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APPLICATION GUIDE

Web Products

WEB PRODUCTS APPLICATION GUIDE

Everything you need to control web quality and productivity from unwind through windup, roll after roll.



>>>

Nexen offers you a wide range of web control systems and components, supported by our expert technical support and service team.

With Nexen, you can be assured of consistent, highquality output from your web printing or converting process. Nexen controls are used successfully with applications as diverse as:

- paper paperboard
- film
 metal strip
- rubber non-wovens
- labels
 foil
- textiles plastics
- laminates
 wire

Precise enough for the laboratory, yet rugged enough for the mill, Nexen control systems are delivered and backed by the recognized leader in web control equipment for almost 50 years.

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Everything you need to control web quality and productivity from unwind through windup, roll after roll.

Tension Control Systems

Nexen can help you address your tension control problems at each stage of the process – from unwind through intermediate zone to windup. Nexen systems make it easy to deal with variations in thickness, elasticity, thermal expansion, poorly wound rolls and changing roll diameter. You also get taper tension control when you need it.

Nexen tension control systems offer you cost-cutting technologies to provide:

- Ease of operation
- Accurate, close tolerance measurement
- Indication of tension
- within the web
- Splice-making capabilities at full line speed

and Clutches

Nexen's line of tension control clutches and brakes offers you the most comprehensive package of features in the industry, in a range of sizes to match your application.

Our patented designs offer you superior, precise torque control at all air pressures. In addition, a ventilated rotor creates an airflow that pulls cooler ambient air through the brake or clutch and dissipates heat away from the unit for better performance.

- Nexen clutches and brakes deliver high thermal dissipation.
- Unique patented airflow design transfers heat away from the unit for better performance.

- Lower-weight rotors mean lower rotational inertia to provide precise control right down to the core and reduced product waste.
- Simple diaphragm actuated calipers offer the widest possible torque range.
- Easy change friction facings.

Web Guiding Systems

Choose from edge position, center position or line follower controls for pinpoint guiding in the unwind, intermediate or windup stage.

A variety of sensors, roll lengths and controllers are available in freestanding web guide models, along with electrical linear actuators for positioning your unwind and windup stands. Self-contained units offer everything you need in a single package.

You receive Nexen's state-ofthe art electronics for the precise alignment you need for unwind, intermediate and windup control. Now you can produce a quality product at higher line speeds without wrinkling or distortion, while you reduce scrap.

- Displacement guidingAccurate roll stand
- positioning
- Edge, center or line following position control.



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TENSION CONTROL SYSTEMS

Precise tension control is vital to any web- or stripfed operation, the product – whether paper, plastics, metal strip, rubber sheet or wire – must be fed under tension, processed under tension and wound up again under tension.

Factors such as poorly wound rolls, elasticity, roll diameter change and irregularities in web thickness cause significant variations in web tension.

Some applications require taper tension on windup. Winding begins at relatively high tension, with a gradual reduction, or tapering, in tension as the roll builds in diameter.

At the very least, your tension control system must compensate for the change in roll diameter. For precise control and high line speeds, it must also be capable of measuring and controlling tension within very close tolerances.

Nexen systems are available to control variable speed motors and pneumatic and electric brakes and clutches.

Load Cell Based Tension Control

Nexen's load cell based tension control system is a closed loop system which senses tension in a web and compares it to a set point, or desired tension level and automatically adjusts air pressure to a pneumatic clutch or brake to maintain appropriate web tension. The load cell based system can also control electric clutches and brakes.

The load cell based systems also can be used with variable speed drives to maintain proper tension in internal tension zones or at the windup stand.

- Control accuracy of 1-2 percent –
- highest of any web control systems • Ideal for use with brakes, drives and clutches
- Simple to operate –set the tension level and let the controller do the rest
- Allows remote computer to determine the tension and set points for each job

Open Loop Tension Control

The open loop tension control system electronically measures or estimates the diameter of the unwind or windup roll. It then modulates a brake to control the unwind, or a clutch or variable speed drive for windup applications to maintain tension as the diameter varies. Accuracy is typically about 8-10 percent.



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TENSION SENSORS



closed loop control systems and tension measuring systems. Tension sensors measure the force applied to the sensor roller and translate this measurement into an electrical signal which can be read by the system.

Nexen offers two types of web tension sensors:

- Under pillow block (UPB),
- Sidewall

The Nexen UPB-type MB Series is based on linear variable differential transformer (LVDT)



MB Series under Pillow Block Sensors

technology, which provides excellent sensitivity, linearity and accuracy combined with a rugged mechanical design for best resistance to mechanical overload.

Nexen strain gauge type sensors also deliver excellent sensitivity and accuracy, while providing added mounting flexibility for applications with significant mounting restrictions.

Nexen strain gauge sensors are available in shaft-end mount styles for machine sidewall flange-mounting or sidewall through-mounting.



Sidewall Mount Strain Gauge Tension Sensors

The force applied to the sensor roll has two components: the tare weight of the sensor roll and bearings, and the force generated by the web tension at

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the specific angle of wrap around the sensor roll.

The following data are required in order to identify the correct sensor for a given application:

- Maximum web tension
- Sensor roll weight
- Sensor roll diameter
- Web angle
- Sensor mounting angle for **UPB** sensors
- Pillow block center line height – UPB sensors only

For assistance in selecting the appropriate tension sensor for your application, contact Nexen or your local Nexen representative.

TENSION CONTROL BRAKES AND CLUTCHES

Broad Range Torque Control

Nexen brakes and clutches offer you precise control over the full operating range - from the high torque needed to manage a large roll, to the lower torque requirements for more delicate materials and demanding applications.



Tension Brakes

Nexen XTB brakes feature multiple calipers, each composed of a pair of pistons. The calipers can be configured individually or as separately controlled groups - each with its own torque-to-air pressure range to control a separate tension range.

Cooler Operation for Longer Life

Insufficient cooling of the roll shaft and bearings can lead to shaft crystallization and seal meltdown. The recommended maximum shaft bearing temperature is typically 170°F (76,6°C). The Nexen XTB has a demonstrated bearing temperature of approximately 140°F (60°C) operating at full torque, compared to 240°F (115,5°C) for competitive models.

The rotor, hub and calipers on Nexen clutches and brakes feature a unique airflow design that draws cooler ambient air over and through the rotor and dissipates heat away from the shaft, bearings and diaphragms of the clutch or brake.

The rotor and the fins on the back of the hub draw cool air into the unit, over the air hoses and toward the caliper. The caliper fins direct the heated air out and away from the unit. The air hoses are located along the inner circumference of the calipers to ensure maximum cooling air flow and protection.



STC Clutch/STB Brake

Lower Rotational Inertia for Greater Control

Nexen brakes and clutches are up to 60-percent lower weight than competition, resulting in up to two-thirds less rotational inertia.

Lower rotational inertia means that you can maintain more precise tension control at low torque levels. This is especially critical when running delicate materials such as tissue and nylon. It can also prevent web breakage as the web nears the end of the roll.

A lower weight brake also contributes to overall system performance by putting less strain on shafts, bearings and stands.

Precise Control at Low Pressure

Nexen STB/STC tension clutches and brakes are pneumatically actuated using a piston /diaphragm combination and are designed for lighter duty than the XTBs.

- No o-rings to stick, no seals to drag.
- Nothing to hinder precise control of torque at low operating pressures - fine control of torque to the end of roll

- 500:1 torque control range for precise control of web processes
- Three piston sets, each with different thrust, for even greater torque range flexibility
- Through-shaft mounting for easy installation
- Compact size
- No rotary air unions required
- eliminates "gun drilling" shafts

Easy to Service

The lower weight of Nexen tension brakes and clutches make them easier to install and maintain. You don't need to adjust pad overhang or shim the pads.

Caliper friction pads are quickly replaced by simply releasing a spring-loaded retaining pin. There are no screws or cotter keys to remove. You change the friction pad without removing the caliper from the brake. The pads are completely interchangeable, one size fits all.

The Nexen XTB disc is also easily replaceable without removing the entire brake, simply pull the disc from the shaft. The hub remains locked on the shaft, so the new disc can be reinstalled in precisely the same position.

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TENSION METERS AND AMPLIFIERS



Tension Meter

Often you need to only measure the tension in a web, not control it. Nexen has a variety of solutions to meet these needs.

Tension Meter

Nexen tension meters precisely measure web tensions with a digital tension display on the front panel. Their 0-10 VDC or 4-20 mA analog output is also well suited as a proportional tension data signal to process controllers, data loggers and variable-speed motor controls.

You can also use one of the sensors for narrow webs, single strands of wire, or any other narrow material where tension will not vary from one side to the other.

Nexen tension meters are also

useful as a tension readout-only device to measure intermediatezone tension.

Tension Amplifiers

Nexen tension amplifiers interface with load cell or strain gauge sensors. They provide an excitation signal to the sensors and separately amplify the return signal from each sensor before combining them to provide a signal proportional to the total tension.

Tension amplifiers are ideal for accurate, low-cost tension measurement of a web process

interfaced with machine controls such as data loggers, process controllers, drive controls, host computers and other applications requiring a precise tension interface.

Tension Amplifiers Offer:

- Low cost signal conditioning for LVDT or strain gauge tension sensors
- Wide tension range for flexible installation
- Ideal for use with machine controls where local
- readout is not requiredIncludes both 0-10 VDC
- and 4-20 mA outputs

Controlled lateral alignment of the web is absolutely essential to providing high quality product and reducing scrap and waste. Nexen web guiding systems are designed, tested and proven to give you that alignment

Web Guiding Applications

Unwind Guiding (See Figure 1) As material is unwound and fed into a

machine, it must be properly aligned with the process to be performed upon it. Unwind guiding is accomplished by sensing



the web as it enters the machine. The sensor is mounted as part of the main machine frame and placed so that its center is located at the desired position of the web. The controller directs movement of the actuator, which moves the roll stand laterally across the machine to bring the edge of the roll into the center of the sensor.

Intermediate Guiding

This method is normally used in the intermediate zone to make minor corrections in position. The steering rolls pivot, directing the web to the left or right to bring it into center position within the sensor.



WEB GUIDING SYSTEMS

Displacement Guides (See Figure 2) Displacement guides consist of a pair of pivoting rollers with a pair of stationery idle rollers, one lead-in roller before the guide and a lead-out roller after the guide. This type of guide induces pure, out-of-plane twisting of the web, which is gentler on a web than a steering guide. Much shorter free spans are required before and after guiding when compared to a steering guide. Displacement guides are often used on printing presses and other applications where space is at a premium.



Windup Guiding (See Figure 3)

The position of the web is monitored by a sensor mounted on the moveable windup roll stand, positioned before the last roll on the machine. As the web shifts laterally, the controller signals the actuator to move the windup roll into line with the web edge.

Chase Guiding

Chase guiding is a technique used to align the edge of two or more webs or to align a process to a web. The sensor is moved by the actuator to "chase" the edge of the web.

In the case of aligning several web edges, the sensors for the second and subsequent webs are aligned with the chase sensor and move in tandem with it. This moves the target or center of the sensor for all subsequent webs, which in turn causes the guides to align their webs to the target.

To align the process to the web, the sensor is mounted to the moveable process component. The actuator then moves the component, causing the sensor to chase the web edge or printed line.

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GUIDE SENSING OPTIONS WEB GUIDE SENSORS AND CONTROLLERS





Ultrasonic Web Guide Sensor



LED Infrared Web Guide Sensor

Ultrasonic Sensors

Ultrasonic sensors are used particularly for edge or center control of photosensitive materials such as photographic film and print paper, and with transparent or translucent films bearing a coating, printing or an opaque surface near the edge. A high frequency sound is transmitted across an air gap to a receiving unit. Interruption of the signal is interpreted as a change in position of the web material. They can also be used with opaque materials.

Infrared Sensors

A pulsed LED transmits an infrared signal across the web edge to a light sensitive sensor; edge position of the material is

Splice Detector System



The Splice Detector System is a visible light system used to sense splices or double thick-nesses in translucent materials. It provides both a visual indication and a relay signal at each splice.



Edge Position Control One edge of the material is aligned with the process at all times. The position of this edge remains constant throughout all processes. The opposite edge is permitted to run free and is eventually edge-trimmed to meet the final specified web width.



Center Position Control

This technique requires one sensor on each side of the web. The objective is to maintain the center of the web on the mean centerline of the machine. If the web varies in width, center position control will maintain an equal edge trim on each side of the web, to be removed later in the processing.

Web Guide Controller

Self Contained

0 1 3

42 mm 13



Line Follower Control

Line follower control is always employed for previously processed materials, using a sensor to follow a line or the edge of a pattern of print or coating material previously laid down on the web.

Web Guide Controllers

A Nexen web guide controller receives signals from a web position sensor and translates them into control signals for web position drive motors. With the appropriate sensor, they offer control accuracy to within ± 0.004 inches ($\pm 0,01$ mm) of an edge or centerline position.

The purpose of the controller is to provide automatic positioning of the web in relation to the sensor. Web position information from the sensor is fed to the web guide controller. The controller's motor control drives an electrical linear actuator to correct the web position by adjusting the roll stand or guide roll mechanism.

determined from the amount of light sensed at the receiving unit. Infrared sensors can also be configured in pairs for center position control. The infrared signal is not affected by ambient light and is useful for processing of certain photosensitive materials. Infrared sensors are used for opague materials only.

Line Follower Sensors

A line following sensor bounces light off a web as it passes around a transport roll in the machine. It is received by a sensing element contained in the same housing. This type of sensor is normally used to follow a printed line or the edge of a printed pattern on the web.

AUXILIARY PRODUCTS

This system is ideally suited for use where high nipping pressure in a machine must be momentarily relaxed to allow a splice to pass through without damaging the web, printing blanket or other components.

This system typically does not require operator intervention. A change in web thickness of more than three seconds duration will cause the system's controller to recalibrate to the new web thickness.

Paper Checker System

Web Guide Controller



Paper Checker

The Paper Checker System detects web breaks and splices on web machines.

This system makes use of an ultrasonic sensor to prevent the false triggering that can result from the presence of print or

other patterns on the web material and for use with photo sensitive materials. Each break or splice is indicated by a separate relay signal and front panel indicator lights.

This Nexen Paper Checker System can be used on transparent to fully opaque webs and with laminates of paper, film and foil. It handles web speeds from 30 to more than 3000 feet per minute, (10 to 1000 meters per minute).

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