

TIP 0304-37

ISSUED - 1991
REAFFIRMED - 1996
REAFFIRMED - 2001
REVISED - 2005
REVISED - 2009
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How to prevent score cracking in a box plant

Scope

The corrugated industry has moved toward higher usage levels of recycled liner and denser liners to meet customer requirements and to help the environment. These changes require plants to control their normal operating practices on the corrugator as well as in the press department to avoid score cracking problems.

All liners can crack or check under hot or dry atmospheric conditions, and even in cool moist atmospheric conditions, if the liners have been over heated on the corrugator. The cracking problems occur most frequently at the score lines. Cracking is especially evident during the drier winter months, or in heated storage environments. Today, many corrugated operations are modifying their machines to run hotter and faster, thus further increasing incidents of cracking.

The retention of moisture in combined board is a very important element to successfully score corrugated board. Most plants are now checking their combined board's total moisture content, measuring it off of the dry end of the corrugator with an automatic weighing and drying oven (see Special Note). Experience has demonstrated that a target moisture from 5.8 to 7.5% total combined board moisture works well throughout the year. Corrugator operating techniques will need to be under control if liners are to be run without quality problems.

Maintenance of the press, especially in regards to Total Indicated Run out (TIR) and axial head movement in any area that applies pressure to the combined board, is critical for preventing score cracking.

This Technical Information Paper (TIP) includes recommended operating procedures to minimize incidents of score cracking.

Safety precautions

No safety precautions are required.

Corrugator

Single facer

- a. Ensure that the showers are piped from the top of the wet recovery steam leg. Extra steam must be applied to the medium at the Gaylord and top shower, steam box or injection plate to get more moisture into the medium.
- b. Where applicable use the medium preconditioner's wet steam shower and ensure that the wrap arm is in the down position to maximize moisture penetration into the medium. Many plants have also reduced the

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

medium preconditioning drum pressure to achieve lower vessel temperatures of 270 to 290°F (132 to 143°C) to leave more moisture in the medium and improve flute formation.

- c. Apply no wrap or minimal wrap on the single facer liner preheater to minimize moisture removal so that the liner's temperature does not exceed 190°F (86°C) and the single face web temperature does not exceed 210°F (96°C) after leaving the lower corrugator, pressure roll nip. Where available use the wet steam liner conditioning shower.
- d. Wrap the liner under the single facer preheater to drive the liner's available moisture toward the glueline. This will trap the liner's moisture within the combined board.
- e. Excessive pressure roll loading can cause inner face liner cracking, contribute to rolling scores and decrease mullen test results. Reduce pressure roll load values to the minimum required for good bonding.
- f. Where practical reduce steam pressure to the peanut rolls/liner conditioning rolls.
- g. Minimize idling or slow running periods as much as possible to avoid short term over heating of the liner/medium. (See Special Note)
- h. Ensure temperature sensors are positioned close enough to the exit point of key heating vessels so that a corrugator speed reduction is truly recognized by automatic systems as a time to reduce heat input.

Glue machine

- a. Apply no wrap or minimal wrap on the double backer single face web and double backer liner preheaters to prevent moisture removal.
- b. Wrap the liner over the double backer preheater to drive the liner's available moisture toward the glue line. This will trap the liner's moisture within the combined board.

Hot plates

- a. Reduce heat transfer by reducing the number of hot plate ballast rolls, feet, or bars in contact with the combined board; set tilting hot plate control to 42-lb run level; or reduce hot plate steam level if possible.
- b. Take a sample of the board as it exits the stacker and allow it to cool. Check for glue pattern and fiber pull (bond) on the single facer and double backer. Check for board warp. Make adjustments as necessary to ensure a quality product.
- c. Ensure dry and wet end communication continues during the combining of recycled or high-performance liners.
- d. Process combined board within 8 hours after corrugating to minimize moisture loss, where practical.

Finishing area

Flexo folder gluers

- a. If scoring anvils are grooved or out of round more than 0.003 in. they need to be replaced. If anvils are too hard (durometer values too high) it will also cause cracking.
- b. Make sure all score beads, score shoulders, as well as anvils are the same height on their respective mounting bars.
- c. Score bead total indicated run out (TIR) and axial head movement should be less than 0.003 in.