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Partnership with papermaker leads to innovative solution

Desperate to resolve runnability problems associated with the lumpbreaker position on its two fourdriniers, the Smurfit-Stone Container Corporation's mill in Ontonagon, Michigan, USA, turned to the innovators at Scapa Rolls, now part of the Voith Sulzer Paper Technology Service Division, for help.

Build-up on the roll was causing breaks and downtime. Steps taken previously to solve the problems had been ineffective. The innovative use of a polyurethane roll cover – the first application

of its kind – to replace existing rubber covers solved the problem.

The two containerboard machines at the Ontonagon mill produce corrugated medium with a recycled content of 33%. Both paperboard machines have conventional fourdrinier wet ends with a steam box located approximately three feet ahead of the lumpbreaker roll position. Stock temperature is 170° F to 190° F out of the steam box. The mill loads its lumpbreaker rolls to between 40 and 90 pli.

Fig. 1: Smurfit-Stone Container's mill in upper Michigan produces recycled content corrugating medium.

Most mills that make this grade traditionally use a two-inch thick, 200 ± 50 P&J rubber cover on the lumpbreaker roll. The mill had tried to alleviate the build-up problems by trying a number of different cover compounds supplied by a variety of cover manufacturers, but with little success. All of these rubber covers would pick at one time or another.

Like many others, the Smurfit-Stone Container Ontonagon mill used showers and chemicals to limit or prevent stickies from building up on the cover. This build-up caused the rolls to vibrate and bounce, leading to breaks and subsequent machine downtime to clean them. The chemical addition to the cleaning shower was adding cost and the cleaning showers were causing wet end breaks and housekeeping problems.

Voith Sulzer Paper Technology agreed to supply a polyurethane lumpbreaker roll cover for a trial. A technical team was dispatched to assess this new application for the possible use of a polyurethane roll cover.

Application

The decision to try a polyurethane cover in this position was based on results the mill had seen when rubber covers in the first and second press top roll positions

on the No. 2 paper machine were switched to polyurethane covers. These rolls are located just downstream from the lumpbreaker roll on the fourdrinier and are in direct contact with the sheet. Previously, the rubber covered press rolls would pick and cause runnability problems. Switching to polyurethane covers in the first and second press positions eliminated build-up and picking problems.

The technical team wanted to be certain the polyurethane cover was soft enough to work in this application but hard enough to resist water permeation. A 50 P & J PolyMax cover was chosen as the best choice for a roll cover running in this position. Installing a 50 P & J cover where a 200 P & J cover had been running required adjustments by both the mill and the Voith Sulzer technical team's roll cover design element.

Voith Sulzer Paper Technology changed the surface finish of the PolyMax roll cover to a very smooth finish compared with the rather rough finish typical of a rubber lumpbreaker cover. To save costs, the cover thickness was designed at 1-inch instead of the traditional 2-inch thick soft rubber cover. The mill agreed to a one-month grinding interval until the effects of water permeation were determined. Keeping the polyurethane cover roll out of the machine for this time would allow the cover to dry out before it was re-installed in the machine.

Start-up

When the first PolyMax lumpbreaker cover was installed on the No. 2 paper machine, the roll was two inches smaller in diameter than it was when covered with rubber and required a spacer to be installed under the bearing housing. Dynamic nip impressions were taken and scanned with a Voith Sulzer NipScan unit to confirm uniform loading at the lower pli. Because of problems with the spare rubber covered roll, the PolyMax remained in the machine for three months before it was removed for regrind and inspection.

Together, the mill and the Voith Sulzer technical team found a way around the water absorption problem inherent with polyurethane roll covers. The mill agreed to leave the roll out of the machine for four weeks before re-installing it to give it sufficient time to dry out and prevent moisture from penetrating the bond layer and loosening the cover.

The idea of using polyurethane in this position has had little support in the industry because it was far different from what was considered to be typical. It should be noted that the nip width was reduced with the use of a polyurethane cover. After successfully running with no build-up, the loading and crown were brought back to where they were when the mill ran rubber covers. The nip width was still only a

Fig. 2: New polyurethane lump breaker roll cover has eliminated stickeys buildup problems and improved machine runnability.

Fig. 3: Ron Howard, general manager of the Smurfit-Stone Ontonagon mill.



fraction of what it was before, but this had no ill effect.

Increasing nip pressure actually helped to increase machine speed without negative effect on sheet properties. Fears of sheet crushing and the possibility of sealing the sheet too early, preventing proper drying, were not realized.

Results

Detailed, specific cost savings data cannot be released, however, some of the positive outcomes realized include:

- The machine started up with no cleaning shower and no chemical addition to the lumpbreaker roll.

- No downtime to clean build-up off of the PolyMax lumpbreaker roll cover has been needed.
- The reduced dwell time in the nip has not affected sheet quality and improved off-couch sheet dryness has been achieved.
- Machine breaks were reduced considerably and the No. 2 machine is now producing record tons at record speeds.
- The grind interval of the polyurethane roll cover has remained at three months with no water permeation issues.

- The machine continues to run with no chemical addition and no shower on the lumpbreaker roll.

With the overwhelming success of the polyurethane roll on its No. 2 paper machine documented, Voith Sulzer was given the opportunity to cover the No. 1 paper machine lumpbreaker rolls in PolyMax. To date, all lumpbreaker rolls at the Ontonagon mill are covered in PolyMax and are achieving similar results.



Ron Howard, general manager of the Smurfit-Stone Ontonagon mill, said *“Both Mike Woller at Voith Sulzer Paper Technology and Joe Asiala and Eugene Lewis, assistant superintendents at the mill, are to be commended for their innovations and development of new lumpbreaker operation technology. Few people in the industry supported this concept initially, but many mills will take advantage of it in the future based on the Ontonagon mill’s success.”*