VariFlex
Two-drum winder
Solid, compact, reliable
The aim of every papermaker is to produce saleable goods at a consistently high quality level. As technology leader, Voith continuously develops new products and services that contribute to a high productivity of the machine, while taking into consideration quality and plant safety. The basis for this is the process competence and the bundled know-how covering all production steps from stock preparation to the wrapped reel ready for dispatch.

There are proven winder technology concepts for all paper qualities and reel dimensions, which make the product paper into a marketable product in various reel dimensions and widths. For a better operating efficiency, Voith places emphasis on consistent high quality and productivity.

The Voith winder portfolio
Voith winders offer technology solutions for every challenge related to paper quality and productivity. The two-drums winders VariFlex™, as well as the single drum winders VariPlus™ and VariTop™, were specially developed for different fields of application. Together, they cover the entire spectrum of winder technology concepts.

Application-related solutions
Paper is not patient; on the contrary, each paper has its special characteristics. Therefore, Voith winders offer different technologies for all specific requirements for paper and board qualities. The table above shows a general assignment of paper and board grades to winder technologies. On a project-related basis, Voith specialists always offer the best winder configuration for the respective production requirements.

The wide range of application areas of the two-drums winder is clearly visible in this overview. VariFlex with its drum and cover combinations can be specifically designed for different paper grade requirements. Particularly sensitive papers or very big reels require other technologies such as VariPlus or VariTop winders.

The VariFlex – The flexible winder concept
The VariFlex winder is based on the proven two-drum winder technology. In principle, the paper is unwound from a parent reel under tension. In the slitter section, it is slit in the longitudinal direction into the specified web widths. Then, the single webs are wound onto a reel set.

In a two-drum winder, the reel set is rewound in a winder drum valley formed by two winder drums. The nip pressure required for an optimum winding hardness is built up by a rider roll at the beginning of the rewinding process. As the diameter increases, the roll’s own weight assumes this function whereby the steadily increasing nip pressures pose a particular challenge as soon as a certain roll weight is exceeded.

The elastic covers ElaGrip™ and ElaCare™ for winder drums have considerably expanded the spectrum of the VariFlex winder with regard to paper quality and reel diameters. In addition, the high level of automation in connection with a user-friendly control concept makes VariFlex a highly productive and flexible machine solution, which pays off quickly.

Voith offers precise winder concepts for each application
VariPlus in operation
VariTop – The solution for LWC, SC and newsprint machines
VariFlex – Suitable for a broad variety of applications

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**Voith winders** For each application the best solution

<table>
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<tr>
<th>Paper grade</th>
<th>Two-drum winders</th>
<th>Single-drum winders</th>
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<td>Specialty papers</td>
<td>Thermo-paper, silicone treated paper</td>
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<td>Specialty papers</td>
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- standard
- alternative
VariFlex – Product-oriented technology

Two-drum winders represent the basic winding technology. Therefore, it is not a surprise that they are the solution for a variety of challenging applications in everyday paper and board production. The combination of different roll covers makes this proven technology especially suitable for many paper grades.

Many criteria are considered for each application-related optimum winder: the special characteristics of the papers such as grammage, density, smoothness, compressibility and also the desired operational data such as output, reel widths and reel diameters.

The specified drum geometry and arrangement of the VariFlex winder as well as the selection of suitable covers ensure the desired high speeds, reliable web run, good reel geometry, safe handling even of big reel diameters and last but not least, high productivity and consistent quality. Undesired air inclusions and potential winding problems such as creases, ridges, overstretching, a loss of volume and glossy spots are avoided.

The selection and combination of the drum covers depend on the specific requirements of the respective papers. With the especially developed ElaGrip and ElaCare covers for winder drums, Voith sets the highest standards for big reel diameters – even for sensitive paper qualities. The covers with special grooves and selectable hardness grades support the formation of an optimum winding structure. They equalize CD thickness profile fluctuations and impede disturbing air inclusions in the reels, ensuring a fault-free optimum winding quality.

If required, the best winder concept for the highest quality and production reliability can be determined for the customer’s case of application on the pilot winder in the Voith Technology Center.

Drive technology as determinant factor of winding technology

Optimal winding parameters are the basic prerequisites for excellent winding results. In the area of winder technology, Voith has decades of experience regarding the setup of these winding parameters. The integration of the single main drive controls into the Voith drive control system ODC™ represents the systematic further development. The components of the main drive, such as frequency converters or motors, can be combined freely.

For the drive control system, the same Siemens PCS7 programming environment and language is used as for the machine control.

The entire program, which is executable in one shared CPU, is characterized by consistent and structured programming. Voith is the contact or the user for all matters related to the control system, which facilitates a quick reaction and reduces costs.

In case of online access to the engineering system, the shared CPU and the common programming language allow easy tracking of signals of all program parts without external interfaces. This also provides the ability to record the signal for error analysis and optimization purposes on a uniform time base.

VariFlex Design

1. Lowering platform
2. Core chucks
3. Safety guard
4. Rider roll
5. Ejector with core inserter
6. Reel spool lift-out
7. FlyingSplice
8. Parent roll magazine
9. Parent roll unwind
10. Sitter section
11. Web tension measurement
12. Spreader unit
13. Gecko OneStep (start and end gluing device)
14. Perforating unit
Web threading made easy

Variflex is equipped with an automatic web threading system. The operator only feeds the web tail manually to an air table in the area of the unwind unit. Then, the web is automatically guided through the tape sections and air tables up to the rewind unit. As soon as the web has reached machine width without wrinkles in the rewind unit, it is cut crosswise and spliced onto the cores.

Automated splice systems for the unwind unit

For connecting the old web with the new full parent reel, there are different types of splicing units available such as FlyingSplice™ and ButtSplice™. Both allow an automatic change and thus eliminate the need for new web threading.

FlyingSplice is preferably used for packaging papers and board grades. The splicing process is carried out at reduced speed and results in a perfect splice without interference of an operator.

ButtSplice is recommended for graphic papers. It connects the end of the old web with the beginning of the new one butt-to-butt by means of adhesive tapes of different widths applied on both sides. This splice is carried out at shutdown. It is especially suitable for finished reels intended for rotary printing or that will be processed by sheet cutters, as this splice does not cause any problems during downstream processing. Another advantage of ButtSplice is that a splice in the rewind unit is not necessary in the case of an incomplete reel set from the parent reel.

Trace of glue and perforation in one processing step

For winders, an efficiently working start and end gluing is indispensable for an effectively functioning automatic reel set change.

The Gecko OneStep™ system applies hot glue through a traversing nozzle on two non-stick half shells of a gluing and perforating roll. A perforating blade is situated in the center of the shells. By turning the roll, these traces of glue touch the paper web applying the glue. Simultaneously, the web is perforated over the entire working width by the perforating blade. While ejecting the finished reel set, the perforation breaks and the web is separated. Gluing is prepared at full machine speed. The glue application and the perforation of the web take place shortly before the machine stops for the reel set change.

Gecko OneStep allows an easy removal of the single traces of glue from the base body thanks to an optimized matching of the surface system with the used hot glue. In accordance with the sizes, the single traces of glue are interrupted in the longitudinal slit area of the paper web. When applying the traces of glue from the half shells onto the web, the peripheral speed of the gluing and perforating roll is synchronous to the speed of the web.

The flexible Gecko OneStep system can be used for all paper grades and grammages. The integration into an existing machine at a later time is possible without any difficulty.

Advantages

- Short amortization time
- Integrated perforating unit, consequently no separate cut-off knife or the like are required
- Defined distance between trace of glue and point of separation for a perfect start gluing
- High flexibility, because type and number of glue traces (straight or wavy trace) are freely selectable for the individual case of application
- Low maintenance requirements
Web spreading and separation
Sectionalized guide rolls forming a bow are used for spreading the web ahead of the longitudinal slit.

For separating the web after the slitter section, the proven roller spreader bar RollerBar is used. Due to its narrow segments and adjustable bow setting, the spreader bar has substantial benefits. The roller spreader is often imperative for narrow webs across the full width and particularly for problem areas at the outer edges of the web.

Core handling – quick and reliable fixing of reels
The cores are fed by feeding elements integrated in the ejecting unit. Frequency controlled drives allow a high positioning speed while releasing and fixing the core chucks.

Optionally, Voith also offers an automatic core feeding with core length measurement, as well as an additional option in connection with an automatic core cutter.

Avoiding vibration
Two-drum winders tend to strong vibrations when processing certain paper grades, i.e., very rough and bulky papers that have a high friction coefficient such as copy paper and papers that are easily compressible such as corrugated medium. During the winding process of such papers, self-excited vibrations occur at certain operating points depending on web speed and winding diameter. The paper reel gets out-of-round, which excites the entire winder. The generated frequency of excitation is always a bit below the natural frequency of the winder. Natural frequencies, which are determined by the stiffness of the winder drums, are mostly involved in this problem.

However, this does not always lead to a vibration problem; only the operating points, in which excitation complies with the vibration resonance frequency, generate a problem. For avoiding these complex vibration problems, Voith developed the hydropneumatic winder drum bearing (short: HPD bearing) as well as a special rider roll damping. Thanks to these damping systems, vibrations can be reduced by up to 90 %.

Using HPD bearings, the bearing stiffness and damping behavior of the supports can be easily adjusted from very hard to very soft. By modifying the support characteristics, the dynamic adjustment of both winder drums can be optimized in large areas independently from each other with regard to the bending natural frequency and the resulting damping behavior while the machine is running.

The rider roll damping ensures maximum damping of the positioning hydraulics of the rider roll crossbeam.

Both units for avoiding vibrations are options of VariFlex. Retrofitting the HPD supports or the rider roll damping at a later time is possible without any difficulty.
Reliability and quality

For meeting the constantly increasing requirements for paper quality, reel dimensions and production speeds, Voith Paper consequently continues to develop technologies and components for its winders, since only the perfect interaction of all elements ensures optimal quality and productivity in paper and board production.

Slitter section – Accuracy up to decimal places
The automatic slitter positioning system TruSet™ ensures a quick and precise slit width adjustment with an accuracy of +/-0.25 mm. Top and bottom slitters are moved separately by two independent belts through a patented positioning system. Thus, positioning of the slitters is possible even with the web in the winder, since there is no mechanical connection between the slitter pairs. The slitter positions are determined by absolute measuring via magnetostrictive sensors. The slitters are characterized by a long service life; the bottom slitters are self-adjusting and therefore do not require a time consuming calibration after reglazing. All in all, TruSet stands for a maintenance and operator friendly, production-proven slitting technology.

Control concept – Guarantor for highest productivity
Its high degree of automation makes the two-drum winder a successful production machine. Especially the automatic reel set change with the Gecko OneStep technology allows a nearly continuous production.

The HMI-assisted machine control is based on Siemens PCS7 software standards and can be integrated into the papermaker’s production management system through a network connection. Depending on the required productivity, different kinds of automation components are used up to a fully automatic operation including automatic reel set change. This makes VariFlex a highly productive machine, resulting in a rapid return on investment.

Design and installation
The entire machine design complies with ergonomic aspects taking into account operation, maintenance and safety concerns. These include the good access to all operating areas, extensive automation, safety devices and CE certification as well as a decentralized control configuration with bus system. All essential components can be tested prior to delivery during the shop assembly. Thus, the erection and commissioning at the customer’s premises are significantly simplified and expedited.

Technologies from a single source
Voith is also a competent partner for the paper and board producing industry beyond the scope of winders. For example, Voith offers concepts for the safe disposal of process-related waste such as the remaining paper on the empty reel spool, trim strips in the slitter section or the web tail after threading. Voith experts also support the customer in the planning-in of the pulper and supply protective covers for the pulper openings in accordance with the latest safety standards.

For achieving an optimum paper quality, Voith also offers quality-enhancing measures such as dust suction units that remove dust from the surfaces or dust caused by longitudinal slits. Moreover, Voith specialists apply their long-standing know-how to the development of integrated system solutions for paper producers.

Service packages ensure a smooth operation
With the Total Equipment Services, Voith offers three service packages for winders and all relevant components of the paper machine. Thanks to these packages, paper producers can ensure the full performance of their equipment, avoid unplanned shutdowns, and reduce equipment service costs, thus maximizing the availability and productivity of their paper mills.

The service packages Basic, Comfort and Premium cover all service, maintenance and upkeep activities. They are adapted exactly to the customer’s production and maintenance schedule.