem.



## When faults occur,

it is essential to make clear information available to define the problem, its cause and to prevent its repetition. Inform the paper supplier as soon as possible and send them:

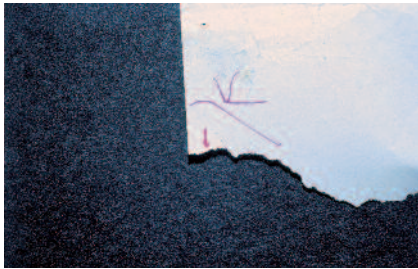
- Description of fault (see list)
- Order and roll number(s)
- Press running status at time of break and paster/splicer records (to identify any related patterns)
- Consecutive sections of fault (e.g. both sides of a web break)
- White paper samples for laboratory analysis.



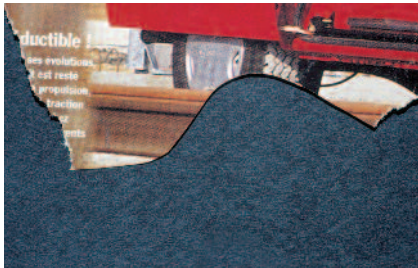
A



B



C



D



E

- A- Holes in the web
- B- Stuck web
- C- Fibre cuts/shives
- D- Hair cuts
- E- Calender cuts

## 1 Sheet defects

### **Holes in the web - A**

There are several causes which are often difficult to identify correctly. The results are very similar and for a printer their origin is relatively unimportant as they are the paper manufacturer's responsibility. Common causes are: Slime holes from bacteria clumps entering the pulp which dies when the paper is dried leaving a weak area in the web which opens into a hole (with hard crusty edges) when the web is unwound. Holes from water drops occur when condensation falls on to the wet paper web, as the water droplet passes through a nip the surrounding paper area is crushed. Other more rare causes are plucking and wire holes.

### **Stuck web - B**

This can be caused by water getting on to the paper surface after machine processing or by excessive coating. As these areas dry out one or more web layers stick to each other.

## 2 Cuts in the web

### **Fibre cuts/shives - C**

Occur during calendering when batches of fibres bond together and curl like hairs forming a semi-circle. When a web break occurs, the fibre cut is identified by the smooth semi-circle edge branching off into the rough areas where the paper tears. Sometimes a compressed fibre is evident along the edge, appearing light tan in colour. Fibre cuts are generally < 10 mm (0,4") long. They are very similar and often confused with hair cuts (which can be much longer).

### **Hair cuts - D**

Occur during calendering if a hair or synthetic thread contaminates the pulp and is caught on the web and then cuts the paper while it is in the calender. These are becoming rarer as screening improves in manufacturing. They are sharp, smooth edged and curved with no definite length or direction. They may cause web breaks if they are located at the edge of the web and in a cross web direction.

### **Calender Cuts - E**

Paper with a poor profile may allow excess paper to accumulate locally at the calender nip. The very high pressure folds it over into a crease which as it passes through the nip splits along the length of the crease. The cut is usually diagonal to the machine direction. Often the area adjacent to the cut appears translucent due to the excessive calendering pressure. There are often several cuts inline; they are usually 5-8 cm (2-3") long and may have edges that are crushed, glazed or discoloured.

## 3 Winding defects

### **Loose winding (slack start)**

Wrinkles close to the core are caused by low tension at the start of the roll in the winder. Now comparatively rare and related to humidity changes in roll cores prior to winding.

### **Winder wrinkles (or drum puckers or crepe wrinkles) - F**

Narrow wavy wrinkles with a creped or corrugated appearance running across the width of the roll. This occurs if the outer roll layers are wound with a higher tension than the inner layers. The outer layers press so hard that the web tension on inner layers will be under zero, giving a compression force. Rolls wound softly close to the core will be sensitive; an abrupt change in hardness during winding will give drum puckers; large caliper variations also contribute to this problem. Soft winding at start of roll and too high nip pressure towards end of roll (due to high roll weight) also creates wrinkles in the winder nip.

### **Burst - G**

This is usually associated with large diameter rolls and most often near the top of the roll. The burst inside the roll is caused by the high tension between a hard and soft area of the roll during winding resulting in a slightly curved split in the paper at right angles to the machine direction.

### **Uneven winding**

An in-and-out pattern on the side of the roll caused by lateral movement of the web (or core) during winding, in extreme cases this may be accompanied by edge cracks.

### **Convex or concave winding**

Caused by sideways movement of the web during unwinding.

### **Run together at core**

During winding the web overlaps adjacent rolls which are then difficult to break apart. This leaves residual paper on the side of the roll, usually close to the core.

### **Loose paper within the roll**

May result from the web bursting or breaking during winding; or by loose paper being blown on to the roll during winding.

### **Edge cracks - H**

Caused by uneven sheet thickness along the edges of the web or by improper slitter setting. Tears are found at the edge of the web usually close to the core.

## **4 Slitter defects**

### **Poor slitter edge/Edge tears - I**

Usually caused by a dull or badly set slitter knife giving the roll edge a wavy or shaggy appearance. A defective slitter edge may be nicked or torn with an irregular or rough edge to the paper. Edge tears may also occur if the roll is bumped or damaged on the end. Slitter dust is sometimes present which can build up on the outer edges of the blanket causing print deterioration and/or scoring of the rubber.

### **Foldover**


Crack or tear in the edge of the web which is folded over during slitting or rewinding.


## **5 Mill splicing defects - J**

There are two general types of defective mill joins that cause web breaks: Break at the join or a break on the join.

A protruding mill join is now comparatively rare and occurs if the two webs are not inline with each other and the paper protrudes at the end of the roll, this may stick to the ink on the blanket at the edge of the printing area.

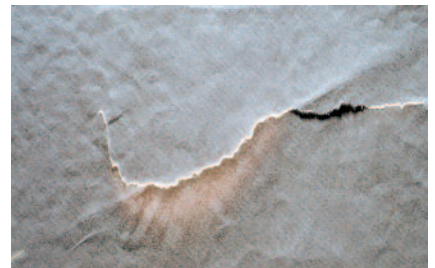
A stuck (or defective) mill join is where the splice tape is not covered by the paper (or the cover tape) and sticks to the next paper layer in the roll causing a web break. Even when the mill join is correct there may be some wrinkles or creases in the paper after the splice.

 Incorrect splice systems lead to adhesive bleeding out due to the high pressure within the roll, causing paper layers in the roll to stick together which will cause a web break as they are unwound.

 To avoid wetting of paper layers around the join only "hard" adhesive double coated tapes should be used for overlap joins; for butt joins only single coated tapes should be used.



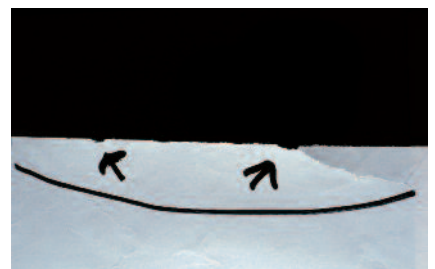
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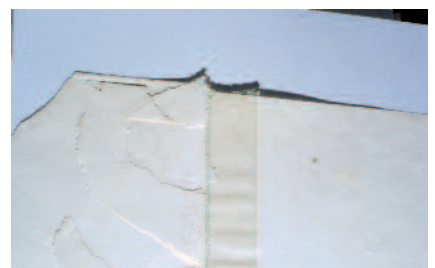
G



H



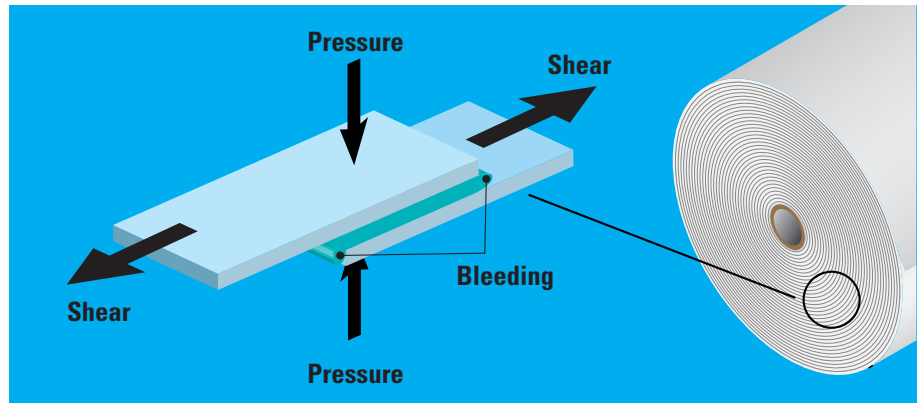
I



J

F- Winder wrinkles  
G- Burst  
H- Edge cracks  
I- Poor slitter edge  
J- Mill splice defects

The right combination of adhesive tape and splice type are essential to minimise web break risks during printing. Some adhesive systems contain additives which behave like a liquid and will be absorbed by most paper qualities. This moistening of the paper can create weakness in the tension profile and may lead to a web break.



K- Rope marks

## 6 Non-uniform rolls

Cause is excessive thickness of paper or moisture which under pressure stretches creating more paper, resulting in a baggy area in the web.

### **Soft end**

Variations in sheet thickness across the web make the edge of the roll feels "soft" in relation to adjacent areas.

### **Slack edge (baggy web)**

Poor moisture or caliper profile across the web (or both) creates a "long edge" which cannot be tensioned in the winder. An area of paper across the width of the web appears slack or baggy and can result in creasing; loss of register; and web wander (especially over air turn bars).

### **Rope / Chain marks - K**

These occur when areas with differing caliper cause the web to stretch under high tension during winding and calendaring. They are bands of relative variation which extend around the roll, parallel to the machine direction, and possibly all the way through the roll. Between these bands are diagonal markings that resemble a rope or have a tyre-like pattern.

## 7 Core defects

Manufacturing defects are comparatively rare and may include: Core protruding from the roll end. Slipped core caused by slack start, by drying out and shrinkage of roll core or delamination.

## 8 Wrapping defects

### **Stuck edges (glue on end)**

Caused by either a fault in the wrapping process allowing glue to come in contact with the roll end; or by localised water penetration of the wrapper resulting in small patches where the paper layers are stuck together.

## 9 Transit, handling and storage damage



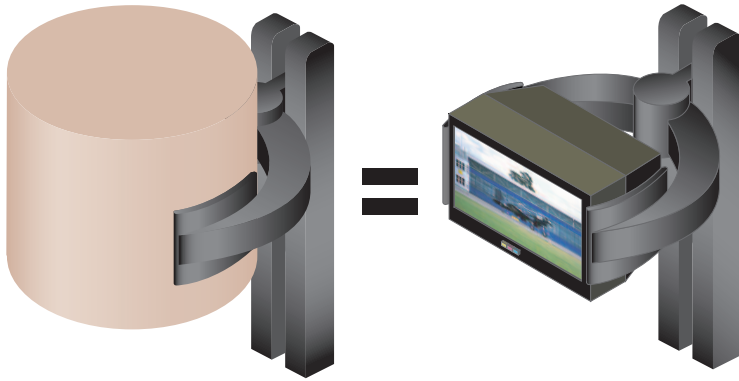
See "Roll to web processing" for best practice procedures to store and handle paper rolls. This is a major web break cause and is mostly in the hands of the printer to control.

### **Delivery inspection**



Check condition of rolls as they are unloaded. Failure to report damage to delivery driver will make subsequent damage claims difficult with insurance companies.






A paper roll costs the same as a large colour TV!



### Handling and storage damage

 Motivate staff to use best practice procedures to store and handle paper rolls. The following list will help isolate working procedures which may need improvement.

#### Crushed core

Results if roll has been dropped at some point in the transport chain.

#### Out-of-round

Caused by hard impact during transit; prolonged horizontal storage; excessive lift truck pressure.

#### Starred roll

Caused by a hard impact during transit or handling.

#### Body damage

Perforation of body wrapping and paper by poor handling (scuffing, impact against a sharp object, incorrect lift truck procedures).

#### Crimps and edge nicks

Caused by poor roll handling (e.g. turning the roll without sufficient ground clearance; releasing the roll when the mast of the lift truck is not vertical; incorrect stacking of rolls in the warehouse).

#### Head damage



Tears or indentations of roll ends caused when stored on end on rough or dirty surface; or by rough handling over an uneven surface.

#### Water damage

When saturated areas dry out, one or more web layers stick to each other. This defect is not always visible on the wrapper but can be seen as gaps in the roll windings (be careful not to confuse this with glue on roll ends).

#### Moisture wrinkles or Piping

Wrinkles running around the roll in the machine direction, as a result of absorbing moisture from the atmosphere. These wrinkles are caused by an imbalance between the moisture in the paper and the moisture in the surrounding atmosphere.

-  Do not remove belly wrapper until roll is loaded on to paster.
-  Ideally, the area where rolls are unwrapped should be at 20°C-23°C (68-74°F), 50-55 % Relative Humidity.

**Some printers attach high density foam pads to the metal clamps to act as a cushion.**



Check clamp pressure regularly





## BEST PRACTICE

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**Aylesford Newsprint** is a dedicated manufacturer of premium quality newsprint. Its "Renaissance" brand is widely used by many major European newspaper publishers. The mill specialises in 100% recycled newsprint of exceptional runability and superior printability — brighter, cleaner and with high opacity. All products are made exclusively by recycled paper using highly skilled staff operating the most advanced technology available. The company's continuous improvement programme helps ensure the attainment of the highest operational and environmental standards. Aylesford Newsprint is jointly owned by SCA Forest Products and Mondi Europe who bring a wealth of experience in quality paper manufacture.

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### Kodak

**Kodak GCG** (Graphics Communications Group) provides one of the broadest product and solutions portfolios available in the graphic arts industry today, including a wide range of conventional lithographic plates and Computer to Plate solutions; Kodak GCG branded graphic arts films, digital, inkjet, analogue and virtual proofing products, as well as digital printing solutions and colour management tools. Kodak GCG is a leader in prepress technology and have received 16 Graphic Arts Technology Foundation (GATF) InterTech Technology Awards. With headquarters in Rochester, NY, USA, the company serves customers around the globe with regional offices in the United States, Europe, Japan, Asia Pacific and Latin America.

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### manroland

**manroland AG** is the world's second largest printing systems manufacturer and the world's market leader in web offset. manroland employs almost 8 700 people and has annual sales of some Euro 1,7 billion with an export share of 80%. Web fed and sheetfed presses provide solutions for publishing, commercial, and packaging printing.

[www.man-roland.com](http://www.man-roland.com)



**MEGTEC Systems** is the world's largest supplier of weblines and environmental technologies for web offset printing. The company is a specialised system supplier for roll and web handling (loading systems, pasters, infeeds) and web drying and conditioning (hot air dryers, oxidisers, chill rolls). MEGTEC combines these technologies with in depth process knowledge and experience in coldset and heatset printing. MEGTEC has manufacturing and R&D facilities in the US, France, Sweden and Germany, China and India along with regional sales, service and parts centres. MEGTEC also provides energy and efficiency consulting and machine upgrades.

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**Muller Martini** a globally active group of companies is the leader in the development, manufacture and marketing of a broad range of print finishing systems. Since its foundation in 1946 the family-owned business has focused exclusively on the graphic arts industry. Today, the company is segmented into seven operating divisions: Printing Presses, Press Delivery Systems, Saddle Stitching Systems, Softcover Production, Hardcover Production, Newspaper Mailroom Systems and OnDemand Solutions. Customers rely on a worldwide manufacturing, sales and service network of approximately 4 000 employees. Subsidiaries and representatives provide Muller Martini products and services in all countries of the world.

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**Nitto Denko Corporation** is one of the world's specialist suppliers of polymer processing and precision coating. The company was formed in Japan in 1918 and employs 12 000 people all over the world. Nitto Europe NV is a subsidiary, which was founded in 1974 and is the group's leading supplier to the paper and printing industries with products like repulpable double-coated adhesive tapes for splicing systems. Nitto has also become the reference supplier to offset and gravure printers worldwide. Nitto Europe NV is ISO 9001 certified.

[www.nittoeurope.com](http://www.nittoeurope.com), [www.permacel.com](http://www.permacel.com), [www.nitto.co.jp](http://www.nitto.co.jp)

### QuadTech.

**QuadTech** is a worldwide leader in the design and manufacture of control systems that help commercial, newspaper, publication and packaging printers improve their performance, productivity and bottom line results. The company offers an extensive range of auxiliary controls, including its best-selling register guidance systems (RGS), the award-winning Color Control System (CCS) and the widely-known Autotron. QuadTech, founded in 1979, is a subsidiary of Quad/Graphics and is based in Wisconsin, USA. The company was ISO 9001 registered in 2001.

[www.quadtechworld.com](http://www.quadtechworld.com)



**SCA** (Svenska Cellulosa Aktiebolaget) is a global consumer goods and paper company that develops, produces and markets personal care products, tissue, packaging solutions, publication papers and solid wood products. Sales are conducted in 90 countries. SCA has annual sales in excess of SEK 101 billion (c. € 11 billion) and production facilities in more than 40 countries. SCA had approximately 51 000 employees at the beginning of 2007. SCA has a range of high grade, customised publication papers for newspapers, supplements, magazines, catalogues and commercial printing.

[www.sca.com](http://www.sca.com), [www.publicationpapers.sca.com](http://www.publicationpapers.sca.com)



**Sun Chemical** is the world's largest producer of printing inks and pigments. It is a leading provider of materials to packaging, publication, coatings, plastics, cosmetics, and other industrial markets. With annual sales over \$3 billion and 12 500 employees, Sun Chemical supports customers around the world and operates 300 facilities throughout North America, Europe, Latin America and the Caribbean. The Sun Chemical Group of companies includes such well-known names as Coates Lorilleux, Gibbon, Hartmann, Kohl & Madden, Swale, Usher-Walker and US Ink.

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**Trelleborg Printing Blankets** is a product area within Trelleborg Coated Systems. Trelleborg is a global industrial group whose leading positions are based on advanced polymer technology and in-depth applications know-how. Trelleborg develops high-performance solutions that seal, damp and protect in demanding industrial environments. Trelleborg is represented in the printing industry with its brands Vulcan™ and Rollin™. With the market knowledge grown over many years combined with innovative technology, patented processes, vertical integration and total quality management, servicing 60 countries on five continents, both brands can be considered among market leaders worldwide, providing offset printing blankets for the web, sheetfed, newspaper, business forms, metal decorating and packaging markets. Its European production sites are certified with ISO 9001, ISO 14001 and EMAS certifications.

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www.wocg.info **e-TOOLBOX**

<p><b>Roll to web processing</b></p>	<p><b>Web break prevention &amp; diagnosis</b></p>	<p><b>How to avoid surprises when changing paper grades</b></p>	<p><b>Productivity maintenance</b> How to run presses longer, leaner and faster</p>
<p><b>How to get colour approved rapidly and maintain it</b></p>	<p><b>Environmental considerations</b> Energy Economy Efficiency Ecology</p>	<p><b>Total process colour control &amp; Alternative Screening Technologies</b></p>	<p><b>Perfectly Finished Web Printed Products</b></p>

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