Newsprint and newsink economy and quality in the face of rising prices : workshop, Hong Kong 13-14 June 1995 : [quality parameters]

1995

https://hdl.handle.net/10356/93220

Quality Parameters

Session 8:

Quality parameters

Inking levels
Set-off and rub-off
Print-through
Linting
Fan-out
Register control

ifra

QUALITY PARAMETERS IN NEWSPAPER PRINTING

QUALITY PARAMETERS AND THEIR USEAGE IN EVALUATIONS

Even halftone areas (D)	100	%
Even solid tones (D)	88	
Tonal reproduction	75	
Colour accuracy	63	
Detail rendition	63	
Density of solids (D)	50	
Sharpness	50	
Register	38	
Screen ruling	25	
Paper shade	25	
Paper brightness	25	
Saturation of colours	13	
Grey balance	13	

ifra

Even halftone and solid areas require correct: INKING

Even inking - **within one copy and throughout one run** - is one of the most important key issues to print quality.

In a conventional inking unit - comprising of up to 25 rollers - variations must be kept in a low level to ensure consistency. Once the variation increases, it is impossible to stabilise within a reasonable time.

To be able to stabilise the inking, the printer needs **target elements** to measure or to visually evaluate.

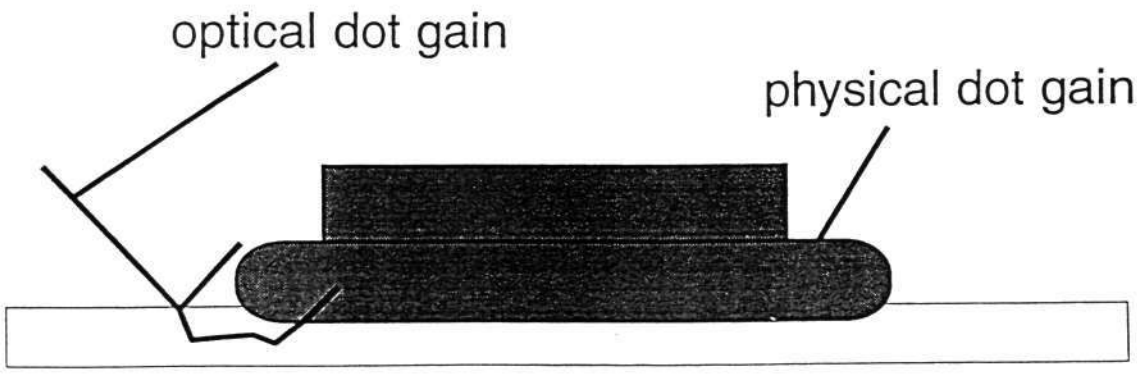
ifra

DOT GAIN

When ink is applied on paper, each individual halftone dot increases in size - this is called dot gain.

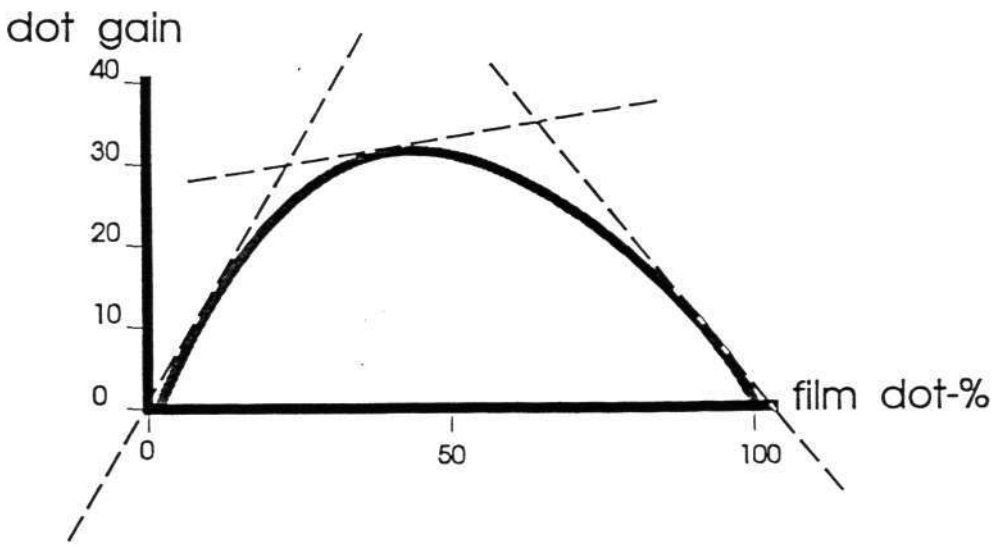
There are two factors causing dot gain:

- physical enlargement of dots **(physical dot gain)**
- caused by wet ink penetrating into the paper
- optical enlargement of dots **(optical dot gain)**
- caused by light traveling in the paper and reflecting to areas covered with ink



ifra

Factor	Change in dot-%
PLATEMAKING Under cutting of light	+ 3
PRINTING Optical dot gain	+ 20
Physical dot gain	**+ 6**
TOTALLY	+ 29



Dot gain in highlights increases contrast, in the middle tones maintains contrast and in the shadows reduces contrast.

ifra

Factors affecting dot gain:

ink
paper
screen ruling
dot shape
amount of ink
amount of water
fountain solution
blanket
impression
temperature
plate
film type (negative/positive)
humidity
press speed
ink sequence

ifra

The key issues in minimising and stabilising dot gain are:

- establish a good ink-water balance
- maintain constant inking through measuring
- do not use too rough paper, especially with inks of low viscosity
- do not use too high impression settings
- use elastic blankets
- control the platemaking

ifra

DENSITY OF SOLIDS

The density of solid tone areas is determined by:

- maximum contrast
- the amount of rub-off and set-off

Maximum contrast is defined by using the NCI-test (Normal Colour Intensity)

$$K_r = D_s - D_h / D_s$$

K_r = relative contrast
D_s = solid density
D_h = halftone density (usually 70% halftone)

In very many practical cases, the optimal inking level determined by NCI has been decreased to avoid rub-off and set-off.

ifra

Set-off is ink attaching to other surfaces (cylinders, roller bars, opposite page) *immediately after printing*.

Tested in a test device which has two nips. The first to apply ink and the second to bring a test paper in contact with the ink. Density of the test paper is measured.

Rub-off is ink attaching to other surfaces when the surface is rubbed *1 - 24 after hours printing.*

Tested by a special device where a specified weight (50gr.) is covered with paper and rubbed against the printed surface.Density of the rubbing paper is measured.

ifra

For black inks, low-rub inks have been developed and they produce satisfactory results. For colour, it is more difficult.

IFRA is running a project on high pigmented newsinks where:

- the pigment concentration of ink is increased from 14 - 16 % to 18 - 22%
- more pigments requires less ink to produce high density
- the rub-off behaviour of these inks are tested

ifra

PRINT THROUGH: STRIKE THROUGH and SHOW THROUGH

Print through is ink becoming visible on the reverse side of the paper. It is caused by strike through and show through.

In a test of 32 European newsinks print through varied from 0.044 to 0.070 with ink densities of 0.85 - 0.95. (45 gr. newsprint of opacity 93.0)

ifra

Strike through is caused by ink penetrating deep into the poures of the paper.

It is measured by zeroing the densitometer on the paper and by measuring the density on the reverse side of a solid tone.

Strike through should be kept in a good region by:

good ink-water balance
not too low viscous inks
not too porous paper
correct densities
not too high impression settings

ifra

Show through is ink becoming visible on the reverse side because of low opacity (high transparency) of the paper.

Opacity is a measure of the ability of the paper not to transmit light.

Correct values for opacity are:

grammage	opacity %
48.8	93.5
45.0	92
40.0	90

(all with Y-value of 64.5)

ifra

LINTING, FAN-OUT

Linting is cumulative build-up of small fibre particles on the rubber blanket.
It causes density variations, mottling and marking.

Linting is strongly affected:
- by the linting prospensity of the paper (amount of loose fibres or fillers)
- by the ink (tack and viscosity)
- by the printing conditions

To avoid linting:
- use rough paper
- use lower viscosity ink
- use lower tack ink
- use good blankets

ifra

Fan-out is dimensional change in paper caused by the applied water and ink.

The direction of the dimensional change depends on the **fibre orientation.**

The fibres swell more than they increase their length >
high orientation in MD (Machine Direction) causes larger changes in width

The amount of fan-out should never be more than **0.1 % of paper width.**

Because fan-out varies from mill to mill, from paper to paper and from reel to reel, it should be compensated in the press (and/or prepress)

ifra

A basic adjustment can be done in prepress or by positioning of the plates.

Variations from that basic adjustment should be carried out in the press.

ifra

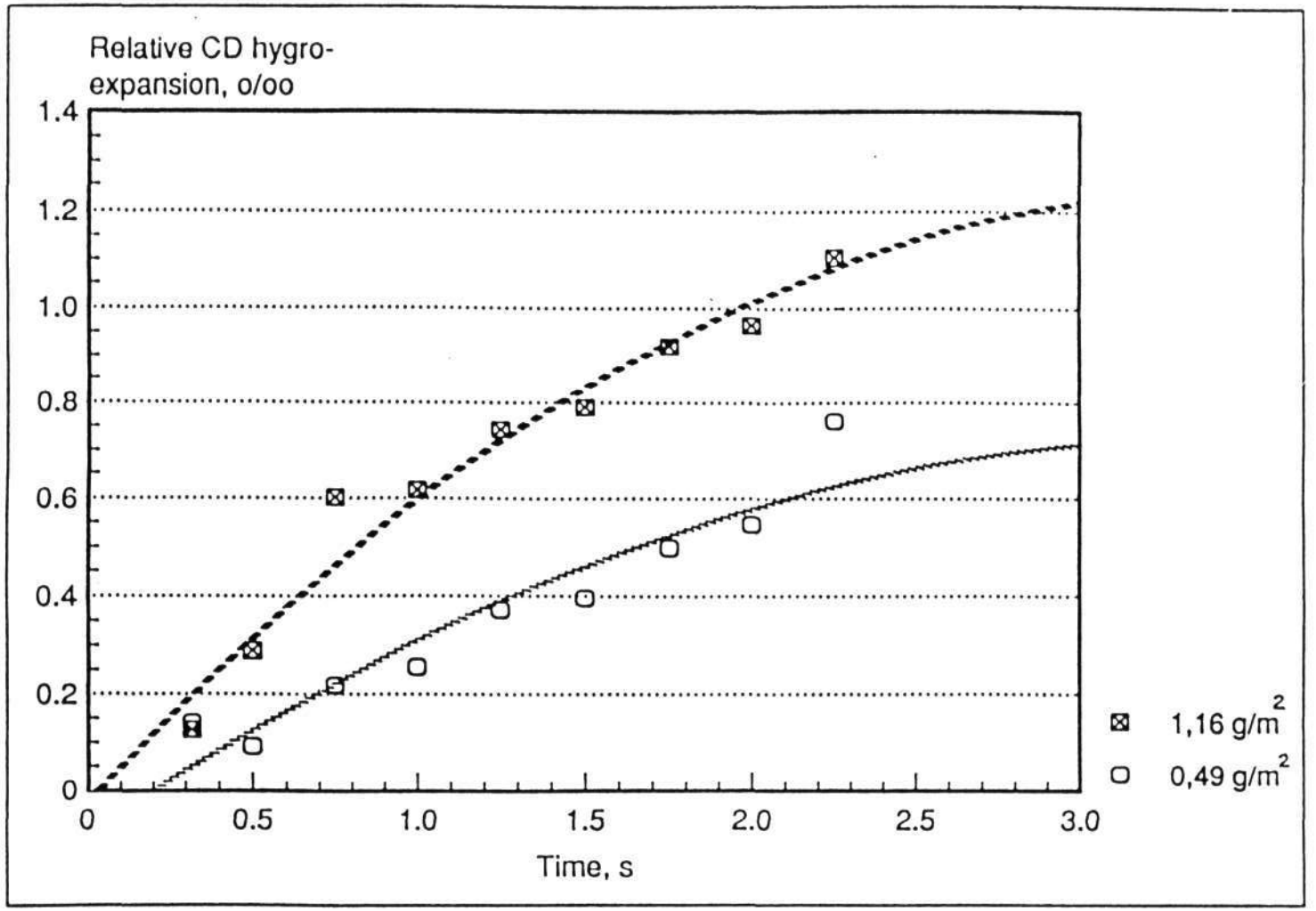


Figure 17. *Time dependance of the dynamic CD hygroexpansion of newsprint at two amounts of applied water. Results from pilot scale trials.*

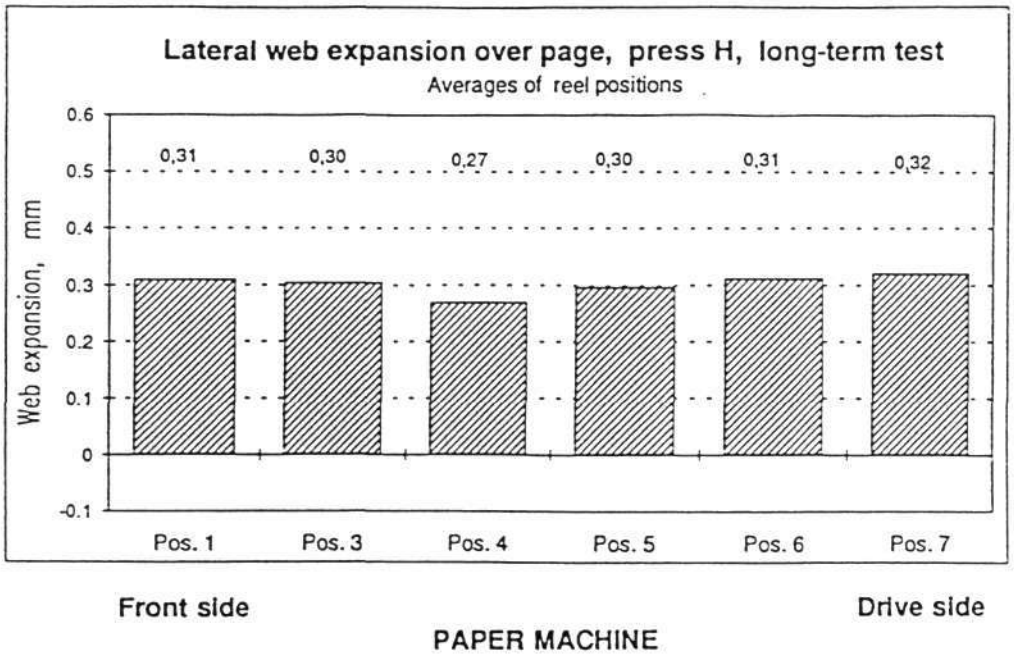


Figure 1. *The average lateral web expansion over the page in press H was 0.305 mm. Only position 4 deviates significantly from position 7. No other significant differences between reel positions were found.*

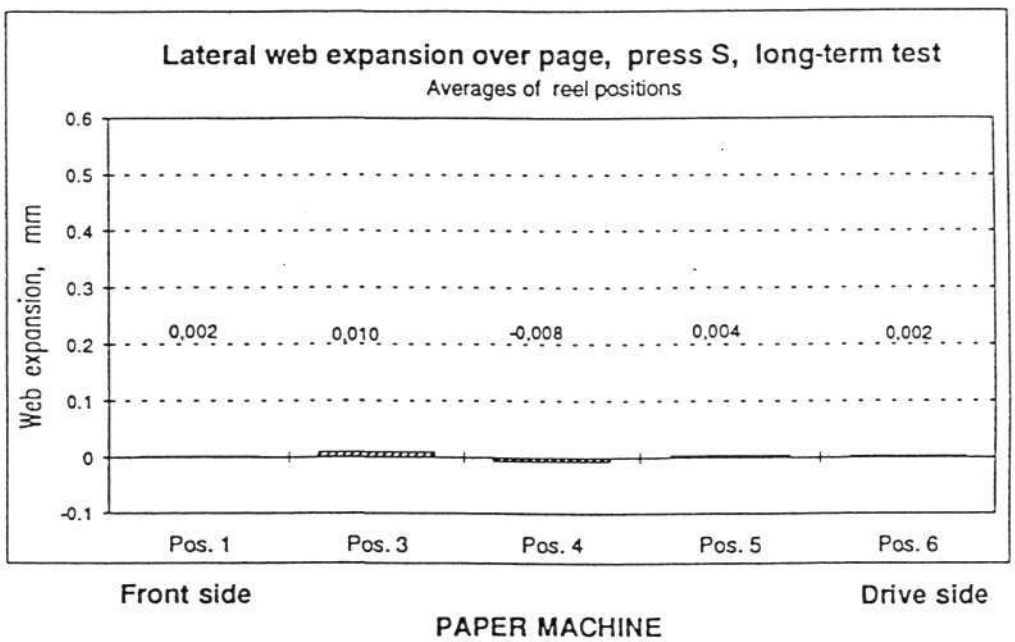
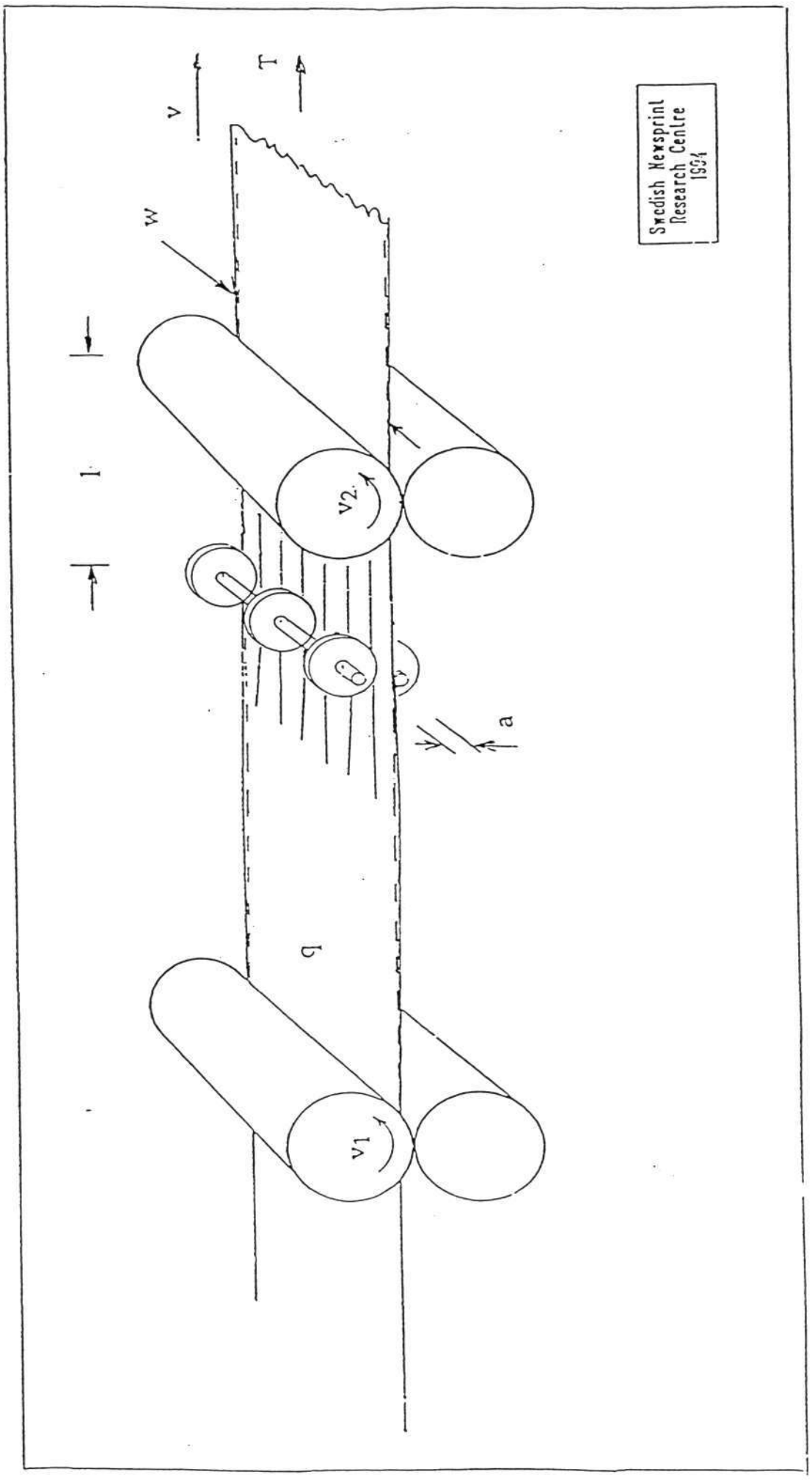
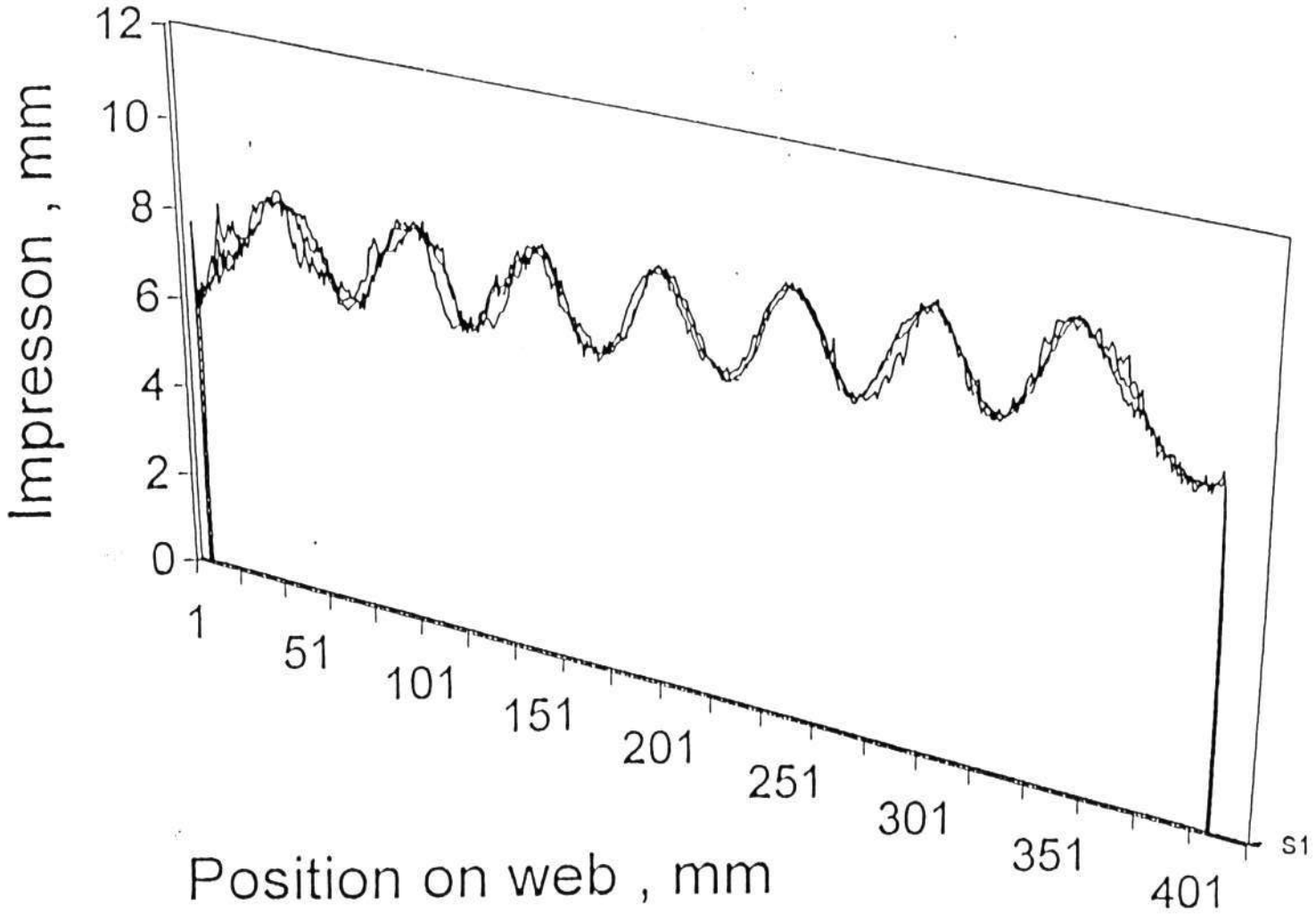


Figure 2. *The average lateral web expansion over the page in press S was 0.002 mm. No significant differences between reel positions were found.*

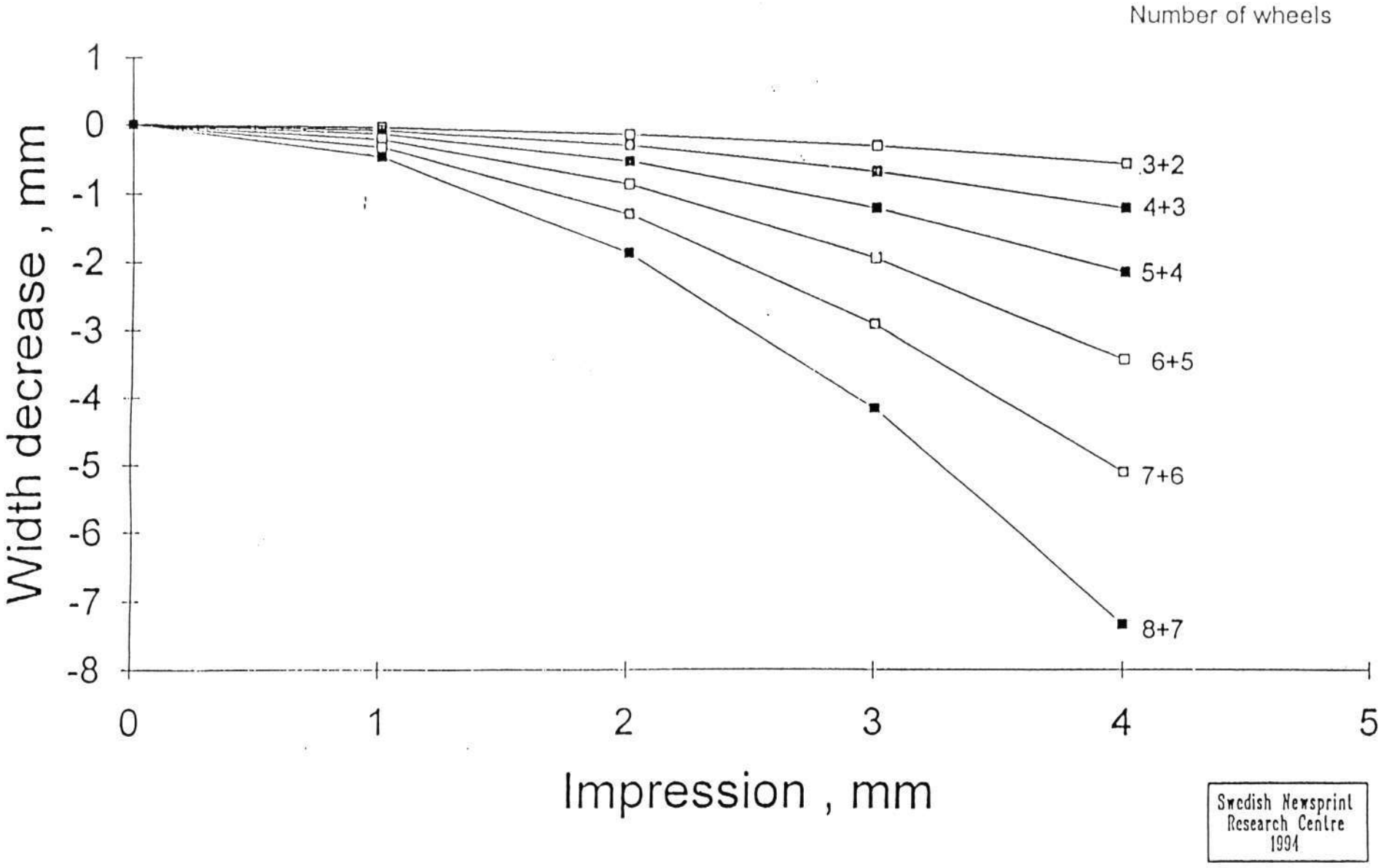
ifra





The wave form across the paper web 10 cm after the anti fan-out rollers at the impression of 2 mm. Number of wheels 7 + 8.

1994-05-04



The width decrease of the paper web (calculated) as a function of the impression in the paper at different number of anti fan-out wheels.

1994-05-03

REGISTER CONTROL

Accurate register is a precondition to good colour.

Micro register is a precondition to sharp crisp bright images.

Register errors are caused by:
- sudden changes in web tension
- constant movement of the web
- register errors in films, plates, separations

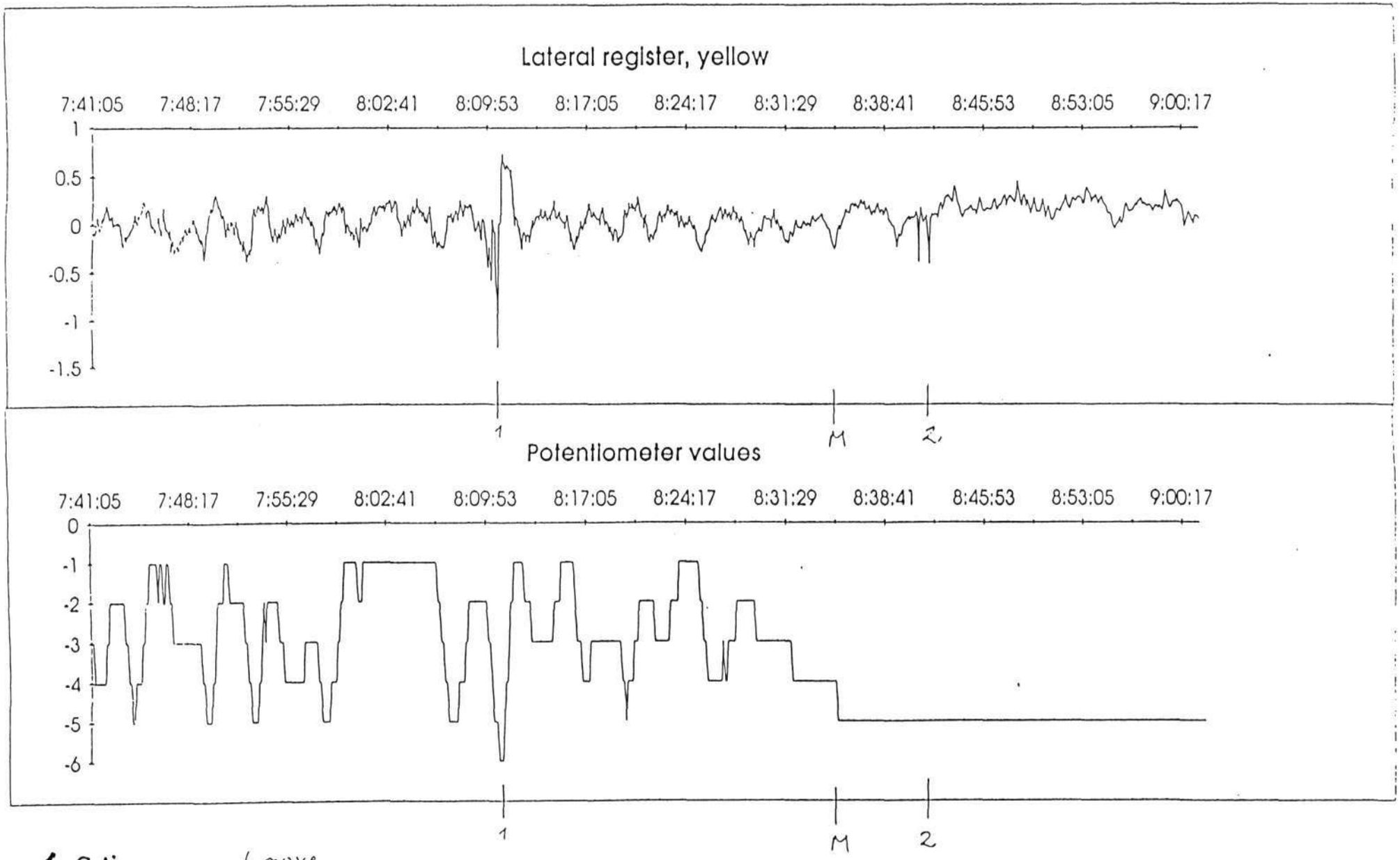
Sudden changes are caused by web tension changes after reel changes, during speed alterations, because of material variation etc. There causes should be minimised and bad copies ejected.

ifra

Constant movement of the web cannot be avoided. The press should be adjusted so that the movement is within tolerable limits (< 0.05 mm)

Register errors of plates, films and separations should be avoided altogether.

ifra

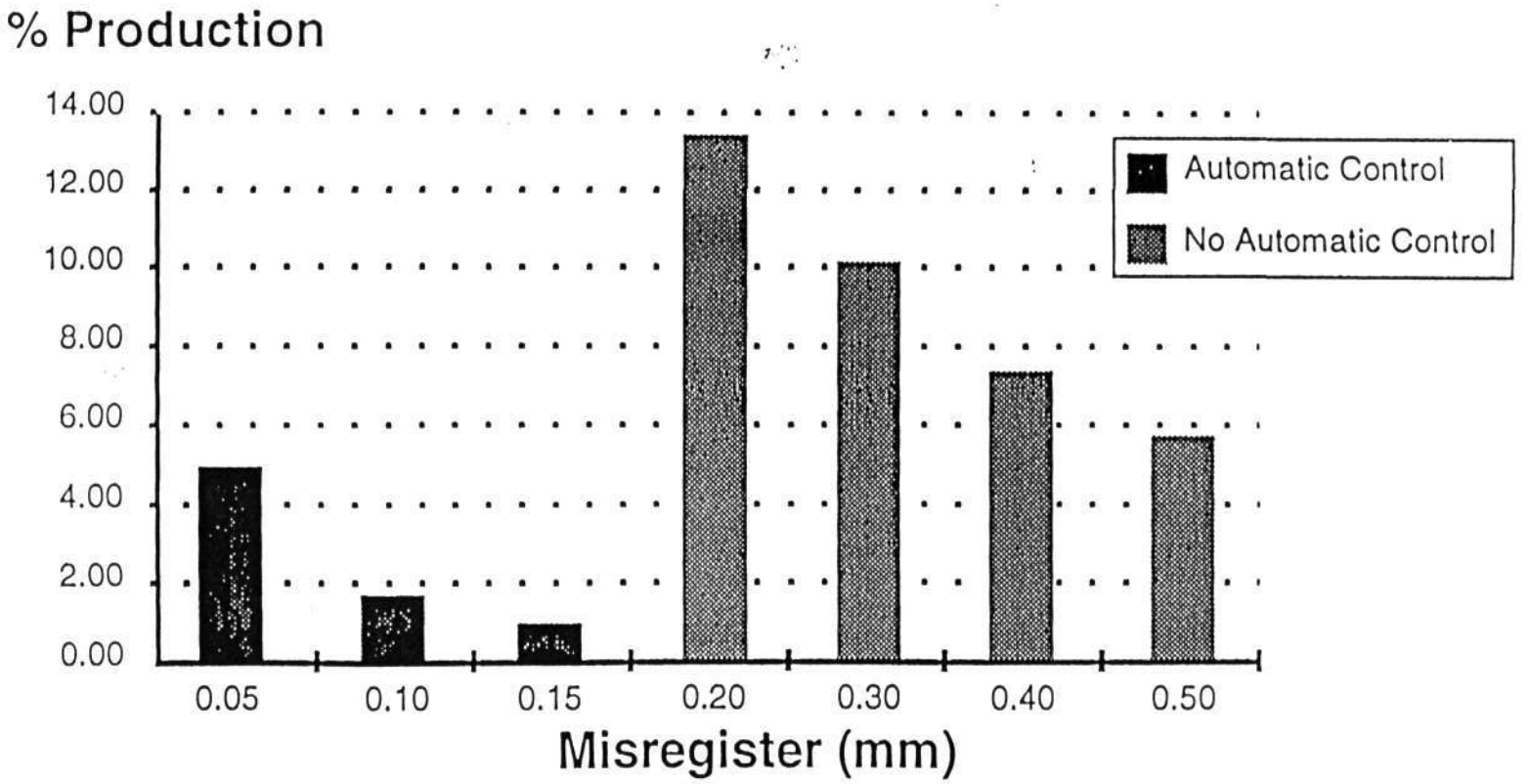


1 Splice, manual move
2 Splice

Appendix

News International

Analysis of Misregister With and Without Automatic Register Control



PressTech CONTROLS LTD

Appendix 4

Newsprint Properties and their Correlation to Print Quality

Print Uniformity (evenness, sharpness, etc.)

Basic characteristics	
Moisture content	○
Ash content	○
Structural properties	
Sheet formation (incl. pin holes)	●●
Sheet defects (holes, shives, etc.)	○
Sheet density/Sheet thickness	○
Roughness/Smoothness	●
Hardness	●
Oil absorption (permeability)	○
Mechanical characteristics	
Surface strength	●

○ Low influence

● Medium influence

●● High influence

Relative print density / ink requirement

Basic characteristics	
Ash content	○
Structural properties	
Sheet density/Sheet thickness	○
Roughness/Smoothness	●●
Hardness	○
Oil absorption (permeability)	●
Optical characteristics	
Shade	○
Y-Value (brightness)	●●
Opacity	○
Light scattering coefficient	○

○ Low influence

● Medium influence

●● High influence

Print-through

Strike through and Show-through

Basic characteristics	Strike-through	Show-through
Grammage	●	●
Ash content	●	●
Structural properties		
Sheet formation (incl. pin holes)	○	○
Sheet density/Sheet thickness		○
Oil absorption (permeability)	●	
Optical characteristics		
Shade		○
Y-value ("brightness")		●●
Opacity		●●
Light scattering coefficient		●●

○ Low influence

● Medium influence

●● High influence

Linting/Plugging
(fibre and filler deposit)

Basic characteristics	
Moisture content	●
Ash content	○
Mechanical characteristics	
Surface strength	●●
Web and reel characterictics	
Slitter defects	●

○ Low influence

● Medium influence

●● High influence

Web breaks

Basic characteristics	
Moisture content	●●
Structural properties	
Sheet defects (holes, shives, etc.)	●●
Water absorption	○
Mechanical characteristics	
Tearing resistance	○
Tensile strength	○
Elongation	●
Web and reel characteristics	
Winding defects	●●
Slitter defects	●
Splicing defects	●●
Cross direction profile (non-uniformity)	●
Core defects	○
Wrapping defects (glue on end)	●●
Transport and storage defects	●

○ Low influence

● Medium influence

●● High influence