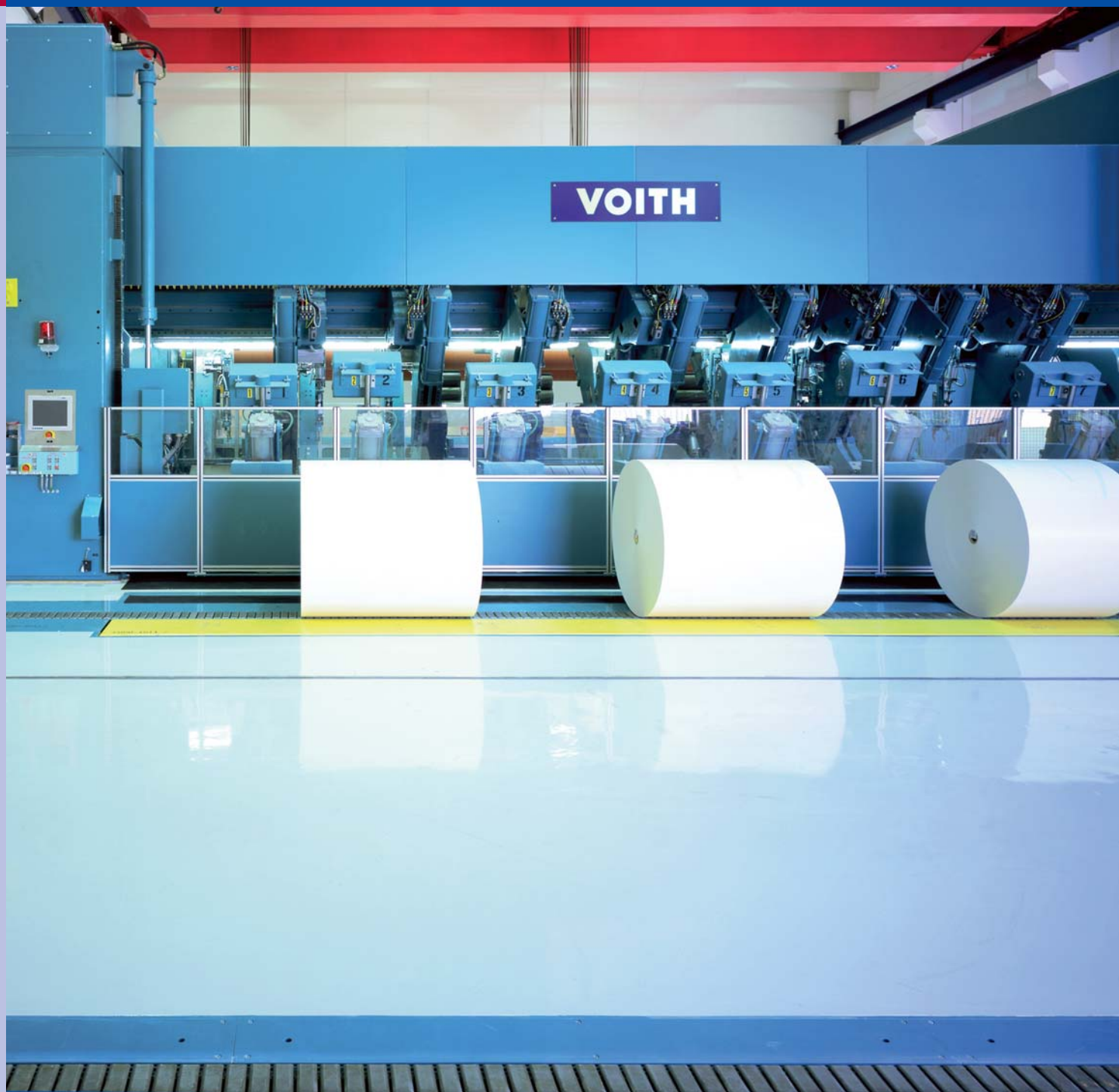
Voith Paper

VOITH

Voith single-drum winders – power and feeling for large sized rolls and demanding paper grades



Voith – Our company

Voith is a reliable partner to essential industries. We set standards worldwide for paper making technology, power transmission, power plant equipment and for industrial services.

With annual sales of approx. € 3.3 billion, 24,000 employees and 180 locations worldwide Voith is one of the large family-owned companies in Europe.

We want to be our customers' preferred supplier and business partner

Quality, reliability and soundness are key concepts of our identity.

These are expressed in three words:
Voith – Engineered reliability.

The engine of our strong growth: innovative power and reliability

Voith engineers have again and again written new chapters in the history of technology. Today, Voith holds over 7000 active patents worldwide. Approximately 400 new ones are added every year.

Voith has operated in the black since its founding on January 1,1867. The dynamic development and the growth over the last few years confirm that we have taken the right steps.

We will continue to expand our worldwide dedication to our markets.

Process know-how from one company –

from raw materials to finished wrapped rolls

One Platform Concept from Voith: the installation concept for efficient and profitable paper production

It is the objective of every paper mill to produce marketable goods at a consistent high quality level. Our claim is that we provide the paper industry with equipment which is consistently tailored to the respective paper grade and with a great emphasis for profitability, operational reliability and future-orientation.

As the leading supplier to the paper industry, Voith Paper has developed a technology philosophy which specifically creates the best solutions for the optimum added value chain in paper manufacturing. The basis for this is our comprehensive process expertise and combined know-how covering all the production stages from stock preparation to wrapped rolls ready for shipment.

Voith Paper's One Platform Concept represents the practical implementation of this philosophy. The persistent alignment to the product 'paper' has led to a modular machine platform with proven and innovative technologies including components designed to meet customers' requirements and which, at the same time, fit the overall concept of the system. High productivity which takes quality and machine reliability also into consideration: the One Platform Concept provides the most profitable production line for every respective paper grade.

This Voith Paper process philosophy accompanies the entire finishing process; from calendering through winding to wrapping and conveying of the finished rolls; careful and effective handling of the finished product is the priority.

Voith Paper has completed its range of finishing equipment with the winder technology. There are proven technology concepts for all paper grades and roll sizes and it is these concepts which make the product 'paper' into a marketable product in various roll diameters and widths. In doing so, Voith relies on consistent high quality and productivity for improved profitability of the mills.

Suited for all requirements:

Winder technology from Voith Paper

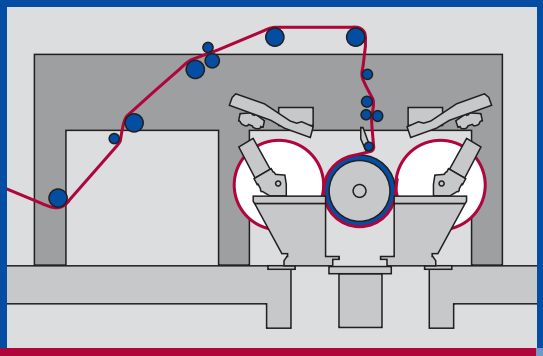
Winders from Voith Paper offer technology concepts for every challenge in paper grade and productivity. The VariPlus™ and VariTop™ single-drum winders and the VariFlex™ and VariSteel™ two-drum winders were specifically developed for different applications and, together, they cover the entire range of papers.

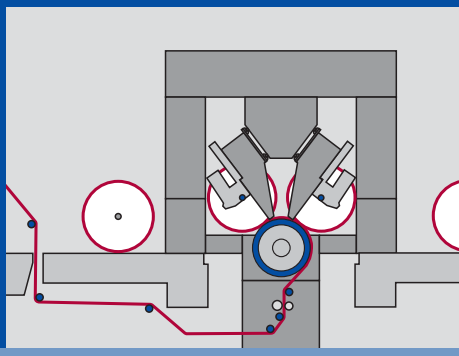
Every paper has its own properties. Thus winders from Voith Paper provide various technology concepts for all specific requirements in paper and board grades. The overview of the applications clarifies the individual technology concepts of these winders. Generally, the two-drum winders VariFlex™ and VariSteel™ are suitable for a wide range of paper grades.

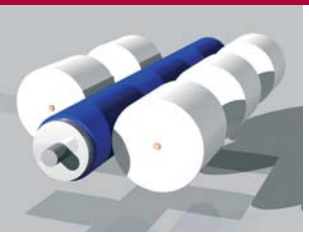
However, extraordinarily large rolls or special grades such as sensitive papers require different technology approaches which can only be met by winders of the VariPlus™ and VariTop™ design. Single-drum winders are also the only winders which allow the use of different diameters in one set of rolls and the production of wound rolls for various applications – e.g. hard wound shipping rolls in addition to rather soft wound rolls for sheet cutters. Thus the table below can only give a general idea of grades and technologies. The Voith Paper winder specialists always supply the optimum winder configuration designed and configured for the respective production requirements.

● = Standard ● = Alternative

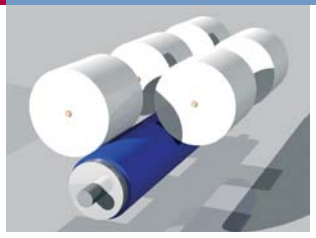
		Two-drum winder		Single-drum winder	
Paper grades	**Paper-specific notes**	**VariSteel™** Steel drums	**VariFlex™** Soft-covered drums	**VariPlus™**	**VariTop™**
Newsprint	Standard, upgraded newsprint, directory		●		
LWC / SC Rotogravure			●		●
LWC / SC Offset			●		●
WFU	Wood-free uncoated	●	●		
WFC	Wood-free coated		●	●	
Speciality papers	Thermo-paper		●	●	
	Carbonless paper, cast-coated grades			●	
	Cigarette paper, decore paper, filter paper	●			
	Silicon base paper, thin paper		●		
Wrapping papers	Corrugated base paper, corrugated medium, test liner, kraft liner, fluting	●			
Uncoated board		●			
Coated board	One and two-sided		●		







In the case of the VariPlus™, the paper rolls are wound in the 3 and 9 o'clock position.



In the case of the VariTop™, the paper rolls are wound in the 1 and 11 o'clock position.

VariTop™ and VariPlus™ – winder technology for a wide range of applications

Single-drum winders such as the VariTop™ and VariPlus™ have been developed to solve the problem of high nip pressure with increasing roll weights. Since the entire weight of the wound rolls rests on the two winder drums of the two-drum winder, very high nip pressures arise with heavy paper rolls which may lead to undesired winding defects. Soft covers have provided the remedy in this case and considerably enlarged the working window of the two-drum winders. However, the two-drum winders reach their limits with large-scale rolls and sensitive grades.

In a single-drum winder each paper roll is individually wound in its own rewinding station. The nip pressure can be controlled precisely regardless of the roll weight and it can even be varied from station to station. The same applies to the force on the roll periphery resulting from the torque of the center drive which can also be controlled in a precise manner.

The rewinding rolls are arranged in 3 and 9 o'clock position to the center drum in the VariPlus™. The nip loads created by the rewinding rolls, being pressed against the center drum, can be controlled very finely and adjusted to minimum nip pressures. However, the weight of the individual paper rolls is borne solely by the respective rewind station. This leads to the rewind chucks and the cores being subjected to greater forces particularly with heavy rolls. This may cause layer damage in the roll center with certain paper grades. Above all, this affects papers with a low basis weight and high density, e.g. LWC, ULWC and SC rotogravure grades and extra large and heavy rotogravure rolls.

This is where the VariTop™ comes in. Due to the arrangement of the rewinding rolls in the 1 and 11 o'clock position, a respective part of the roll weight is used to generate the nip load which in turn reduces the load in the roll center. Equipping the center drum with an elastic cover and the resulting greater contact width of the rewinding rolls means that the specific nip load is greatly reduced. That is why the VariTop™ can also produce the largest and heaviest paper rolls with optimum wound roll quality. In this process, the center drives ensure good hardness at the core so that rolls intended for rotary printing can cope with the unwinding in wide, fast running printing machines.

High-performance specialists for particular challenges:

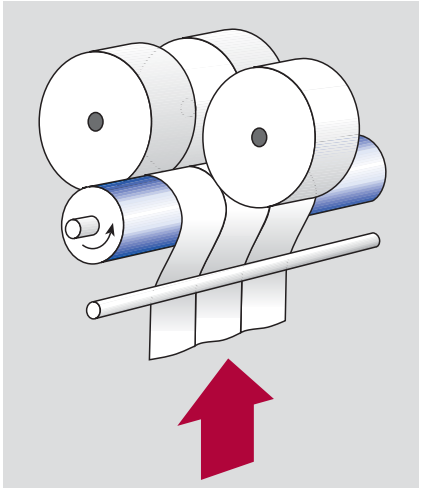
VariTop™ and VariPlus™

The advantages of single-drum winders are obvious – to be more accurate they rest in the core chucks of the rewind stations. Specific control of the nip load means that the VariTop™ and the VariPlus™ are the winders providing solutions for the proverbially „great" requirements in roll dimensions and in the winding quality of the finished rolls.

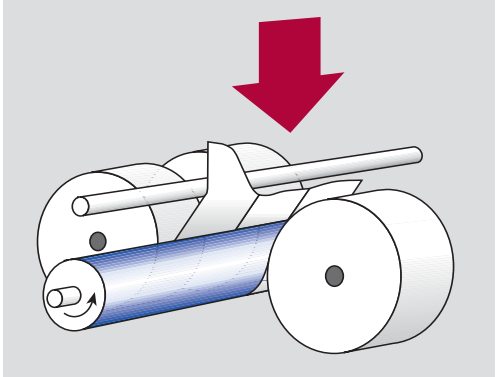
The VariTop™ is, so-to-speak, the high-end solution in winder technology. It can easily master the largest finished rolls for LWC and SC rotogravure papers. It also has the technological reserves necessary to cope with the future requirements of the market such as e.g. the increasing widths of the printing machines.

By contrast, the VariPlus™ can be described as the specialist among the Voith Paper winders; this is made clear by its main applications with speciality papers such as thermo paper, self-copying paper and cast-coated types. But it also demonstrates its technological superiority with WFC sheet papers or particularly vibration-critical WFU grades.

Despite that the basic principle is common to both – a center drum and separate winding stations for the individual paper rolls – VariTop™ and VariPlus™ differ in essential elements. This is particularly evident in the web run.



In the VariTop™ the web is running to the center drum from below.



In the VariPlus™ the web is running from above into the winder and then is being led to separate rewind stations via the center drum.

In the VariTop™ the web is guided to the rewind stations from below. Thus the machine consists of two levels; the actual operating level and an underfloor level. The noise-intensive areas of the slitting section and the trim removal can be shifted from the actual operating level to the basement. Furthermore, closing off this basement area and installing an air conditioning system will eliminate or drastically reduce shrinkage of the web.

VariTop™ with 8,300 mm trim width for SC-A papers

The rewind stations of the two winding concepts also differ greatly from one another in design. The VariPlus™ rewind stations are supported on the base and are moved laterally in accordance with the roll width and number of rolls and also unload the rolls independently at floor level. By comparison, the rewind stations in the VariTop™ are suspended from a center crossbeam within the machine frame and are positioned in precision guides according to the roll width. Roll lowering tables take on the unloading of the finished rolls. Rewind stations which are not in use can be parked in a parking area outside the actual winder; this applies to both the VariPlus™ and the VariTop™.

Single-drum winders are also used as “salvage winders” for roll quality checks or for salvaging rolls which have defects. They are generally located downstream of the actual winder and are normally designed for the maximum width of the finished rolls which are to be produced on the machine winder.

VariTop™ with 9,000 mm trim width for SC and LWC offset and rotogravure

The demands of the paper – the challenge to technology

The decision in favor of a particular winder must take many criteria into account. In addition to the formal specifications such as roll width and diameter, it is, above all, the different properties of the papers which are to be considered. Many paper grades which are otherwise inconspicuous show their weakness when large roll sizes are processed.

LWC and SC rotogravure papers

The production of LWC and SC papers for rotogravure poses particularly high demands also for winders. The large roll sizes of these wood-containing papers with relatively low basis weights and very smooth, dense surfaces pose a challenge for winding – in this case stressless winding is the top priority. Careful handling of these papers is possible with the VariTop™ due to the new elastomer covers for the center drum and the rider rolls. Offset grades can, of course, also be run on this type of winder; these are often produced on the same paper machines as rotogravure grades. The optional center drives of the rewind station ensure a homogenous winding profile and, above all, hard initial winding: these drives transmit torque via the cores which is required at the winding start; this applies particularly for wide rotogravure rolls. The weight relief due to the 11 and 1 o'clock position of the rolls to the center drum means that the rewind stations can maintain the nip load within the optimum range for a hard but careful winding of the rotogravure rolls over the entire winding process.

LWC / SC rotogravure and offset

Type	**VariTop™**
Width	**9,000 mm**
Speed	**2,800 m/min**

SC paper

Type	**VariTop™**
Width	**8,300 mm**
Speed	**2,800 m/min**

Modern winder technology must take into account the characteristics of the papers as well as the requirements of the printers.

Wood-free coated papers

Wood-free coated papers are produced for a wide range of applications. In particular cases they may also require a single-drum winder instead of a VariFlex™. This is, for example, the case for a multiple two-side coated sheet with sensitive surfaces for which a VariPlus™ provides the best solution. In the case of uncoated, wood-free grades the VariPlus™ represents the optimum technology concept with regard to vibration-prone grades.

Speciality paper grades

The main application for the VariPlus™ is, however, for speciality paper grades which demand more sensitivity in the winder. These include thermo-sensitive papers, self-copying paper and cast-coated grades. All these papers have special properties which are to be retained even after slitting and rewinding in the winder as they are important quality features for further processing. That means for example that self-copying papers are not to discolor, thermo papers are not to blacken and the surfaces of cast-coated grades should not lose the achieved gloss.

The consistently high quality of the finished rolls produced with Voith winders demonstrates the comprehensive expertise of Voith Paper in all aspects of paper production. At the same time the recognized productivity and reliability confirm the high degree of product and market focus of the Voith Paper technology concepts – for all papers and all challenges.

WFC – multiple two-side coated	
Type	**VariPlus™**
Width	**5,200 mm**
Speed	**2,500 m/min**

Speciality paper grades	
Type	**VariPlus™**
Width	**4,000 mm**
Speed	**2,500 m/min**

From unwinding to finished rolls – reliable technology throughout

The single-drum winders VariTop™ and VariPlus™ from Voith Paper rely on state-of-the-art components which combine productivity and reliability. This applies particularly to the fully automatic roll set-change which quickly and precisely controls all sequences from the end of winding to the start of a new roll.

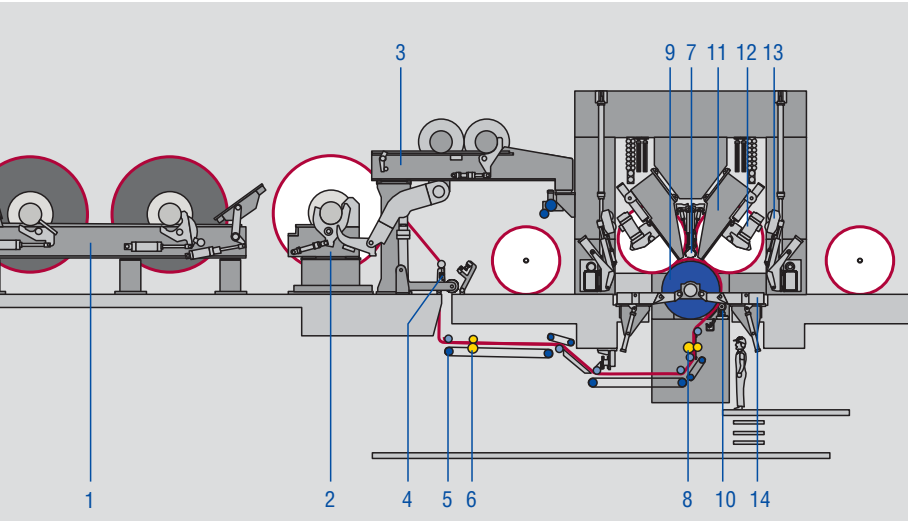
Unwinding

Single-drum winders from Voith Paper offer many options to ensure productivity from the very beginning at the jumbo roll magazine with automatic changeover of full and empty reel spools to simple unwinding. The automatic butt splicer also contributes to this; it delivers a saleable splice either to complete a set of rolls or to eliminate defects in the parent rolls; this allows the printer to process these rolls without problems.

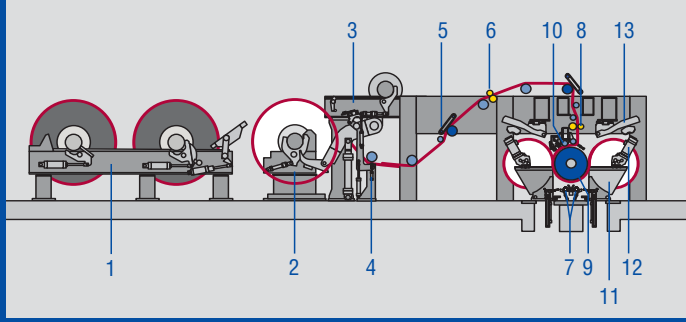
Web threading

Following the unwind the web is then guided to the first guide roll of the VariTop™ at floor level and subsequently to underfloor level. Pre-trimming takes place at this point; the paper is guided via web conveying systems to the center drum. In the slitter section the web is slit to the specified widths. The underfloor web travel also provides paper makers with the opportunity to air condition this area and thus condition the paper.

The slit webs are then guided to the center drum and via this to the loaded cores in the rewind stations. The rubber-covered pair of rider rolls ensures a homogeneous transmittal of the nip pressure over the entire roll width in the initial phase of winding. These rider rolls are self-aligning to the cores and ensure stabilization of the cores at the winding start.



1 Parent roll magazine
2 Parent roll unwinding
3 Empty reel spool magazine
4 Butt splicer
5 Web threading systems
6 Pre-trimming
7 Core injection
8 Slitter section
9 Center drum
10 Web tension isolation
11 Rewinders
12 Center drives
13 Rider rolls
14 Roll lowering table



Finished roll change

One of the highlights of the Voith Paper single-drum winders is the completely automatic finished roll changeover which is similar for both the VariTop™ and VariPlus™. As soon as the finished rolls have reached the specified diameter, the winder control system starts the roll setchange process. All the functions associated with this now are being executed automatically, in part simultaneously: the deceleration of the winder, the holding and severing of the webs, the end and start gluing, the lowering and ejection of the set of rolls on both sides of the winder, the injection of the cores, gluing of the webs to restart the new set.

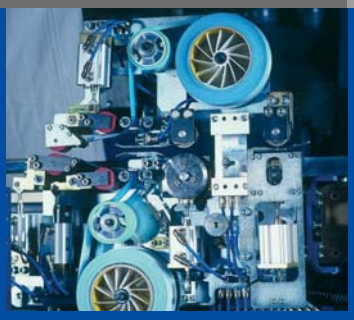
Gluing and severing the webs

There are differences, of course, in the details: the VariTop™ glues web ends and starts with glue lines applied in the direction of the web run whereby a gap in the glue lines is made to allow for the severing of the webs. This gap is then run up to a severing device which perforates the web across the whole width. When the winder drum is turned over again, the individual webs which are held in place upstream are severed along the perforated line; the web ends stick to the finished wound rolls which are then discharged from the winder via an unloading platform onto the roll conveyors. Core grippers take the cores from the centrally located core trough and move them to the rewinding stations for chucking up. Now, the winder is ready to restart, the individual webs are automatically glued to the cores.

The VariPlus™ differs: a specially designed taping and web severing device applies a double-sided adhesive tape across the web after the winder has come to a standstill and the web has been clamped; this tape is cut in the middle immediately after application. In this process the web underneath the tape is perforated and weakened, respectively. Restarting the winder means that the center drum rotates further whereby the slit webs tear in the middle of the adhesive tape at the weakened point. The web ends are taped to the wound rolls. The remaining slit webs are held to the center drum by suction holes. Once the finished rolls have been discharged and the new cores have been loaded, the rewinding stations move these against the center drum where they are brought into contact with the individual webs and with the remaining adhesive tape strips. The suction in the drum is shut off and the webs are released and taped to the cores. The VariPlus™ resumes the winding operation.

The butt splicer automatically joins old and new webs.

Slitter section – slitter positioning by two independent belts



Front view of the butt splice unit

Cores being put onto the rewind chucks of the rewind stations

Winder technology combining winding force with individual adjustability

Power alone is not everything, neither is speed. Both are important aspects of a technology with limitations which are constantly being redefined; but at the end of the day it is criteria such as reliability, availability and consistent quality which define the productivity of a winder.

Center drum

Daily top level productivity requires a sure understanding of the product. One major element of this is the center drum. And it is its surface composition which helps to prevent winding problems. The new elastomer cover ElaGrip™ was specifically designed with this in mind. It reduces nip load on the paper roll and evens out CD fluctuations. In addition, a special grooving helps to prevent undesired web stretching and air inclusions at high speed.

Rewind stations

The individual rewind stations are optically the most obvious difference in the single-drum winder compared to the two-drum winders. These rewind stations are automatically positioned via separate frequency-controlled drives analogous to the slitter positioning system. Center drives can be supplied as an option. An even more specific wound roll structure can be achieved when winding wider rolls since a precisely controlled torque can be transmitted via these drives; thus, the optimum roll hardness is achieved which meets the requirements for further processing. Each rewind station can be programmed separately which permits the production of finished rolls with differing core diameters and roll hardnesses within one set of rolls.

Slitter section

The top and bottom slitters are positioned by patented belt drives which can be moved independently of each other. Thus, an adjustment can be carried out with the web threaded in the slitter section since there is no mechanical connection between the top and bottom

The grooved elastomer cover of the center drum prevents air inclusions during winding.

VariTop™ central crossbeam to support the rewind stations – pre-assembly in the factory

The “suspended” rewind stations in the VariTop™

slitters. The fully automatic slitter positioning system TruSet™ A ensures, controlled by a magnetostrictive measuring process, a rapid adjustment of the slitters down to an accuracy of 0.2 mm. The slitter blades feature a long service life. The bottom slitters are self-calibrating making an otherwise time-consuming offset adjustment unnecessary when using reground slitter bands. All in all a safe, operator-friendly and production-proven slitting technology.

The control concept

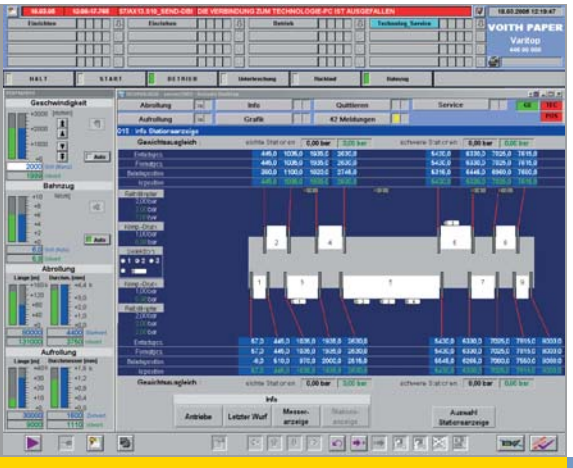
The proven Voith Paper single-drum winders with control concepts on a modular basis become today's effective tools for the paper industry. Above all, it is the smooth and seamless interaction of all components which ensures productivity and quality in the winding process.

The fully automatic finished roll setchange is only one aspect of this comprehensive control concept comprising the modules TruTec™, TruSet™, TruDrive™ and TruLog™. Overall the control concept features great flexibility so that the degree of automation can be adapted in every case to the more or less extensive requirements of the customer.

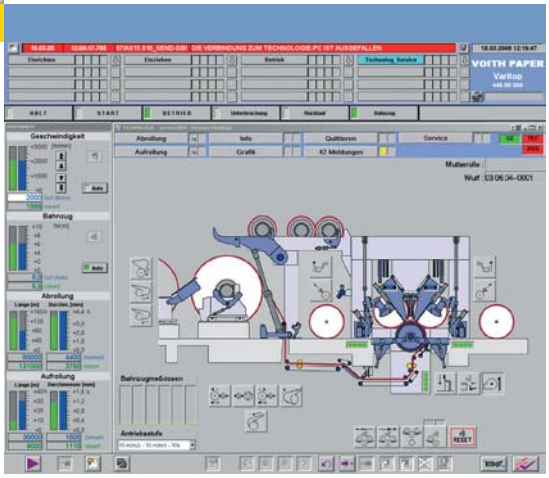
TruTec™ represents the technology center of the winder and comprises functions such as measuring the roll hardness, controlling the rider rolls or monitoring of the target parameters. TruSet™ is responsible for the exact positioning of the slitters, placing of the cores and the exact positions of the individual rewind stations according to the respective specifications. TruLog™ is the binary control system for the logic functions and interconnections while TruDrive™ controls the drives. The screen-guided machine operation is based on current standard Microsoft software, has a network connection via Ethernet and a modem connection for remote diagnosis.

The complete finishing technology from one company

We are also an expert partner to the paper industry in matters surrounding winders; for example for the reliable disposal of process waste such as the remaining slabbing on the empty reel spool, the edge trim in the slitter section or the excess web start after threading. Or for the planning of the pulper including the covers in accordance with the safety standards. Voith Paper provides complete system solutions for paper production from measures which improve quality such as surface or longitudinal slitter dust suction removal through all elements of finished roll conveying to flexible roll wrapping with the Twister™ technology.



Detailed status information is provided for all the functions of the winder – here the positions of the rewind stations are shown.



The control of a Voith single-drum winder is effected via a clearly structured graphic interface.

Looking ahead:
customers and markets determine the path forward

Voith Paper has set the goal for its winder technology to drive forward product development and service. The Finishing Technology Center in Krefeld focuses on these two objectives where both research and development as well as trials for customers are carried out.

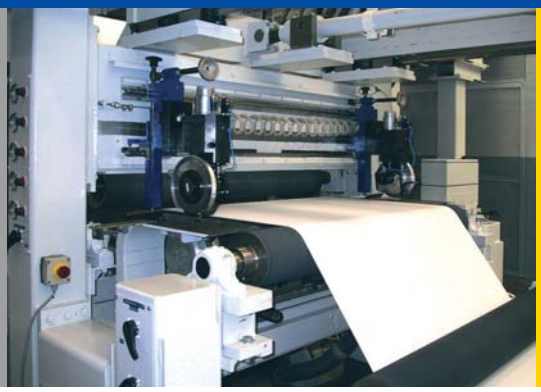
The main functions of the Voith Paper winders are tested together with the customer during factory pre-assembly.

Trials in the presence of customers from all over the world are carried out on the pilot winder in the Krefeld Technology Center.

Extensive trials with customers' papers are carried out in the Krefeld Technology Center to design new winders and to determine the optimal necessary modifications to existing equipment to meet special production requirements. This service offer is popular amongst papermakers from all over the world and it is used intensely. The pilot winder which is in great demand can be operated in two-drum and single-drum mode. All components of this machine are kept at the latest technical standards to be able to demonstrate the best up-to-date options for the customers' production winders.

A visit to the Technology Center is popular in combination with a tour of the adjacent production facilities where the equipment on order is tested during factory pre-assembly to ensure that all important functions operate properly and in accordance with specifications. Future operators can familiarize themselves with "their" machine during these tests and thus improve the learning curve and save valuable commissioning time.

Technical data of the pilot winder	
Speed	up to 3,000 m/min
Web width	max. 1,200 mm
Roll diameter	max. 1,800 mm
Number of slitters	2
Two-drum configuration	
Winder drum 1	Steel or ElaGrip™
Winder drum 2	Steel or ElaCare™
Rider roll	Steel or ElaLoad™
Single-drum configuration	
Single drum	Steel or ElaGrip™
Rider rolls	ElaLoad™
Core inner diameter	76 or 150 mm (unwind and rewind)
Paper/board basis weight range	12 – 600 g/m²



In addition to customers' trials, the pilot winder of the Technology Center also serves the R&D specialists at Voith Paper to test new developments and also components for further improvements. Innovative ideas are driven forward to be suitable for actual production purposes. Such new ideas are often created in close cooperation with customers when facing special challenges. The focus of R&D on winders is to continuously increase productivity based on safety and reliability of the equipment. Subsequently, the trials results are evaluated in the Paper Testing Laboratory. The papers can be tested for all important data and properties and all results are documented in detail.

This also applies, of course, to the other pilot machines in the Technology Center. The Janus™ MK 2 pilot calender, only separated by a wall from the versatile pilot winder, offers vastly differing testing possibilities comparable to practical operating conditions in the mills.

A second calender, located adjacent, can demonstrate both EcoSoft™ operation and NipcoFlex™ wide nip calendering.

Voith Paper as a process and service oriented supplier provides customers with complete and homogeneous finishing solutions. This has become more important than ever before, since the efficiency and the productivity of equipment is of first interest and significance today. Production components must, therefore, work together even more precisely to fulfill the constantly increasing quality demand on paper and board grades. Voith Paper's One Platform Concept is the result of this philosophy which is based on the synergy of experience from paper production, expertise in mechanical engineering and design as well as extensive product know-how from stock preparation to the finished wound rolls.

Voith Paper GmbH
Postfach 10 21 54
47721 Krefeld
Voithstraße 2
47803 Krefeld
Germany
Phone +49 2151 896 0
Fax + 49 2151 896 434

Voith Paper Limited
P.O. Box 8
Apex Works
Grimshaw Lane
Middleton
Manchester M24 1QT
England
Phone +44 161 643 9273
Fax +44 161 653 3114

Voith Paper Finishing Inc.
800 Worcester Street
P.O. Box 800
Springfield
MA 01101-0800
USA
Phone +1 413 726 1000
Fax +1 413 726 1010

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