

# Fabric Density Measurement and Control

## Why measure fabric density instead of fabric weight?

**Because weight measurement is only a sample.**

**Density measurement can be continuous, measuring all of the fabric.**

Fabric density measurement provides the tool to monitor every meter of fabric and identify roll-to-roll variations in weight.

In addition, studies done by Cotton Technology International and others show the finisher can affect length shrinkage variation by controlling to specific course counts.



Automation Partners Inc.

# Optical Sensor for Fabric Density Measurement

The PSM-200 Sensor System is the industry's most reliable, hands-off, linear density measurement tool. It provides continuous, reliable and completely automatic measurement of pick or course count—no operator experience is required.

- Operation is independent of operator skill.
- No prior setup or programming for different styles or fabric types.
- Not affected by color, yarn size, fabric speed or moisture.

The sensor works on woven or knitted fabrics, open width or tubular, including warp, circular (jersey and double knit), interlock, rochelle, tricot and many more.



Automation Partners Inc.  
PSM-200 Sensor Head

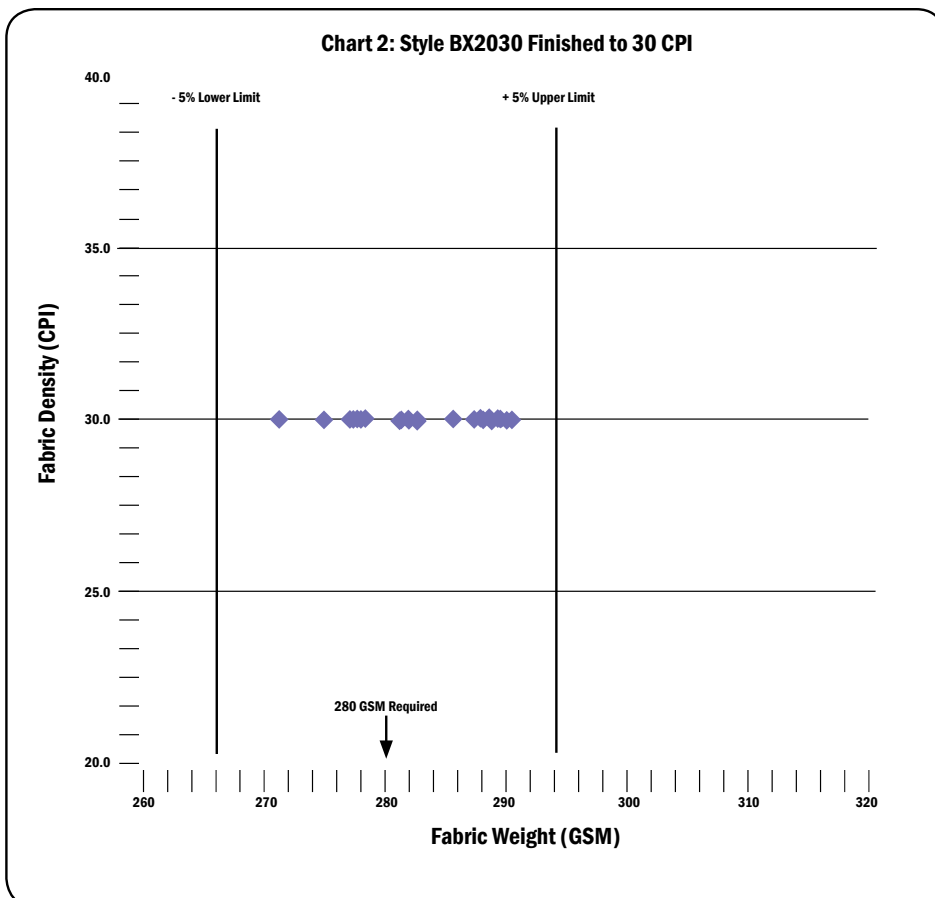
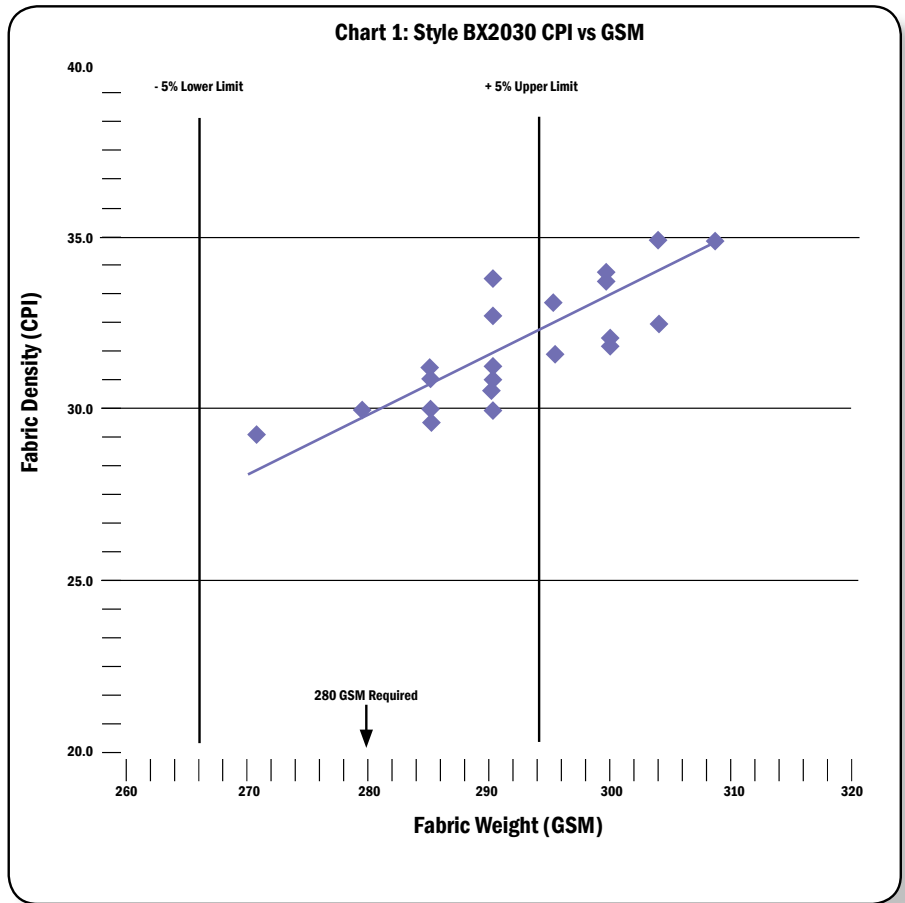
# Weight versus Density

## Why change from weighing fabric (GSM) to monitoring the density (PPI or CPI)?

Because fabric density can be measured continuously, providing a better and more consistent way to control fabric weight uniformity and predict residual shrinkage.

Chart 1 shows the results from 44 rolls of fabric for which punch-weight measurements were used to set up machine operation.

Infrequent weight measurements do not provide enough information for the operator to compensate for varying yarn counts or fabric density changes due to prior processes. The finished fabric weight varies widely, and many rolls are overweight—an unnecessary expense and loss of revenue.



However, using an online, continuous fabric density (CPI) measurement system to set up and adjust the finishing machine for a specific course count results in fabric within weight specifications.

Chart 2 shows Style BX2030 finished to 30 CPI results in fabric within weight specifications with all overweight fabric eliminated.

## The Sensor Technology

The PSM Sensor uses monochromatic infrared light reflected from the fabric. Infrared detectors sense the reflection back from the fabric.

A proprietary dynamic tracking algorithm accurately and automatically determines the course row or pick line of the fabric and aligns the optics for optimum signals. The signal from the detectors, along with signals from the integral tachometer, are sent to the PSM Processor for analysis.

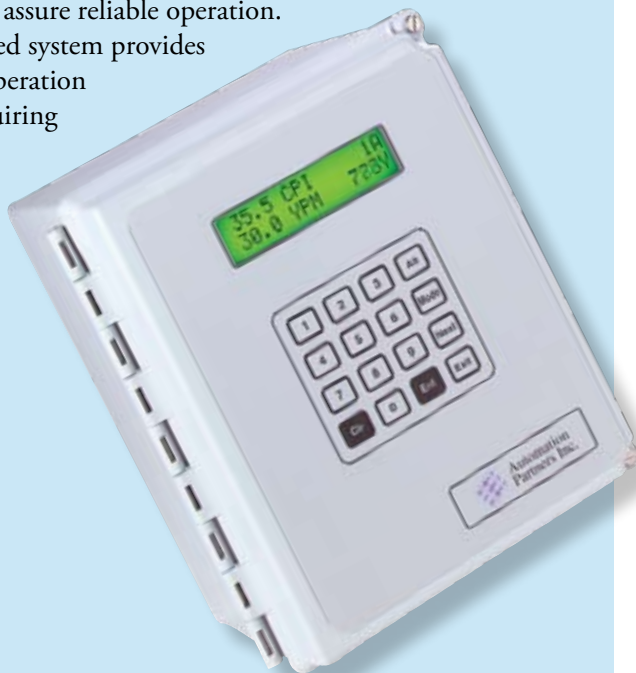
## The Signal Processor

The signals received from the sensor head are analyzed by the microprocessor electronics of the PSM Processor to reconstruct the fabric structural characteristics. Along with the data from the integral tachometer, the processor determines the fabric density using histogram and statistical analysis techniques.

The processor displays the fabric density, fabric speed and fabric length on an LCD. Operation is completely operator independent. No operator input or interaction is required. The system is fully automatic, providing reliable and accurate data on a continuous basis without interfering with the other duties and tasks of the machine operator.

The PSM Processor has been specifically designed for fabric density measurement. Industrial grade electronic components assure reliable operation.

This dedicated system provides for simple operation without requiring operator training.



## The Peripherals

A printer is supplied with the PSM-200 Sensor System, as well as all signal cables.



**42-column dot matrix printer with replaceable print ribbon cartridge.**

Also standard is an RS-232 serial communication port.

### Available options include:

- Analog Output (4-20mA)
- Alarm Signal Lights
- Remote LCD Display

If fabric density is within limits as set on the PSM Processor, the green light is lit. If density is outside the limits, the red light flashes. Provides 360° visibility.



**Alarm Signal Lights**



**Remote LCD Display**

Displays fabric density with 2 inch (5 cm) high LCD digits.

## Frequently Asked Questions

### **The PSM-200 Sensor System sounds nice, but we control to weight and not to course count.**

The PSM Sensor does not measure weight. The system provides a more reliable and repeatable measurement than weight devices. And, the course count is directly proportional to weight—increasing the course count increases the weight. Once you establish the relationship between weight and course count for a specific style fabric, the sensor data will help you produce more uniform fabric.

### **We produce very delicate fabrics and cannot have a device that touches the fabric.**

This is a frequent concern. However, it has been demonstrated in over 1,000 applications that the PSM-200 Sensor System does not cause any marking or damage to the most delicate fabrics. In most applications, the sensor is mounted either in an inverted (under the fabric) or vertical position where it puts minimal tension against the fabric.

There is no device on the market today which is contact free, including camera systems. All must assure the fabric is at the focal point of the imaging device and so the installation of plates or other structure is necessary to keep the fabric in position.

### **Will the PSM-200 Sensor System improve my yield?**

No. The PSM-200 Sensor System is a monitoring system only. It will help your operator set up the machine and provide information to make adjustments to compensate for changing course counts. To achieve completely uniform fabric and improve yield or shrinkage, use one of the Automation Partners Inc. control systems.

**Automation Partners Inc has provided electronic solutions to the textile industry since 1990. With thousands of sensor systems and control systems installed worldwide, API is the market leader in this technology.**

**You can count on this experience and performance to be assured of getting the best product—and the best service—at a fair price.**

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