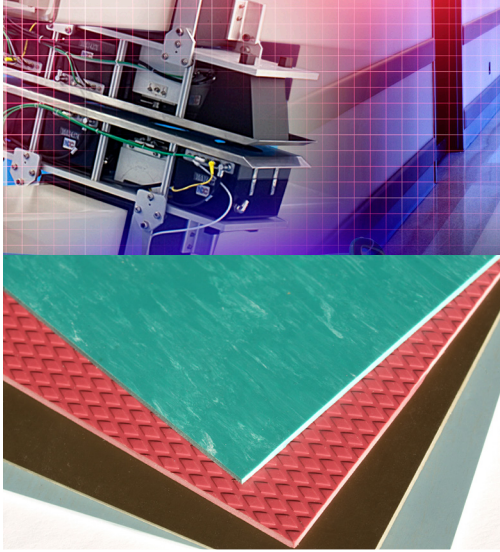
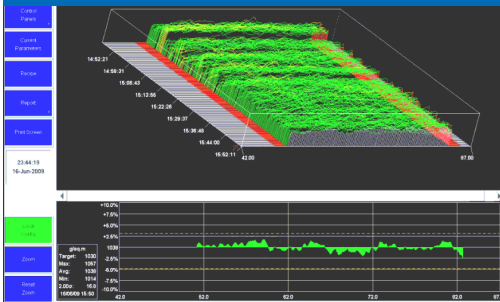


# CALENDERING INDUSTRIES



## Advanced Web Solutions



# NDC's Calender Solutions:

Engineered to deliver  
outstanding results from your process



**NDC's Calendering Systems** represent reliable measurement and control solutions for vinyl, gum (innerliner), textile (fabric), and wire (steel cord, metallic) calenders. NDC recognizes that each calender requires a system tailored to your requirements to deliver a solution with a clear return on investment. Therefore each NDC Calender System includes the right sensors, scanners, measurements, displays and controls to help customers produce quality products.

## Customer Benefits:

- ▶ **Higher Quality and Productivity:** Achieved through accurate measurement and tight control of the process.
- ▶ **Lower Manufacturing Costs:** A flatter sheet to help lower scrap and raw material consumption.
- ▶ **Improved Process Visibility:** Enables operators to make real-time decisions to produce higher quality products more efficiently.

- ▶ Rubber
  - ▶ Wire
  - ▶ Textile
  - ▶ Gum

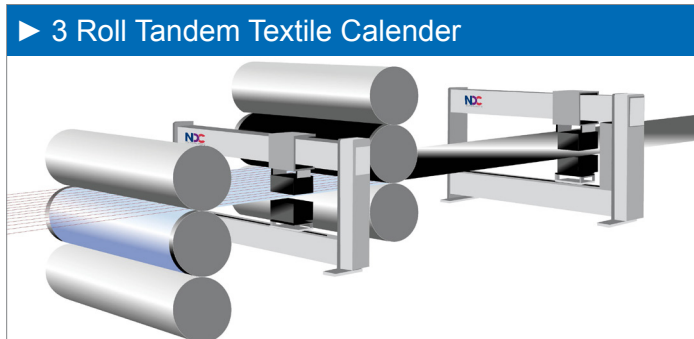
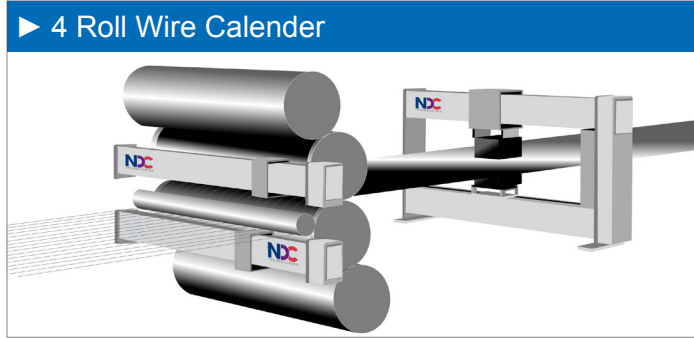
## ▶ Vinyl

### Measurements

- ▶ Gum weight
- ▶ Gum thickness
- ▶ Fabric weight
- ▶ Total weight
- ▶ Wire balance
- ▶ Wire position
- ▶ Wire cord count
- ▶ Wire edge to 1st cord
- ▶ Total thickness
- ▶ Product width
- ▶ Wind-up weight
- ▶ Lump detection

# Calender System Configurations

## Measurement solutions for the calender processes



Calender Type	On-Calender Scanning Measurements		Post Calender Scanning Measurements	
	Weight	Thickness	Weight	Thickness
4-Roll S Wire		2 Laser sensors on rolls 2 and 3	XRB Top & Bottom, XRT and Beta	
4-Roll S Textile	1 XRB on roll 3	or 2 Laser sensors on rolls 2 and 3	Beta	
3 Roll Tandem Textile	Beta		Beta	
2, 3 or 4 Roll Gum			Beta	or Laser (Single-sided)
4 Roll Inverted L	XRB on roll 2	or Laser (Single -sided)	Beta	or OptiMike or Laser (Single-sided)
4 Roll Gum			Beta	or Laser (Single-sided)

# Company overview

Combining industry-best performance and reliability with a global support structure

NDC Technologies, based in Irwindale California, develops and manufactures measurement and control equipment for a wide range of process industries. The company also manufactures in Essex, UK, Dayton, Ohio and has a Technical Center of Excellence in Loncin, Belgium with direct sales and support operations in China, Japan, Germany, France, Italy and Brazil.

Our global client base consists of some of the world's most successful companies who rely on NDC to ensure that their product performance, process yield and quality meet the stringent standards demanded by their customers.

**NDC comprises four divisions:**

**Web Solutions** service the converting, extrusion, calendering and nonwovens industries, providing real-time measurement of key product parameters such as product thickness, coating thickness & basis weight.

**Sensors** service the food, chemical, pharmaceutical, mineral, bulk materials and tobacco industries with on-line and at-line measurements system for constituents such as moisture, fat and protein content.

**Metals** service the steel and non-ferrous metals industry, delivering rugged measurements systems for key parameters such as thickness, width, flatness, edge shape and metals coatings.

**Laser and Ultrasonics** produce non-contact gauges for the on-line and off-line measurement of diameter and ovality, wall thickness and eccentricity, length and speed, and other dimensional monitoring of products in the wire and cable, fiber optics, pipe and tube, building, nonwovens, paper, plastic, and metals industries.

NDC is part of Spectris plc, the leading supplier of productivity-enhancing instrumentation and controls.



NDC is represented in over 60 countries worldwide. ISO9001:2008 [www.ndc.com](http://www.ndc.com)

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In line with its policy of continuous improvement, NDC reserves the right to revise or replace its products or services without prior notice. The information contained in this document may not represent the latest specification and is for indicative purposes only.

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# Accurate Measurements and Effective Controls

## Equals NDC's complete strategy for superior results from your process



### Intelligent Measurement Technologies

- ▶ **Beta:** NDC's beta transmission sensors provide accurate, on-line measurement of total thickness or basis weight. They feature a high-efficiency detection system with optimum source activity for each application.
- ▶ **Single-Sided Laser:** NDC's laser gauges measure thickness via a triangulation computation of a laser beam. This gauge is designed to measure thick calendered products and provides a non-nuclear measurement alternative.

- ▶ **X-Ray:** NDC offers both transmission (XRT) and backscatter (XRB) X-ray sensors. The XRT sensor provides excellent CD resolution for the wire position, spacing and count, while XRB sensors provide a measure of wire balance or on-the-calender gum weight.
- ▶ **OptiMike:** The OptiMike OM190 optical micrometer provides direct, single-sided thickness measurement for vinyl calendered products based on a projecting a beam of light across the apex of the product wrapped over the surface of a precision reference roll.

### Control Technologies

- ▶ Two or three-zone control for a flat profile
- ▶ Delta presets allow for product change-over's without stopping the line
- ▶ Predictive Process Modeling anticipates process behavior by making control moves based on the history of prior outputs before they reach the scanner.

### Gap Control

Provides de-coupled roll gap adjustment for the entire calender stack. Optimum performance is provided by a control algorithm that is tuned for different material compounds plus mechanical backlash and stiction.

### Cross Axis or Roll Bending Control

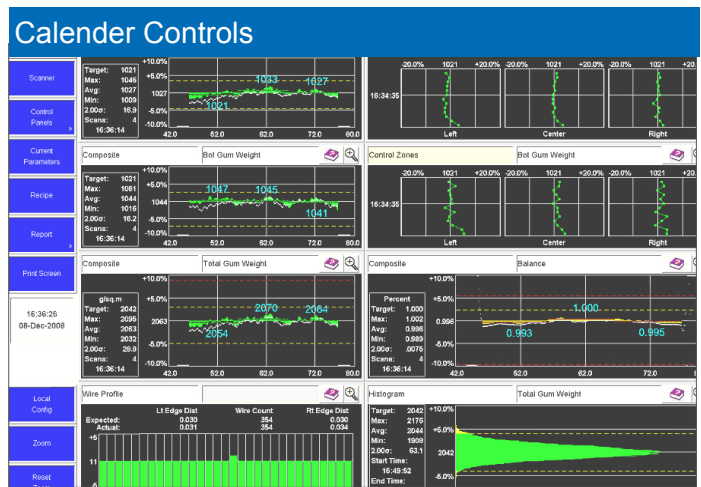
The thickness or weight profile measurements supervise either the cross axis or roll bending controls to flatten the web center zone.

### Delta Preset Control

Roll gap is preset at the beginning of a run via recipe-based targets. The delta from product code A to B is used to automatically adjust the roll positions.

### Sheet Average Control

Average sheet thickness or weight control supervises the gap controls and is decoupled from other controls to avoid interaction and loss of quality.



### Windup Weight Control

Product cooling, stretch or shrinkage between the calender and the winder can result in an offset in the final sheet. The system compensates for these dimensional changes using an algorithm that combines the current product weight, width and speed.

### Line Speed Feedforward Control

Speed feedforward control compensates for calender dynamics such as frame stretch during line speed changes.

# Rugged, Reliable, Maintainable Scanners

High performance intelligent scanners for  
fast, accurate measurement

NDC's AccuTrak scanner supports a multiple sensor payload for complex wire and textile calenders.

...while NDC's compact MiniTrak S-Frame scanner provides reliable measurement in tight calender locations.

**NDC's AccuTrak O-Frame** scanner has been engineered for today's quality requirements. Its rugged design utilizes a head carriage bearing system that provides long-term precise, repeatable alignment and measurement performance.

This intelligent iFrame™ scanner delivers fast, accurate, reliable measurement that is integrated into an intelligent distributed architecture from NDC. Spanning four decades of experience in the industrial measurement and control industry, the AccuTrak O-Frame scanner provides unmatched performance and a low cost of ownership.



**The MiniTrak S-Frame Single-Sided** scanner provides a rigid, reliable box-beam measurement platform with elegant clean lines

The MiniTrak S-Frame supports both the backscatter and reflection family of intelligent iSensors™ from NDC. This frame is compact, robust and supports up to two scanning intelligent iSensors. It requires minimal installation space and can provide critical measurements from difficult process locations.

The MiniTrak S-Frame incorporates an intelligent iFrame module that manages the scanner, sensor and control operations for high system integrity plus responsive measurement and control.

A special version of the MiniTrak scanner for Rubber has remote electronics so that the scanner can be mounted directly against the calender roll.

