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Press roll cover application guidelines

Scope

Faster paper machine speeds and higher press loads have placed increased demand on press roll covers. These changes have resulted in development of new cover compositions and venting patterns to provide reliable operation on modern machines. The information that follows has been compiled with an objective of providing general guidelines for press roll cover application. Specific cover application for each position requires information on machine speeds, press loads, felt designs, web temperature, steam shower application, roll diameters, and other variables. This information must be developed by working with roll cover manufacturers.
Guidelines for press roll applications follow. Parameters discussed include: (1) cover thickness, hardness and venting of various grades; (2) crowning; (3) cover release characteristics; (4) grinding frequency; (5) water cooling considerations; (6) polyurethane covers; (7) ceramic covers; and (8) use of steam showers.

Definitions

P&J hardness—P&J plastometer measures the amount of indentation that a 3.2 mm (1/8") diameter ball makes in the cover one minute after a 1 kg (2.2 lb) weight has been applied. Bone hard covers would have a reading of zero, and the softest cover would have a reading of 300 P&J.

Safety precautions

While this technical information paper is concerned with application of roll covers to the press sections, physical measurements may be taken on the paper machine. Before measuring crowns and hardnesses, the press section drive should be locked out to prevent movement.

Cover application guidelines

Roll cover application guidelines for plain, suction, grooved, and blind-drilled rolls are listed in Tables 1–4. The guidelines are necessarily general and are representative of covers currently used on the grades listed. For example:

- Some mills run outside the cover hardness ranges shown. Special circumstances can require different cover hardnesses for optimum results.
- Cover release requirements vary with furnish characteristics, press configuration, doctor applications, and other factors.
- The most common grooving and drilling patterns are listed. Other parameters are used by some mills.
- Length of time between cover grinds varies widely. Objective standards for roll change frequency should be developed for each position on each machine.

Table 1. Plain rolls

Paper grade	Cover thickness, mm (in.)	P&J hardness [a,b]	Release	Grinding frequency, Months
Fine/publication	12.7–19 (0.50–0.75)	0–25[a]	Medium	6–12
News/directory	12.7 (0.50)	0–2 (granite or equivalent)	High	6–12
Liner/corr. medium	19 (0.75)	10–25[c]	Medium-high	6–12
Bag/wrapping	19 (0.75)	10–25	High	6–12
Lightweight specialties	19–25 (0.75–1.00)	5–25	Medium	6–12

[a] P&J hardnesses shown are a range. Standard cover hardnesses within the range apply.
[b] Exception: Soft size press, breaker stack, and smoothing presses; 12–25 P&J; 1–3 months grinding frequency.
[c] Exception: Hard breaker stack rolls; 0–2 P&J; 6 months grinding frequency.

Ceramic covers

Ceramic covered rolls provide excellent release properties and very high wear resistance. Typical Vickers hardness for ceramic covers used in wet pressing ranges from 800 Hv to over 1200 Hv. Total thickness of the covers range from 0.030" to 0.090", depending on the type of ceramic applied. Ceramic covers may vary both in porosity and surface energy, depending on the application. Surface roughness can also be varied, but is typically in the 15–40 micro-inch range, Ra. Since surface finish of the cover affects release, ceramic roll cover manufacturers should be contacted for specific roughness targets for various paper grades. With some ceramic cover types, it is possible to modify roughness in the press using abrasive blades or other techniques.

Since ceramic covers are relatively thin, roll cores are usually crowned before the covers are applied. For this reason, the correct crown must be established before ordering the ceramic cover. Ceramic covers can usually only refinished once or a few times using diamond belts, and only very small amounts of material removed. Correct doctoring of ceramic covers is critical to successful operation, and supplier recommendations for doctor blade types, doctor loading, and doctor lubrication showers must be closely followed.

Forming, pressing, and drying return roll covers

Most return rolls have bone hard rubber and composite covers. Some 5 P & J polyurethane covers are used. Nitrile (NBR) covers with 10-15 P & J are used on wire turning rolls to improve horsepower transmitability to forming fabrics. Rolls are normally ground to a surface finish of less than 50 ra. Important characteristics of return rolls include good abrasion resistance and capability to be doctored. Return rolls should be inspected during every clothing change to make sure there are no damaged areas or other problems that could cause damage to clothing.

Use of steam showers

Use of steam showers requires careful consideration of roll covers. Roll cover suppliers should be advised when a mill is considering installation of a steam shower. A change in cover compound to provide more heat resistance or a change in cover hardness may be recommended. Higher temperatures usually accelerate chemical attack of cover surfaces. Some comments on roll application near steam showers follow:

- Steam should not impinge directly on a roll cover.
- Excessive steam should not be applied outside the sheet width or in a localized area.
- Thermal shock should be avoided during startups. This is especially important near unfelted center roll positions.
- Automatic controls should assure shutdown of steam showers when rolls are not turning.
- Steam showers should not be used on suction rolls when vacuum is not in use or the fabric is not in place.
- Rolls installed near steam showers should be checked each shutdown for surface condition, hardness, etc.
- Roll covers may have to be reground more frequently due to more rapid heat aging.