US Ink® A Division of Sun Chemical Corporation

Plate Related Problem Guide

Volume XII

The lithographic plate can be a source of unacceptable print. This unacceptable print is usually a premature density loss during the course of a press run, which may be associated with blinding or plate wear. Premature plate wear is a problem which may have underlying causes which are not frequently addressed.

The following are typical problems and their effects:

- Mechanical plate wear - loss in density of print
- Chemical plate blinding and wear - loss in density of print
- Chemical contamination - ink receptivity onto plate and paper
- Paper fiber buildup on plate - loss in density of print

As one can see, the problems result in similar effects on printed form and therefore discriminating and providing solutions can be difficult. Proper diagnosis should be made by investigating the symptoms prior to determining the causes.

Phase I : Acquiring Initial Information

The following questions should be addressed prior to performing any required experimentation.

- What unit (color) is the problem occurring? (i.e....magenta - typically associated with chemical blinding)
- What type of printing process do they use? (offset/direct)
- What type of water does the customer use to make their fountain solution? (tap or deionized, hard or soft) What type of fountain etch?
- What type of plate and what make is it? (wipe on, press ready)
- What is the shelf life of these plates and when were they used in reference to the shelf life?
- What type of plate processor do they use?
- Are processor settings different from manufacturer s recommended settings? (if yes then why/what?)

- Has plate developing parameters changed recently? (if yes then why/what?)

When the above questions have been addressed, most problems can be categorized from the diagnosis and some situations can be isolated as possible causes. For instance, printing problems associated with magenta units may often be due to chemical blinding via cation exchange of the pigment (i.e.. lithol rubine) with the aqueous phase. This ion exchange results in the formation of an insoluble salt, which adheres or clusters near the image area rendering that area to become less ink receptive. Therefore water quality, fountain etch, ink unit questions can isolate possible causes of a problem quickly without performing a single experiment.

Phase II : Detailed Information

Additional questions are often required and should be addressed to the people who have observed the problems.

- When does the problem start to occur?
  - After a long period of time?
  - Upon restart?
- If customer utilizes a variety of plates, does the problem occur on selective plates or does it vary?
- Is the problem specific to printing unit?
- Is the problem specific to ink?

After assessing the situation, several possible causes can be targeted as the main problem.

Phase III : Test Procedures

This phase consists of all relevant experimentation that must be performed in order to establish cause and assure proper diagnosis. The following are experimentation capabilities of the Carlstadt facility :

***SEM* - observe the topography of image and non-image area for any irregularities (can determine what type of wear is present, if any)**

X- Ray Analysis **- determine whether there are chemicals not of plate chemistry**

Visual Assessment **of plate and print**

Plate wear

Image transfer from previous printing unit (symptom associated with wear)

IR Spectroscopy **- presence of organic contaminants and or extent of image area polymer cure**

Zincate Test **- determine interlayer wear**

Dynamic Contact Angle **- measure ink receptivity on new and used plates**

Emulsion Rheology **- determine flow curve differences of emulsion vs. neat ink**

Pigment Dispersion

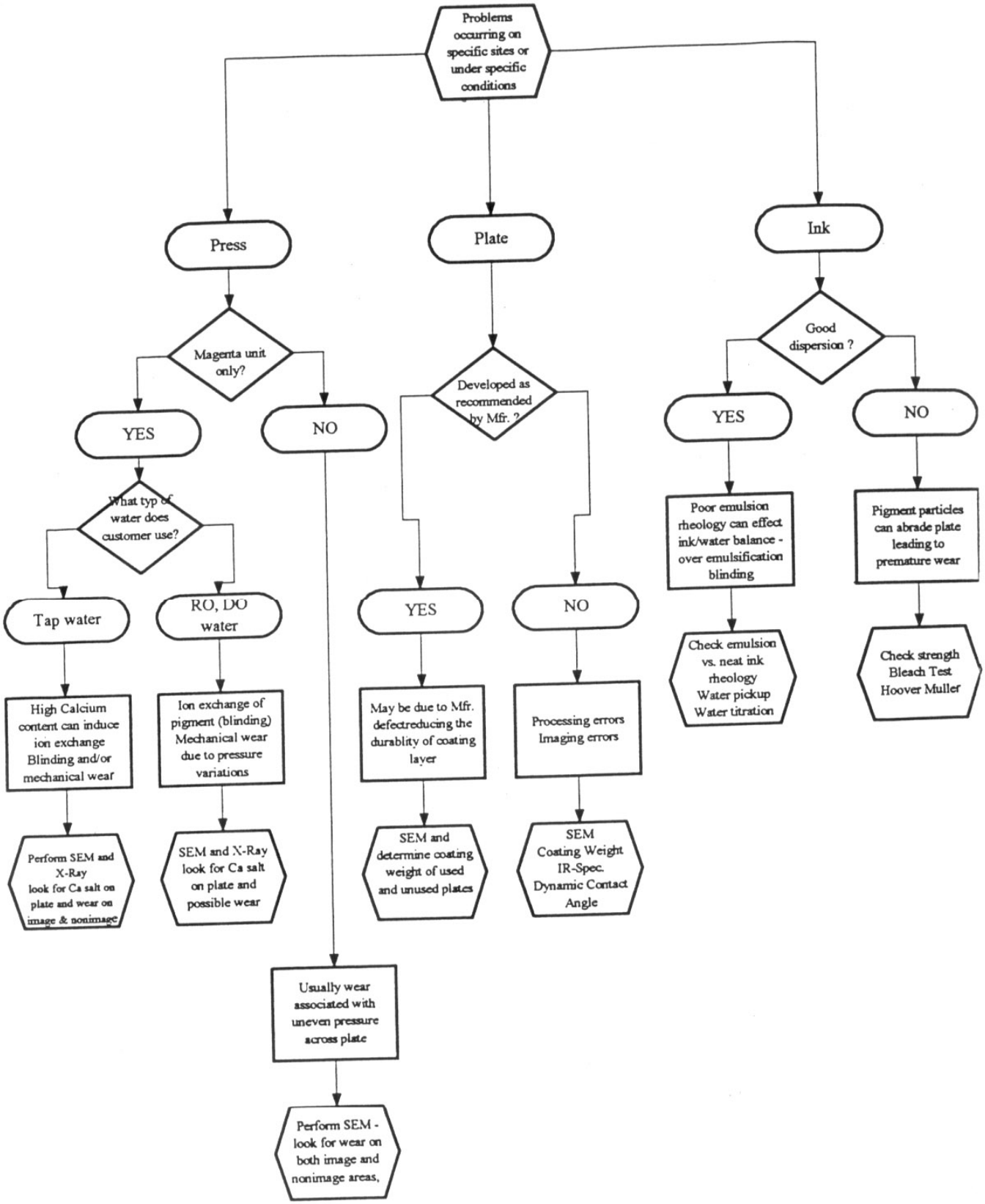
Phase IV : Create a Database

A database should be created for plate related problems from various customers so that quick and accurate diagnosis can be made. Certain types of problems are customer specific and/or region specific and/or seasonally specific, therefore, problems should be classified as such. Database on all relevant items regarding plates (i.e. plate processors) should also be created because they also have their own peculiarities. The following table consists of some examples with print and wear problems:

Problem Type Cause Interaction

PROBLEM	*TYPETYPE*	*CAUSE*	*INTERACTION*
Blinding	Chemical Contamination on Plate	Chemical sensitization via ion exchange	Ink/water/plate
Marks on Print	Chemical contamination on plate	Plate processing, Handling and press hygiene	Plate/pressmen
Wear	Chemical	Wear by grinding action of Ca precipitate on plate and/or rollers	Ink/plate
		Swelling of polymer coat	plate/solvents
	Press	Uneven pressure across the plate	Plate/press
	Plate	Mfr. Defect	Plate/press
		Insufficient curing of polymer coating	Plate/processor
	Ink	Poor dispersion, emulsion rheology, chemical reaction	Ink/water/plate

An efficient diagnosis of printing problems and effective remedy can be made as the database is increased. It should be noted that prior to performing any long and arduous experimentation, Phase I & II should be implemented first. Attached is a flow chart, which can guide you in probing plate related problems.


Problems occurring on specific sites or under specific conditions
Press
Plate
Ink
Magenta unit only?
Developed as recommended by Mfr. ?
Good dispersion ?
YES
NO
YES
NO
YES
NO
What typ of water does customer use?
Tap water
RO, DO water
Poor emulsion rheology can effect ink/water balance - over emulsification blinding
Pigment particles can abrade plate leading to premature wear
High Calcium content can induce ion exchange Blinding and/or mechanical wear
Ion exchange of pigment (blinding) Mechanical wear due to pressure variations
May be due to Mfr. defectreducing the durablity of coating layer
Processing errors Imaging errors
Check emulsion vs. neat ink rheology Water pickup Water titration
Check strength Bleach Test Hoover Muller
Perform SEM and X-Ray look for Ca salt on plate and wear on image & nonimage
SEM and X-Ray look for Ca salt on plate and possible wear
SEM and determine coating weight of used and unused plates
SEM Coating Weight IR-Spec. Dynamic Contact Angle
Usually wear associated with uneven pressure across plate
Perform SEM - look for wear on both image and nonimage areas,