Technical Notes

NANCY PLOWMAN ASSOCIATES, INC.

www.npatest.com

The Blister Test

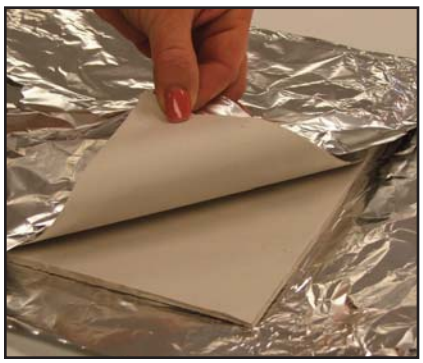
When coated paper is printed on a heat set web offset press, the oven brings the paper's surface temperature (PST) from "room" temperature to values in excess of 250°F and generally in the range of 275-300°F. Since paper contains water (moisture), and water vaporizes at 212°F, there has to be a mechanism for the moisture to escape rapidly from the interior of the sheet, preferably up through the coating layer and inks(s). Otherwise, the vaporized water will have to escape sideways, delaminate the fibers, and cause a condition known as ***blistering***.

Over the years, mills have come to realize there are three important factors that control blistering:

% Moisture in the sheet – The actual percentage, by weight, of water in the paper
Internal Bond – The delamination strength of the paper to be internally split
Porosity – The "openness" of the sheet that allows air to pass through it

In the lab we strive to simulate the web offset printing process in order to predict blister on coated papers. We also are able to determine the temperature at which the paper will blister. Most mills will guarantee their coated text papers up to 300°F, Coated covers have to be treated slightly different as they contain more moisture than text papers. Covers can be "shocked" quickly in the heat of the oven, and have to run a little slower in the press to gradually remove the water in the sheet.
This procedure is continued, increasing the PST until blistering occurs.

Here are the steps we take to test for blister:
STEP 1: Sample the paper off the roll in the printing plant. The paper must be sampled by cutting an approximate 12" x 12" 'window" into the roll. The paper must be immediately wrapped in foil and then in plastic to maintain the moisture level in the sheet.



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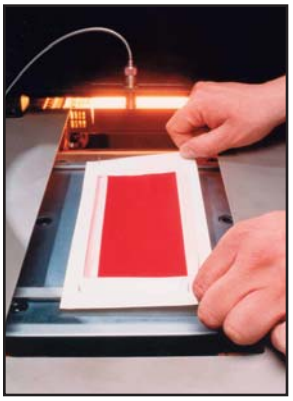
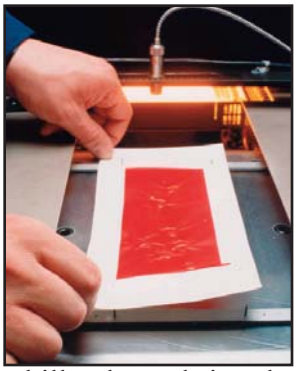
STEP 2: The paper sample is cut for testing and immediately printed on both sides, to simulate typical coverage on press. Here we use a special red ink, at a film thickness of 0.05 mil on both sides.

STEP 3: The printed sample is then heated in the "Heat Set Tester". The paper is placed on the machine and is passed through an oven where quartz lights super-heat the sample on both sides.



STEP 4: An IR sensor at the oven's exit records the Paper Surface Temperature (PST).



The printed sample is removed and placed on a chill color to bring the ink temperature back to ambient conditions.

The sheet is examined for blister.