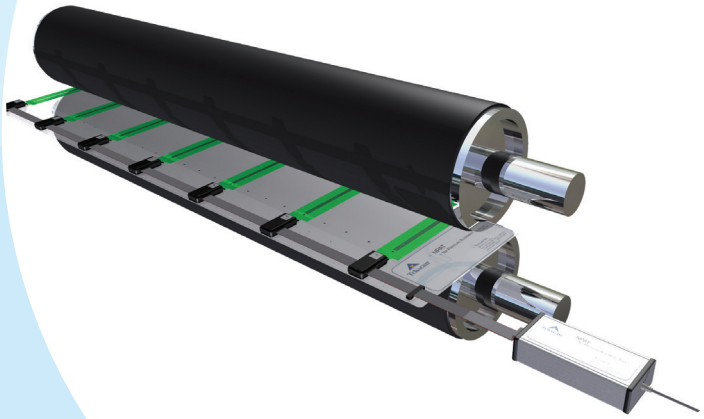
Tekscan®

Nip Pressure Alignment Tool™

Nip Width & Relative Pressure Distribution



The Nip Pressure Alignment Tool (NPAT) is a system used to capture nip footprints and relative pressure distribution between nip rollers. The system utilizes a sensor made up of an array of multiple thin and flexible pressure sensitive bands, which can be configured to different lengths to create a sensor that matches the size of a custom application. The real-time data provided by the NPAT ensures machine set-up and proper roll alignment resulting in a better printing process.

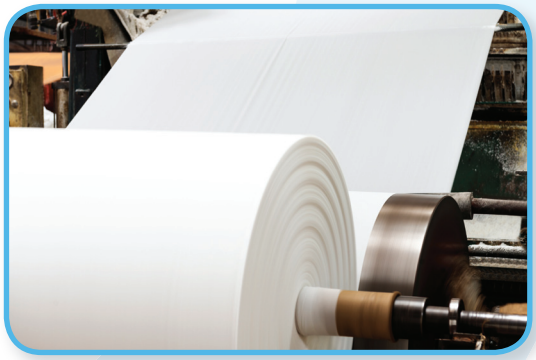
APPLICATIONS

- Machine Setup
- Preventive Maintenance
  - Roll Alignment
  - Crowns
  - Diameter variations due to roller wear
  - Deflections
- Machine Comparison

INDUSTRIES

- Paper
- Iron and Steel
- Packaging
- Film
- Printing
- Die Press
- Converting
- Coaters
- Laminators
- Pull Rollers

Aligning Nip Rollers



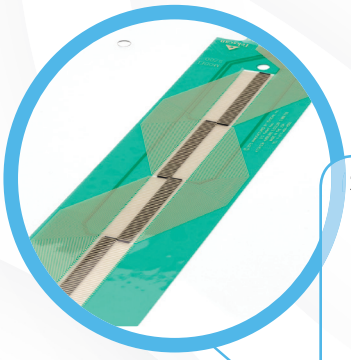
Paper Mill

FEATURES & BENEFITS

NPAT is an economical tool that utilizes a single sensor (configurable in size up to 10 m) and electronics. This system presents a clear visual representation of real-time relative pressure distribution, nip contact, nip width/length, and cross width (pressure across each band). This unique insight ensures proper nip alignment resulting in quality process and product, increasing yield and reducing waste. This quantifiable data guarantees manufacturing, maintenance, and quality assurance engineers a proper set-up.

Configurable Sensor:

- Large sensor with multiple sensor bands whose length and spacing can be configured to match the dimension of the nip being measured
- Bands can be spaced to show pressure footprint and nip width across the roller



Sensor Band:

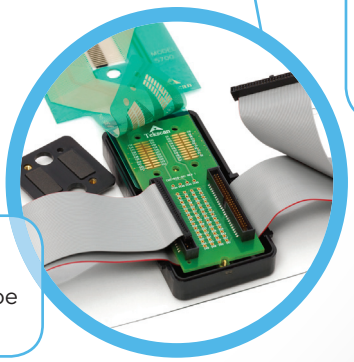
- 2 sensor model resolutions to support different nip sizes
- Standard band measures pressures from 25- 4,500 psi (172- 31,026 kPa). Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)

Portable Carrier:

- Polycarbonate sheet that supports & aligns sensor bands/ connectors for easy alignment when taking measurements
- Easily rolled up for storage and lays flat when unrolled
- Includes a removable plastic sleeve that protects from wet environments

Rugged Electronics:

- Single set of electronics covering a large area
- Connected to a standard Evolution handle; 1 USB connection to PC
- Protected by ruggedized enclosure

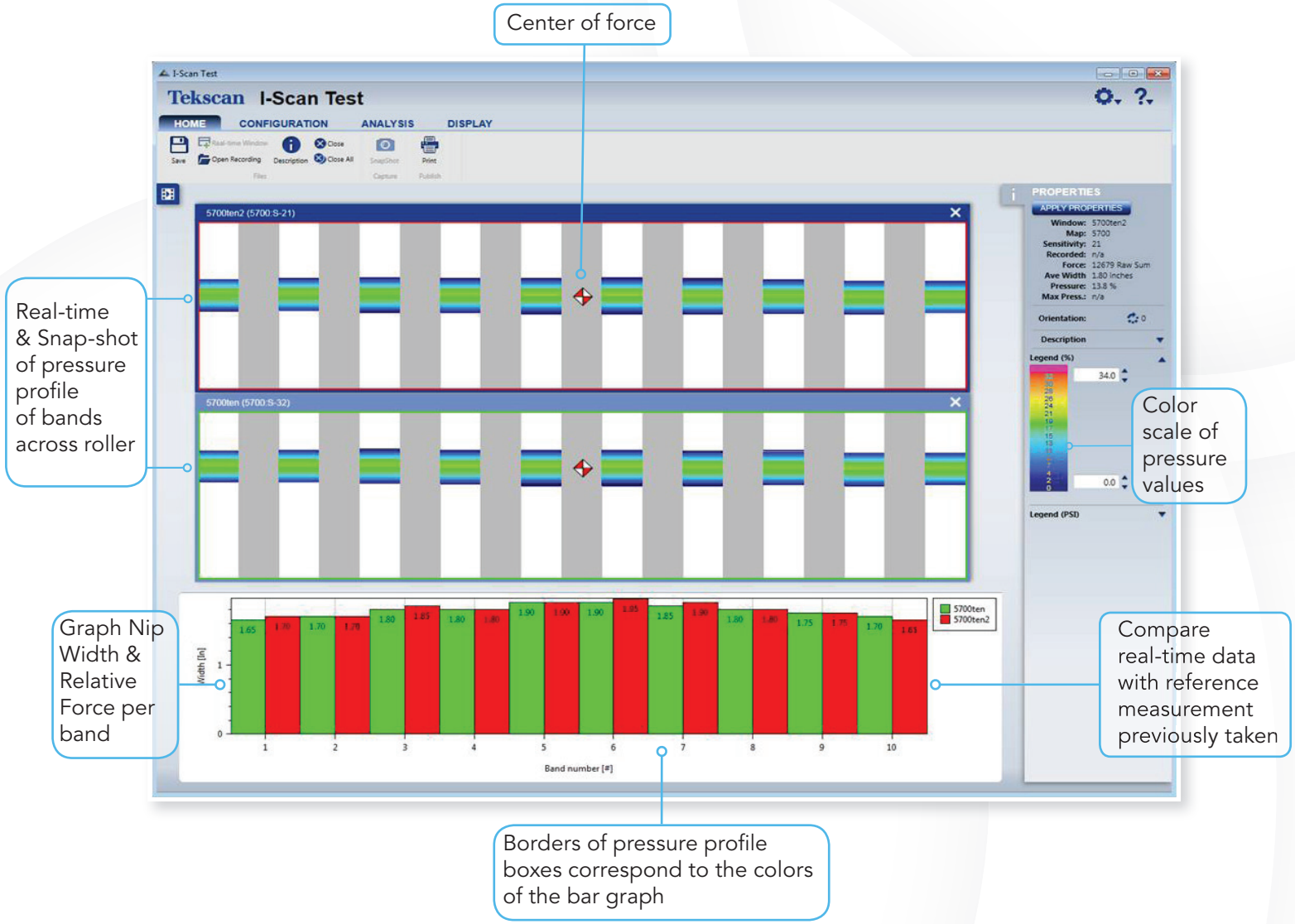


Sensor Band Interconnect:

- Bands are easily replaced and can be serviced in-field

SOFTWARE

The NPAT system comes with I-Scan® Test software. The software includes force/length units and graph features which easily display nip data by band. I-Scan Test has the basic features needed to identify nip uniformity. Data includes: average nip width and relative pressure distribution. This system provides a clear visual representation of pressure distribution, nip contact footprint width and cross width (pressure across each band). Each sensor band in the NPAT system is a single column array that measures the relative pressure distribution across the nip width. The various configurations of NPAT sensors offer different lengths and total spacing between bands.



The software displays the pressure distribution across each band and can save a snapshot of the image. The pressure data is used to create bar graphs by band. The graph can display a previous reference snapshot next to real time data. The software also shows the center of force across the sensor, this can help the user make adjustments to the left and right bearing loads on the machine.

SYSTEM SPECIFICATIONS

Performance Specifications	
Measured Pressure Range	25 - 4,500 psi (172 - 31,026 kPa)
Non-Linearity	<± 3%
Hysteresis	< 4.5% of full scale
Repeatability	<± 3.5%
Operation	Piezoresistive Array
Nip Width	*5700 Sensor: 223.5 mm (8.80”) **5707 Sensor: 201.2 mm (7.92”)
Nip Width Resolution	5700 Sensor: 1.3 mm (0.05”) 5707 Sensor: 1.5 mm (0.06”)
Sensing Length	See Selection Table
Peak Pressure	> 2,500 psi (17,237 kPa)
Lag Time	5 µsec

Mechanical Specifications	
Sensor Band Thickness	0.2 mm (0.008”)
Sensor Material	Polyester
Carrier Sheet Thickness	0.8 mm (0.030”)
Carrier Sheet Material	Polycarbonate
Protective Sleeve Thickness	0.3 mm (0.012”)
Protective Sleeve Material	Polyethylene
Assembled Sensor Thickness	1.0 mm (0.038”)
Assembled Sensor Thickness with protective sleeve	1.3 mm (0.050”)
Ribbon Cable Material	Vinyl
Band Interconnect Enclosure Material	ABS
Housing for Scanning Electronics	Aluminum

Operating Conditions	
Temperature, operating	-20° to 35°C (-4° to 95°F)
Relative Humidity (%)	5 to 90 (Non-condensing)

Storage Conditions	
Temperature, operating	-30° to 60°C (-22° to 140°F)
Relative Humidity (%)	5 to 90 (Non-condensing)

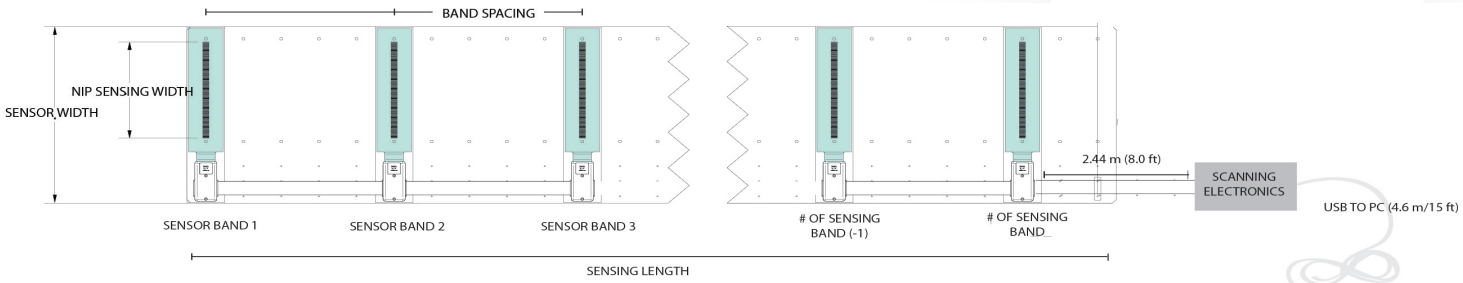
Communication Specifications	
PC Connection	USB 2.0, 480 Mbps
Scan Speed for Real-time Display	40 Hz

*5700 Nip Sensing Band (MAX 13 bands) is used to make sensors between 457.2 mm (18”) and 6,400.8 mm (252”).
**5707 Nip Sensing Band (MAX 17 bands) is used to make sensors between 1,524 mm (60”) and 10,000 mm (396”).

PRODUCT SELECTION

Product Selection

Sensor Type	Sensing Length	# of Sensor Bands	Sensor Band Spacing	Nip Resolution	Nip Sensing Width	System Number
5700	4,570 mm (180”)	13	380 mm (15”)	1.3 mm (0.05”)	223.5 mm (8.80”)	NER5700-1500-13B180
	1,830 mm (72”)	13	150 mm (6”)			NER5700-1500-13B72
	1,830 mm (72”)	7	305 mm (12”)			NER5700-1500-7B72
	6,400 mm (252”)	13	530 mm (21”)			NER-5700-1500-13B252
5707	6,100 mm (240”)	17	380 mm (15”)	1.5 mm (0.06”)	201.2 mm (7.92”)	NER5707-1500-17B240
	9,750 mm (384”)	17	610 mm (24”)			NER5707-1500-17B384

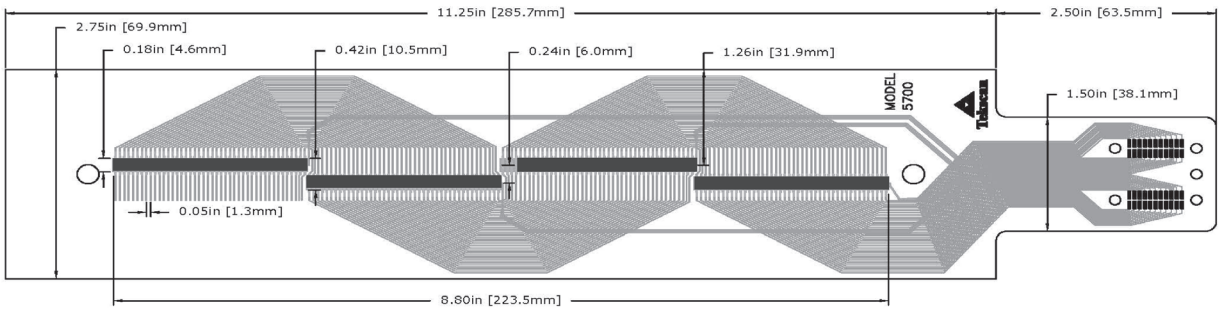


SENSOR SPECIFICATIONS

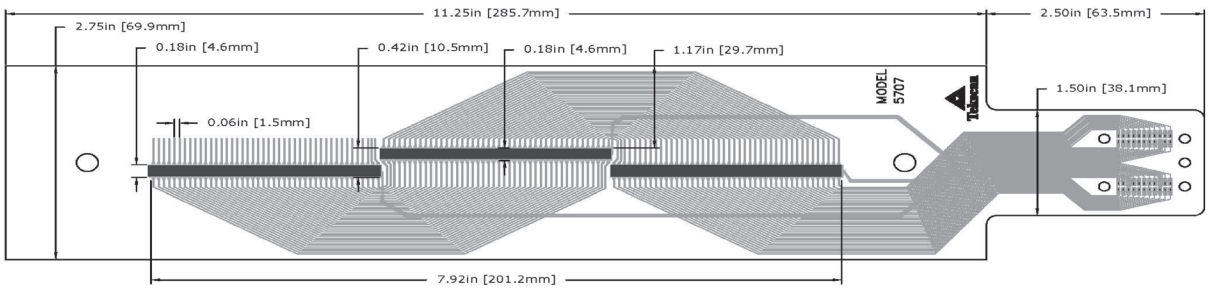
Sensor Band Specifications		
Sensor Band Type	5700	5707
Nip Length	457.2 mm (18”) - 6,400.8 mm (252”)	1,524 mm (60”) and 10,000 mm (396”)
Nip Width	223.5 mm (8.80”)	201.2 mm (7.92”)
Nip Sensing Resolution	1.3 mm (0.05”)	1.5 mm (0.06”)
# of Sensing Rows in Nip Width	176	132
Max # of Sensor Bands	13	17
Measured Pressure Range	25 - 4,500 psi (172 - 31,026 kPa)	25 - 4,500 psi (172 - 31,026 kPa)
Sensor Band Model	5700-1500	5707-1500

Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)

5700 Sensor Band

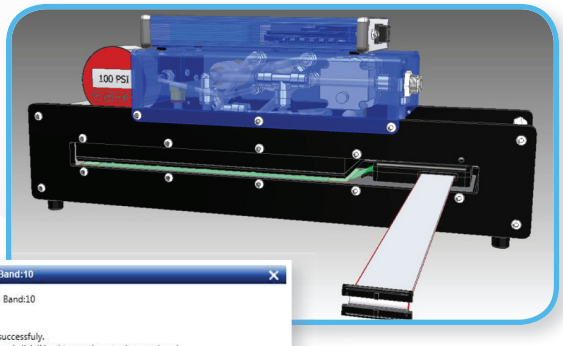


5707 Sensor Band

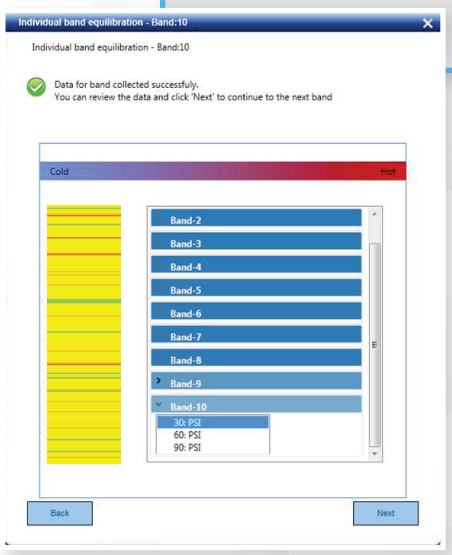


EQUILIBRATION

Equilibration improves accuracy and extends sensor life by verifying that all 2,000 sensing elements have similar output under the same load. To equilibrate, each sensor band of the NPAT is fed into the equilibrator one band at a time. The software uses a Wizard to help users through this step-by-step process. The software controls the pressure via an analog controller to verify a repeatable load is being placed on each sensor (30-60-90%).



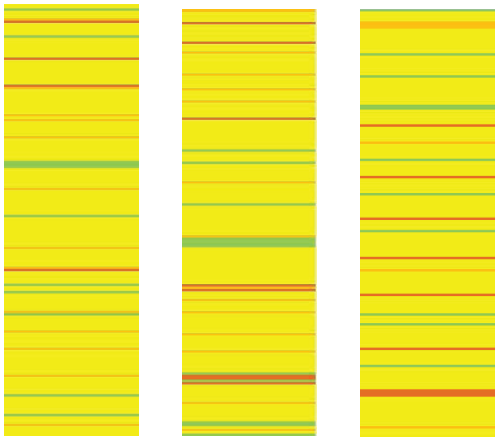
The software detects whether or not the process was done correctly and provides feedback. Once all the bands are loaded, the software applies equilibration factors to all of the sensing elements in the system to improve output uniformity. This process allows the user to identify if a sensor band needs to be replaced.



Equilibration Software Wizard

Why Equilibrate?

Over time and through repeated loading, individual pressure sensing elements will start to vary in sensitivity. The equilibrator applies a uniform pressure across the face of the sensor, allowing the software to easily see and quantify these variations.



Sensor in Equilibrator BEFORE software equilibration is performed

Sensor in Equilibrator AFTER software equilibration is performed

Tekscan®

CONTACT US TODAY FOR A DEMONSTRATION!

+1.617.464.4282 | 1.800.248.3669 | info@tekscan.com | www.tekscan.com/pm