



## The new winder mathematics – one is more than two.

### Why Pitten and Ruzomberok require only one winder for each paper machine

The VariFlex two-drum winders recently put into operation by Voith Paper at the Pitten/Austria mill of Hamburger AG and at the Ruzomberok/Slovakia mill of Neusiedler SCP AG have aroused the attention of experts in the paper industry. Quite rightly! One single winder is sufficient in both cases to cope with the entire production of each preceding paper machine – and, as is well known, in the past two winders each would have been required.



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This “miracle of productivity” has three main reasons:

- First, the high operating speed of the new machine
- Second, its steep acceleration ramps
- Third, the drastic reduction in roll changing times.

Following is a more detailed description of the measures taken to achieve this “leap forward” with success.

Before going into details, an overview of the two winders shall be given:

#### **Pitten**

The VariFlex M installed there belongs to PM 4, on which liner, testliner and paper-board with basis weights between 100 and 250 g/m<sup>2</sup> are produced. The winder

**Fig. 1:** VariFlex M Pitten PM 4.

**Fig. 2:** VariFlex L Ruzomberok PM 18.

**Fig. 3:** Scheme VariFlex L Ruzomberok PM 18.

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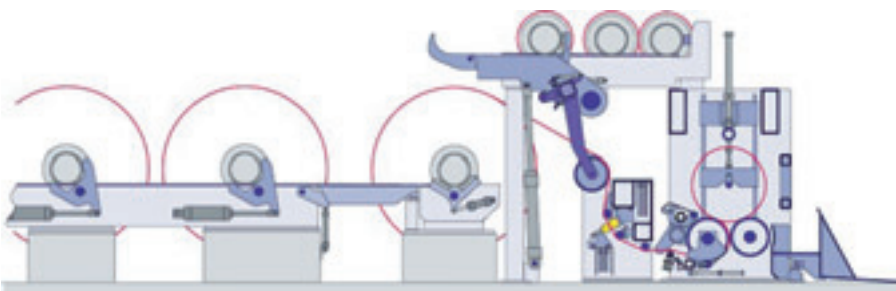
has a trim width of 5,100 mm and can be operated at a max. speed of 2,700 m/min. The capacity is 1,050 t/day (Fig. 1).

### Ruzomberok

The VariFlex L that went into operation at Ruzomberok has a trim width of 6,500 mm. Its maximum operating speed is 2,500 m/min. With a capacity of

895 t/day, it processes the entire production of PM 18, on which copy paper with a basis weight of 77 to 83 g/m<sup>2</sup> is produced (Fig. 2). In contrast to the Pitten winder, which has “only” a standard unwind, the VariFlex at Ruzomberok is equipped with a storage for parent rolls and reel spools as well as a Flying Splice unit (40 m/min) (Fig. 3).

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### The “secret” of the high productivity

The three factors which together explain the recent success have already been named. They shall now be treated more thoroughly in consecutive order:

#### Increasing the operating speed

Up to now the operating speeds have generally been between 2,200 and 2,300 m/min. For the two winders in question a higher operating speed was considered from the very beginning. Previously, however, the idea was to determine exactly at what maximum speed the winders could be operated reliably under all circumstances. For this purpose, Voith performed extensive trial runs. Their results showed: 2,500 m/min are “feasible” as peak value for the operating speed.

The results achieved in Pitten and Ruzomberok – perfectly wound finished rolls with an excellent winding structure! – prove that Voith has approached the limits of the feasible with the increase in the operating speed without, however, exceeding them. If one considers that, for example, copy paper like that produced in Ruzomberok is a not uncritical grade due to its naturally high coefficient of friction – papers with a high coefficient of friction tend, as is well known, to cause vibrations during winding – it is found that it worked out on a completely different line.



**Walter Gems**  
**Manager**  
**Control**  
**Systems &**  
**Project**  
**Manager**  
**Rebuild PM 4**  
**Pitten**

*“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. With the VariFlex, Voith has ‘done a fantastic job’ and deserves every compliment for this unique, productive machine. The entire handling of the project was exemplary.”*

### Steeper acceleration ramps

In the past, acceleration ramps of 20 to max. 30 m/min/sec were common. The corresponding values in Pitten and Ruzomberok – they are around 40 m/min/sec! – have played their part in increasing the productivity of both machines.

### Drastic reduction in roll changing times

On envisaging the processes that take place during winding, it becomes evident that the mentioned higher operating speeds and the steeper ramp curves alone would not have been sufficient to trim the winders lastingly to the desired capacity of 1,050 t/day (Pitten) and 895 t/day (Ruzomberok). A drastic reduction in the roll changing times was additionally required here. And it was accomplished: during the insertion of new cores, the severing of the old webs and the laying of the new web beginnings on

**Fig. 4:** Core handling.



the empty cores in fully automatic mode cost 50 to 60 sec – a “manual” roll change took even up to 2 min – Voith reached stopwatch times of 30 sec (Pitten) and 20 sec (Ruzomberok) with the new VariFlex. As the solution found for Pitten deviates somewhat from the one implemented in Ruzomberok, both variants shall be presented separately here below:

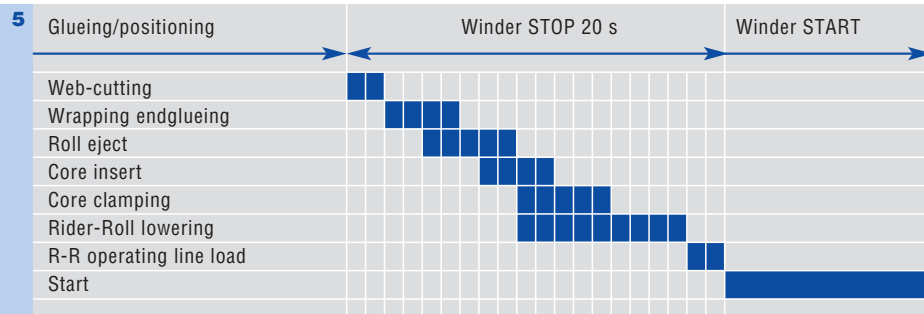
#### Pitten

In Pitten, paperboard with a basis weight of up to 250 g/m<sup>2</sup> 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 must rather 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 of course be exactly aligned to the new partial web

beginnings. By consequence, 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, which 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 (Fig. 4).

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 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, however, implemented a maximum number of movement overlaps and thus drastically reduced the changing time (Fig. 5). Only this guaran-

**Fig. 5:** Roll changing process with overlapping movements.



teed that the VariFlex can in fact reliably follow the PM.

Incidentally, a different glue is used in 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 here. 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. Things look different with the gluing of the end: the radius of the finished rolls is so large that the 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. This is the reason for using different types of glue for each.

**Ruzomberok**

In Ruzomberok, automatic changing is easier than in Pitten. Because the basis weights are between 77 and 83 g/m<sup>2</sup>, 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 must not remain unmentioned that parent roll handling in Ruzomberok (Fig. 3) also produces a large gain in time and capacity. The changing time savings achieved by the flying splice alone are enormous. In addition, the preparation of the following parent rolls for the splice or the introduction of the web can take place in the parent roll storage in parallel with production. This storage rack itself is a convenient roll buffer for the PM and makes complex roll handling with a crane superfluous.

**Robert A. Dokter**  
**Manager of Competence Center Engineering & Safety and Project Manager IMPULS PM 18, Ruzomberok**



*“We are enjoying an excellent relationship besides a harmonic and good cooperation with Voith Paper on a long time base. As a matter of fact, we are ‘together’ in business relation since almost one century when first orders from Ruzomberok mill to J.M. Voith were placed. Besides the technological advantages, this was also a main reason why we selected Voith Paper to rebuild our PM 18 and to deliver the new VariFlex for the upgraded line.*

*In retrospect, I can say that our decision was right. All the goals under quality and schedule terms were met. Our new high speed winder with its various novel technical features made a perfect initial start-up, reached its top operation speed in shortest time and is now in continuous operation since October 2003. In one word: It is a most convincing illustration of ‘engineered reliability’!*

*Let me add that the cooperation between all persons involved was excellent. This helped both sides remarkably in achieving the targets.*

*Neusiedler SCP would like to take this opportunity to express their heartfelt thanks to Voith Paper’s personnel taking part in the IMPULS PM 18 project.”*