The VariFlex M on Pitten's PM 4 can operate at speeds up to 2,700 m/min.

When One is More than Two

Only one winder unit is needed to handle the entire production of each paper machine in applications that previously would have required two.

by Stefan Maier

The Pitten mill of Hamburger AG and the Ruzomberok mill of Neusiedler SCP AG recently installed a single VariFlex two-drum winder on paper machines at their respective mills in Austria and Slovakia. In both cases, the winders supplied by Voith Paper are handling the entire production of each preceding machine, a task that in the past would have required two winders.

This "miracle of productivity" is the result of three conditions relative to the new VariFlex unit: first, its high operating speeds; second, its steep acceleration ramps; and third, the drastic reduction in roll changing times.

This article examines specific measures taken by both mills to achieve this "leap forward" in technology application.

The VariFlex M at the Pitten mill was installed on PM 4, which produces linerboard, testliner, and paperboard with basis weights between 100 and 250 g/m^2. The winder has a trim width of 5,100 mm and can be operated at a maximum speed of 2,700 m/min. It has a capacity of 1,050 metric tpd.

The VariFlex L installed at Ruzomberok has a trim width of 6,500 mm and a maximum operating speed of 2,500 m/min. With a capacity of 895 metric tpd, it processes the entire production of PM 18, which produces copy papers with a basis weight of 77 to 83 g/m^2. In contrast to the Pitten winder, which has "only" a standard unwind, the VariFlex at Ruzomberok is equipped with storage for parent rolls and reel spools as well as a 40-m/min flying splice unit. *(see Figure 1)*

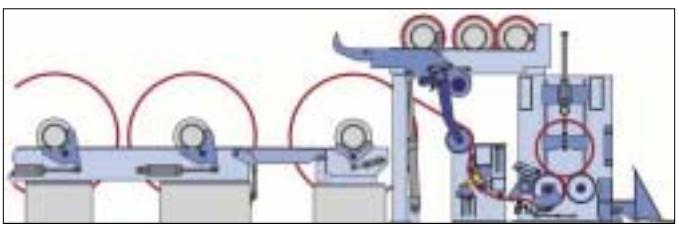

Figure 1. Schematic of VariFlex L on Ruzomberok's PM 18, showing parent roll/reel spool storage capacity and flying splice unit.

The three keyVariFlex conditions critical to project success at both mills —high operating speeds, steep acceleration ramps, and short roll changing times—are discussed more in detail below:

▶ *Increased Operating Speeds.* Up to now, winder operating speeds have generally been between 2,200 and 2,300 m/min. For the new winders at Pitten and Ruzomberok, a higher operating speed was considered from the very beginning. To determine exactly at what maximum speed the winders could be operated reliably under all circumstances, Voith conducted extensive trial runs. Results showed that 2,500 m/min would be "feasible" as peak value for the operating speed.

Results being achieved at Pitten and Ruzomberok—perfectly wound finished rolls with an excellent winding structure—prove that Voith has approached the limits of feasibility in regard to operating speed without, however, exceeding them.

▶ *Steeper Acceleration Ramps.* In the past, acceleration ramps of 20 to 30 m/min/sec (maximum) were common. The corresponding values at Pitten and Ruzomberok, at around 40 m/min/sec, have played a vital role in increasing the productivity of both machines.

The VariFlex L winder at Ruzomberok operates at maximum speeds of 2,500 m/min and includes storage for parent rolls and reel spools.

▶ *Drastic Reduction in Roll Changing Times.* Considering the processes that take place during winding, higher operating speeds and steeper ramp curves alone would not have been sufficient to permanently trim the winders to the desired capacity of 1,050 metric tpd (Pitten) and 895 metric tpd (Ruzomberok). A drastic reduction in the roll changing times was also needed.

This was accomplished during the insertion of new cores. The severing of the old webs, and the laying of the new web beginnings on the empty cores in fully automatic mode cost 50 to 60 sec, e (a "manual" roll change can take up to 2 min). Voith reached stopwatch times of 30 sec (Pitten) and 20 sec (Ruzomberok) with the new VariFlex units.

Due to grades being produced and other variants, the solution implemented at Pitten deviates somewhat from the one at Ruzomberok. Solutions at both mills are discussed separately below.

At Pitten, paperboard with a basis weight of up to 250 g/m^2 is produced. At such basis weights, the process in which the traces of glue are applied for initial and final gluing exclusively onto the paper web—more precisely the single webs—is no longer sufficient.

For the initial gluing, the empty cores, rather, must be glued. This is done outside of the machine. The glued cores are subsequently taken up by core tongs and, during roll ejection, brought into a position above the winding bed. To

ensure good initial winding of the new set, the trace of glue must be exactly aligned to the new partial web beginnings.

The cores must not be allowed to "tumble" simply into the winding bed by opening the tongs. Therefore, the tongs are provided with a telescopic vacuum strip that pneumatically runs to the still clamped cores and holds them firmly by vacuum. After the tongs have opened, the strip lowers the set of cores hanging on it gently and accurately into the roll bed. *(see Figure 2)*

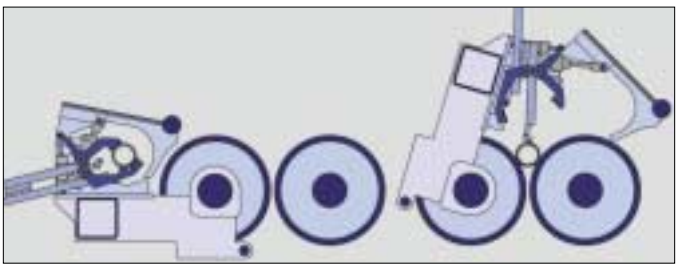

Figure 2. Schematic of core handling for paperboard production at the Pitten mill.

The above-described core insertion is, of course, only a small part of the complete roll changing process, which furthermore includes stopping of the almost finished rolls, severing the webs, ejecting the roll set, etc. All of these single actions add up to a considerable length, provided that each subsequent step is only completed if the previous one has been fully terminated (step chain control).

Through the use of modern path detection and proportional technology for all changing functions involved, Voith has now implemented a maximum number of movement overlaps and thus drastically reduced the changing time. *(see Figure 3)*

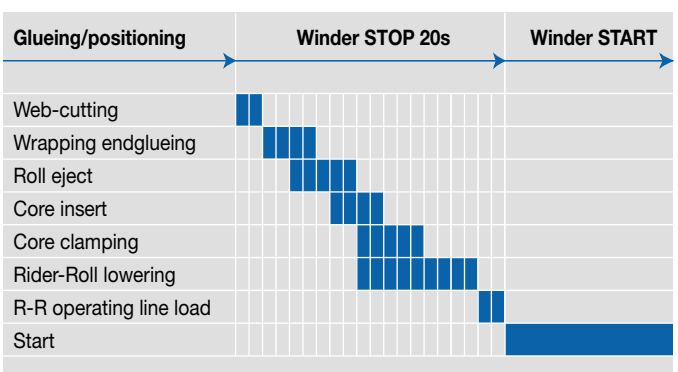

Figure 3. Roll changing process with overlapping movements.

Incidentally, a different glue is used at Pitten for the gluing of the beginning than that used for the gluing of the end. This again has to do with the sometimes very heavy grades that are wound at this mill. These heavy grades tend not to want to wind themselves around the core at the start of winding. They literally "resist" doing so. This resistance can only be broken by using a glue with a greater adhesion.

"We are very satisfied with the new VariFlex. Thanks to its high degree of automation—the short roll changing times are unique — the winder follows the paper machine at all times without effort and safely."

— Walter Gems, manager Control Systems & project manager for the rebuild of PM 4 at Hamburger AG's Pitten mill in Austria

Things look different with the gluing of the end. The radius of the finished rolls is so large that resetting forces of the web can now no longer play any decisive role. As a consequence, a glue can be used here that has less adhesion than the adhesion of the glue for gluing the beginning.

An important criterion for the end glue is, however, its short hardening time: If the glue between the outer layers of the finished rolls did not "set" in good time, safe transport of the rolls in the mill would not be ensured. Clamp forklifts might "lose" such rolls during transport. This must be avoided under all circumstances, which is the main reason for using different types of glue for each.

At Ruzomberok, automatic changing is easier than at Pitten. Because the basis weights are between 77 and 83 g/m^2, the complex procedure of specific insertion of the cores and the separate gluing of the beginning described above becomes superfluous. This also explains the difference in the stopwatch times—Ruzomberok (20 sec) and Pitten (30 sec).

It should also be mentioned that parent roll handling in Ruzomberok (Figure 1) also produces a large gain in time and capacity. The changing time savings achieved by the flying splice alone are enormous.

In addition, preparation of the following parent rolls for the splice or the introduction of the web can take place in parent roll storage in parallel with production. This storage rack itself is a convenient roll buffer for the paper machine and makes complex roll handling with a crane superfluous. ■

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