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Common curtain coating problems: causes, detection, and correction

Scope

Curtain coating is the deposition of a functional coating of a wax-based hot melt on a combined board surface by transporting the board through a falling film or “curtain” of the molten material.

As with any converting operation, various problems can arise, causing operational difficulties, and product defects.

The purpose of this Technical Information Paper is to identify common curtain coating problems, including how to detect those that may not be readily apparent, to list some of their causes, and to recommend corrective measures.

Safety precautions - Hot wax!

Curtain Coating Wax is used at elevated temperatures. Hot curtain coating wax can cause significant burns. Wear proper safety equipment when working on or near a curtain coater.

Content

Problem	Possible causes	Correction
Pinholes	1) Elongated holes caused by bubbles in the melt due to air entrainment from splashing, enfolding, pump leaks, etc. 2) Round holes forming after laydown from moist board or dense spots due to sizing, calendering, coating or printing. 3) High wax temperature causing excessive penetration. 4) Insufficient coating laydown. 5) Uncoated fibers acting as wicks.	1) Raise wax temperature; eliminate splashing, enfolding, pump leaks (Do not use anti-foaming additives). 2) Ensure that the board is not wet and has a uniform porosity. Use permeable inks or coatings. 3) Lower wax temperature. 4) Increase wax load. 5) Use smoother paper or more wax.
Poor adherence	1) Low wax temperature causing insufficient penetration for good mechanical “grab.” 2) High-density board limiting wax penetration.	1) Raise wax temperature. 2) Raise wax temperature; use higher porosity board.

TIP Category: Automatically Periodically Reviewed (Ten-year review)



Documents

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**Scoreline cracking
or staining**

- 1) Insufficient coating adherence allowing lifting of the coating away from the board surface when score is flexed.
- 2) Coating “bridging” score.
- 3) Coating not sufficiently flexible for intended use.
- 4) Flex rate too fast during box set-up.

- 1) Increase adherence by increasing wax temperature.
- 2) Raise coating head and/or change angle of blanks going through curtain. Increase head pressure if possible.
- 3) Use coating designed for higher degree of flexibility.
- 4) Decrease box forming machine speed; external folding shoes to decrease angular folding rate.

**Uneven wax load
across board
(stripe effect in
falling curtain or
laydown)**

- 1) Dirty or improperly adjusted orifice.
- 2) Incompatible wax mixture being used.

- 1) Clean and/or adjust orifice.

Darkened coating

- 1) Oxidation of wax due to excessively high temperature.

- 1) Reduce coating temperature. Reduce time and temperature of pre-melting. Reduce recirculation time.

Poor gloss

- 1) High wax load.
- 2) High ambient temperature.
- 3) Development of surface “dust” or “bloom” after coating due to migration of wax out of blend.

- 1) Decrease wax load to reasonable level (7-8 lbs/Msf.)
- 2) Reduce ambient temperature or cool laydown more quickly with air circulation over coated surface.
- 3) Avoid wide temperature contrasts between coating and contact surfaces. Use alternate coating blend.

Shadowing

- 1) Bent, creased or severely warped board.

- 1) Use flatter board or provide hold-down until board gets through curtain.

**Coating breaks—
unstable curtain**

- 1) Wax temperature too high.
- 2) Dirty orifice; dirt or bubbles in curtain.
- 3) Incompatible and/or badly oxidized wax in system.
- 4) Drafts or mechanical vibration reaching coating head area.
- 5) Warped board “springing” from in-feed nip roll.
- 6) “Pops” or “fisheyes” caused by silicones or other surfactant contaminants.

- 1) Lower temperature (if below cloud point, raise temperature).
- 2) Clean orifice; correct for bubbles (see above).
- 3) Replace wax in system.
- 4) Eliminate drafts or vibration.
- 5) Provide hold-down until board is through the curtain.
- 6) Check for airborne contaminants, particularly from printing operations.

Blocking

- 1) Wax melting point too low for end-use application.
- 2) Coated surfaces too hot when stacked.

- 1) Use higher melting point wax formulation.
- 2) Direct cool air stream over surface before stacker; increase time (distance) between curtain and stacker.