

Embed Confidence into Your Machine

Integrating Interface
Pressure Measurement
Technology to Achieve
Machine Alignment

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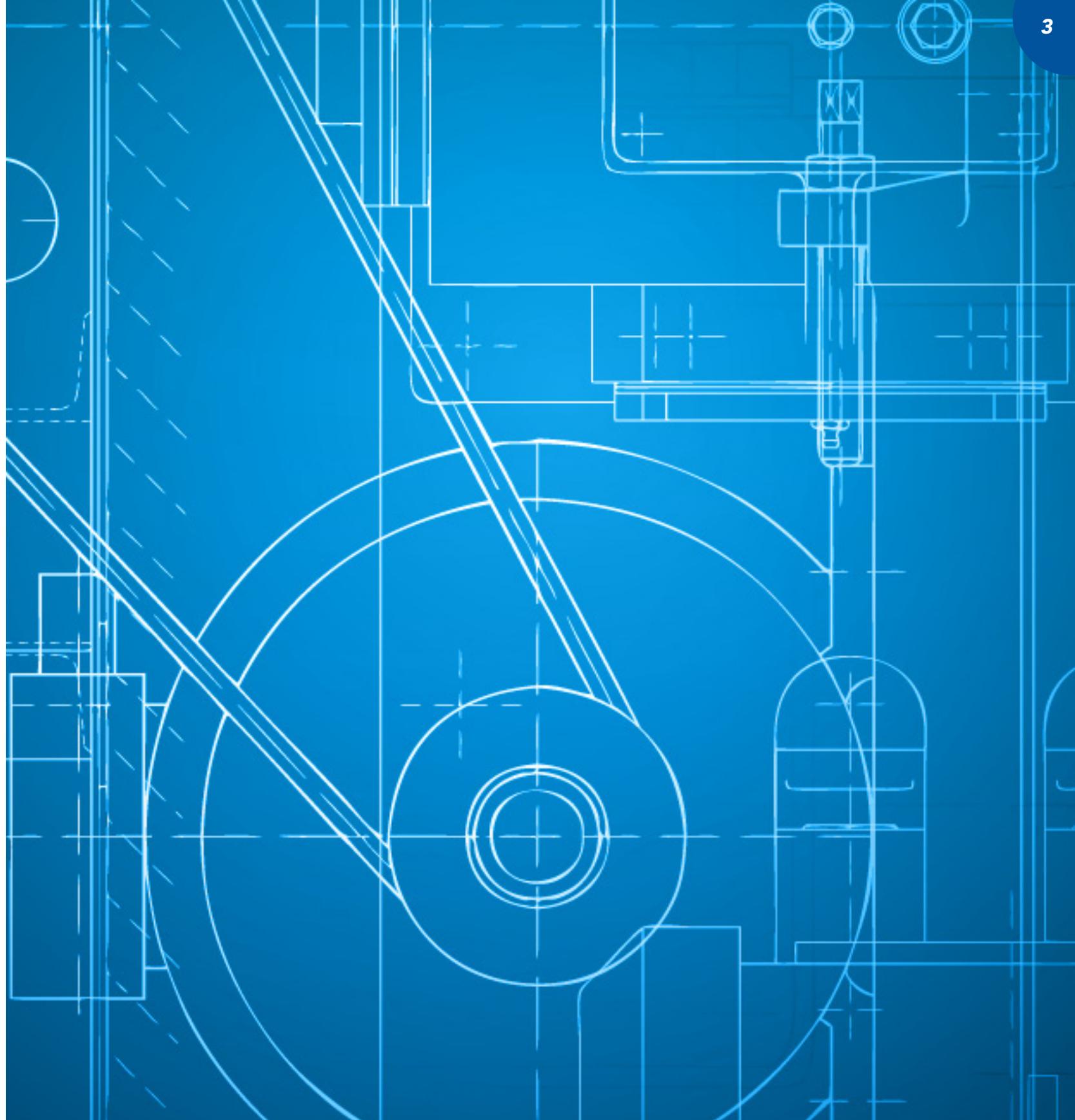
INTRODUCTION

Designing Machines with a Competitive Edge

Original Equipment Manufacturers (OEMs) aim to design differentiated products with unique features and added-value that benefits the customer.

This eBook focuses on how to integrate interface pressure measurement technology, also known as pressure mapping technology, to achieve optimal machine design. This integration results in a trustworthy machine that:

- Provides a competitive edge in the market
- Streamlines machine alignment operations
- Saves time, money, and resources



Investing in a Streamlined Process

Companies today prefer to invest in “smart” machines that produce quality product with minimal variation. This often involves purchasing a machine they trust, one designed to reliably perform to specification.

When a company is integrating a new machine into their operation, they expect increased productivity in their throughput with improved quality. A machine that supports a quality plan by providing actionable data provides value to the organization even before its first run.

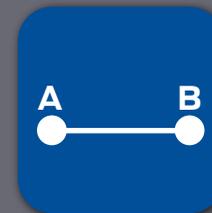
Manufacturing engineers have more confidence in a machine that has a repeatable setup procedure that can create verifiable data for quality control records. As manufacturing facilities are striving for six sigma quality, 10-50 defects per million opportunities (DPMO), the setup procedure becomes more critical.

Even when all the settings are identical to a prior run, the complexities of a machine can yield different behaviors. Evaluating interface pressure provides key information on the product being produced. Proper machine alignment is critical to producing a successful finished product, whether that is in packaging, electrical components, printing, or any high volume production.

Understanding what is happening between two surfaces in the machine can provide key insight for optimal machine setup and design. Commissioning this insight during the R&D process can lead to critical design enhancements and can be used to further develop an optimal setup specification, maintaining a quality performance for the lifespan of the machine.

A machine that can perform pressure mapping on its setup configuration provides more confidence to its operator and is less of a warranty burden to its manufacturer.

4 Characteristics of a Smart Machine:



EFFICIENCY



SAFETY & SECURITY



FLEXIBILITY

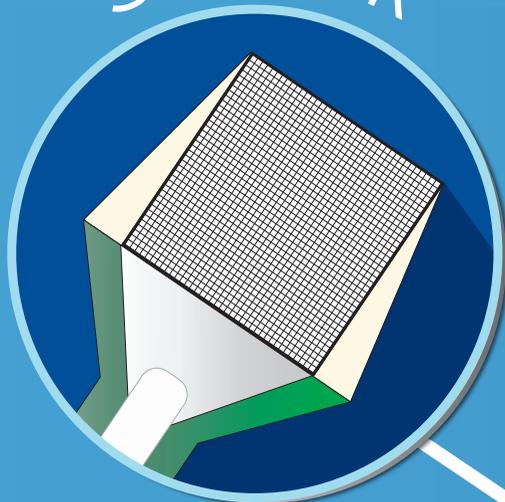


CONNECTIVITY

“Understanding Smart Machines: How They Will Shape the Future” by Dr. Rainer Beudert, Leif Juergensen and Jochen Weiland

COMPONENTS IN A PRESSURE MAPPING SYSTEM

SENSOR



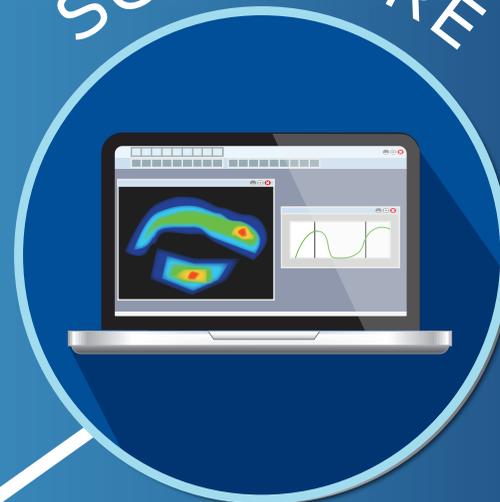
- Minimal invasiveness
- High resolution
- Thin & flexible

ELECTRONICS



- Scan thousands of sensing points within each sensor
- Instant data transfer to PC via USB or WiFi

SOFTWARE



- Display pressure distribution data in multiple formats for superior analysis
- Display pressure data graphs in 2D & 3D
- Capture peak pressures and center of force in real time
- Allow for video playback of pressure data

What Is Pressure Mapping?

Even between relatively flat surfaces, one finds the interface pressure distribution is often not uniform with localized areas of peak pressure. Pressure mapping technology helps design engineers obtain insight into areas that may impact design and quality.

Modern pressure mapping systems require 3 components – **sensors**, **scanning electronics** and **software** – to deliver real-time, actionable data, in ways other methods cannot.

- The **sensor** transforms compressive pressure loads to a change in resistance.
- The **scanning electronics** collect analog data from the sensor and convert the data to a digital signal.
- The **software** displays real-time activity of the sensor area, allowing the user to see force, pressure, contact area, and timing data.

Benefits of Pressure Mapping Technology

#1 VALUABLE INSIGHT

Quantifiable Data

A pressure mapping system provides actionable pressure data. Real-time data analysis allows engineers to analyze information in a timely manner and make data-supported decisions. This data includes:

- Total Force
- Pressure Distribution
- Peak Pressure
- Center of Force
- Forces in Different Areas
- Timing

#2 CORRECTIVE ACTION FEEDBACK

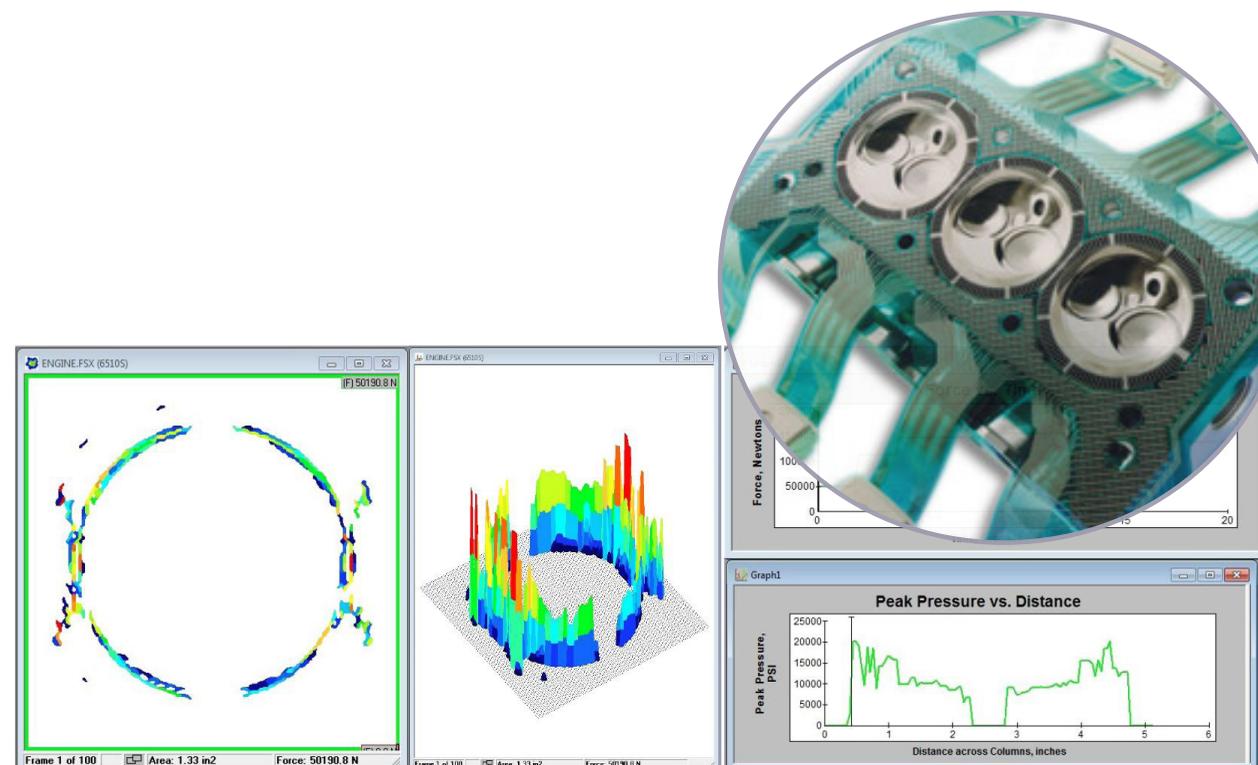
Real-Time Feedback & Analysis

A pressure mapping system provides real-time feedback, allowing the engineer to assess any issue occurring in their process, and fix it quickly. This saves the company downtime that can be extremely costly, depending on the run schedule and product.

#3 QUICK & ACCURATE SETUP

Set It & Go

A pressure mapping system has a customized user interface based on the preference of the user. Once specifications of proper setup are in place during initial testing, a streamlined process is put in place. This process allows for quick and accurate setup before any run.

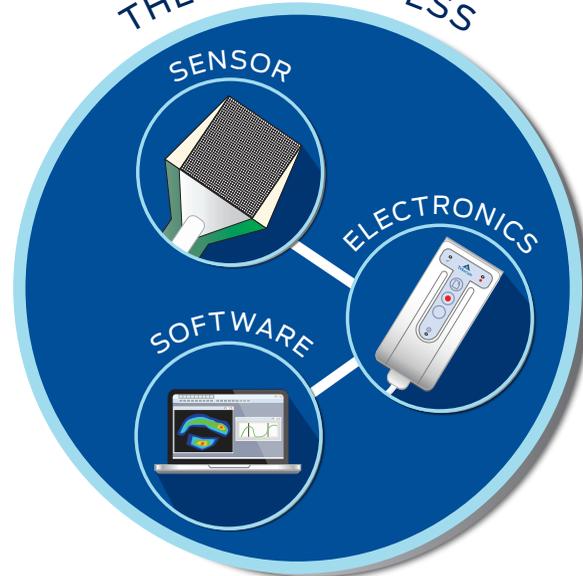


Validating the Technology: R&D to Full Integration

Pressure mapping systems are often used for Research & Design and Test & Measurement purposes. There is often a journey a company takes before investing to embed a system into their machines. This journey is outlined in the steps below:

PHASE 1

THE R&D PROCESS



Initial investment in Tekscan's I-Scan™ system to verify and improve the repeatability of your machine process. Gain insight into how your machine could be setup for optimal performance.

PHASE 2

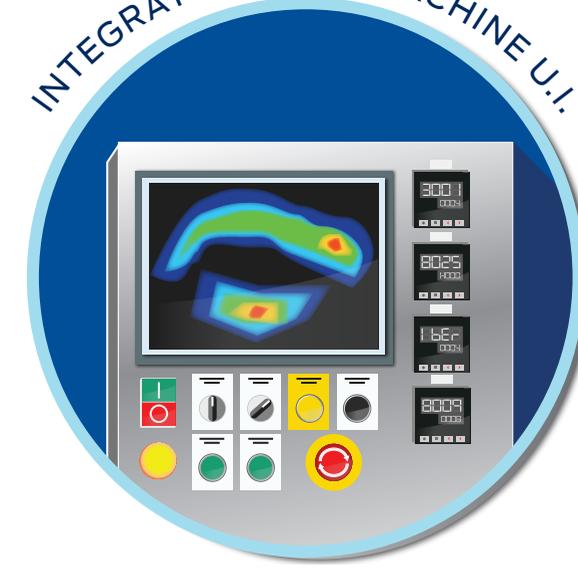
IN-FIELD MACHINE SETUP



Equip your field service team with I-Scan systems so they can service your customers by providing them with a guaranteed setup that is backed up by quality data.

PHASE 3

INTEGRATION INTO MACHINE U.I.



Invest in your machine's integration with the system. This ensures proper setup, and results in higher customer confidence. These customers invest in a valuable product, and your credibility as an innovative manufacturer rises.

Designing a Machine with Interface Pressure Measurement Technology

Integrating pressure measurement technology provides insight into what could not be seen before.

A machine designer's goal is to provide the optimal design to the customer. This means that each piece of the machine is working properly and efficiently for the given application. Pressure mapping technology ensures this proper setup and provides the designer and the user actionable insight in real time.

This technology is an added-value feature that transforms a modern machine into an innovative one that customers can trust. This innovative add-on helps strengthen the OEM's credibility amongst their customers by providing a machine with a competitive edge.

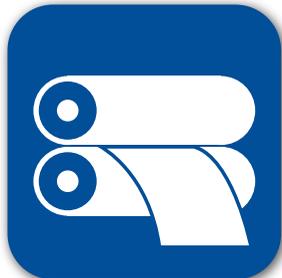


Ideal Industries & Applications for Integration

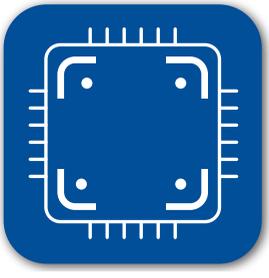
Pressure mapping technology is the ideal solution for measuring pressure distribution in a machine where two surfaces meet. This is common, but not limited to, the industries and applications shown on the right.

The integration of sensor technology and software into these machines allows for a more controlled, quality process. More data and insight equates to a better, streamlined process.

IDEAL INDUSTRIES FOR PRESSURE MAPPING INTEGRATION:



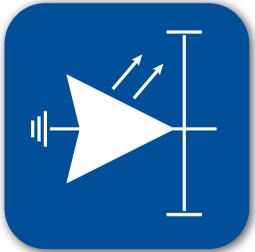
PRINTING



MICROELECTRONIC COMPONENTS



PACKAGING



ELECTRONIC ASSEMBLY

IDEAL APPLICATIONS FOR PRESSURE MAPPING INTEGRATION:

- Ultrasonic Welding
- Tool & Die
- Bar Sealing
- Molding
- Thermoforming
- Nip Rolls & Laminating

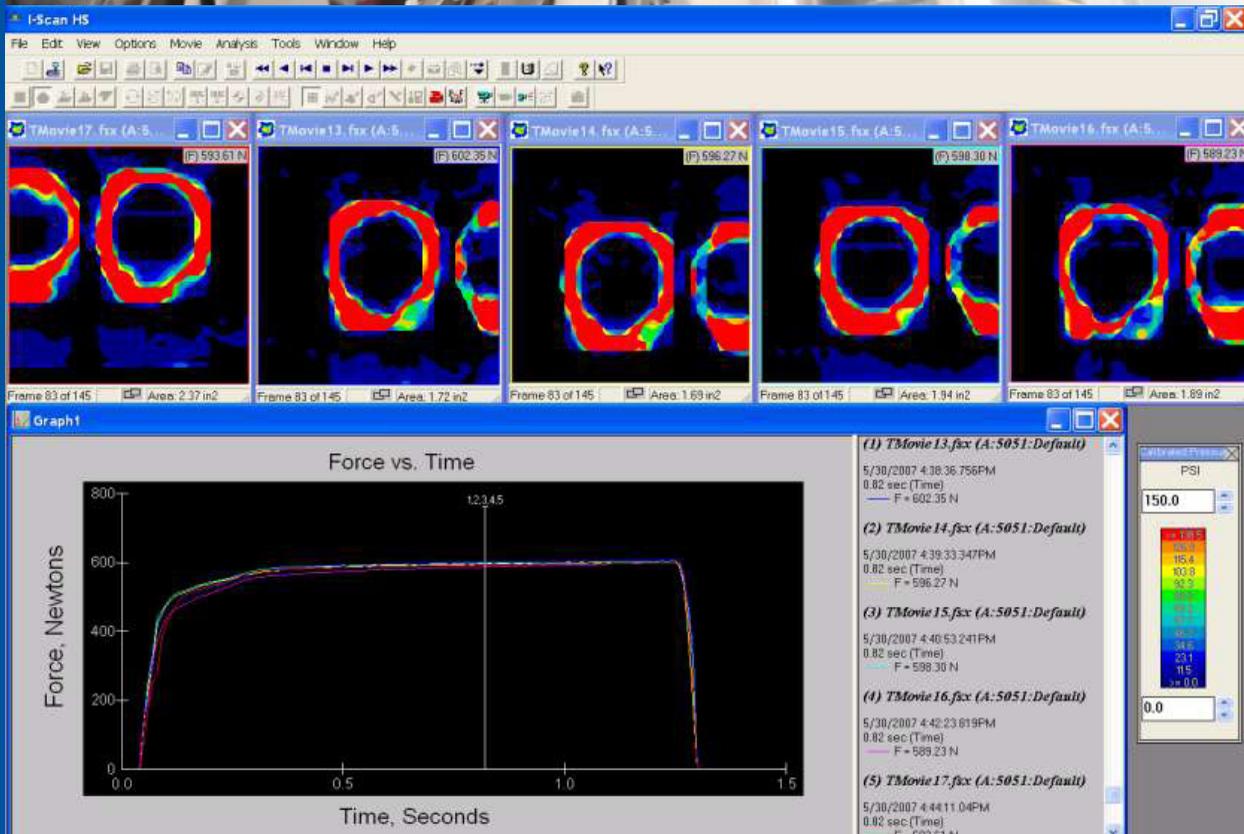
Ultrasonic Welding: Contact Lens Packaging Solution

Packaging contact lenses requires a machine that creates a uniform seal. This sealing process involves ultrasonic welding, which is the bonding of thermoplastics through the use of heat and applied force. A damaged seal results in the leak of saline solution, which ultimately results in dried up contacts.

An uneven seal is usually the result of non-planar machine parts causing misalignment and an uneven pressure distribution. A machine designed with interface pressure measurement technology can ensure proper alignment that results in an even

seal. A designer with insight into the seal's pressure distribution can design a machine with a consistent setup resulting in a proper seal. This technology ultimately gives the user insight into whether the right amount of pressure is being applied in order to create a quality product.

This insight helps improve yields and reduce waste. This technology provides the machine builder with a design for guaranteed alignment and quality assurance.



Similar Applications:

- Single Serve Packaging
- Toy Manufacturing
- Any Form, Fill, and Seal Application

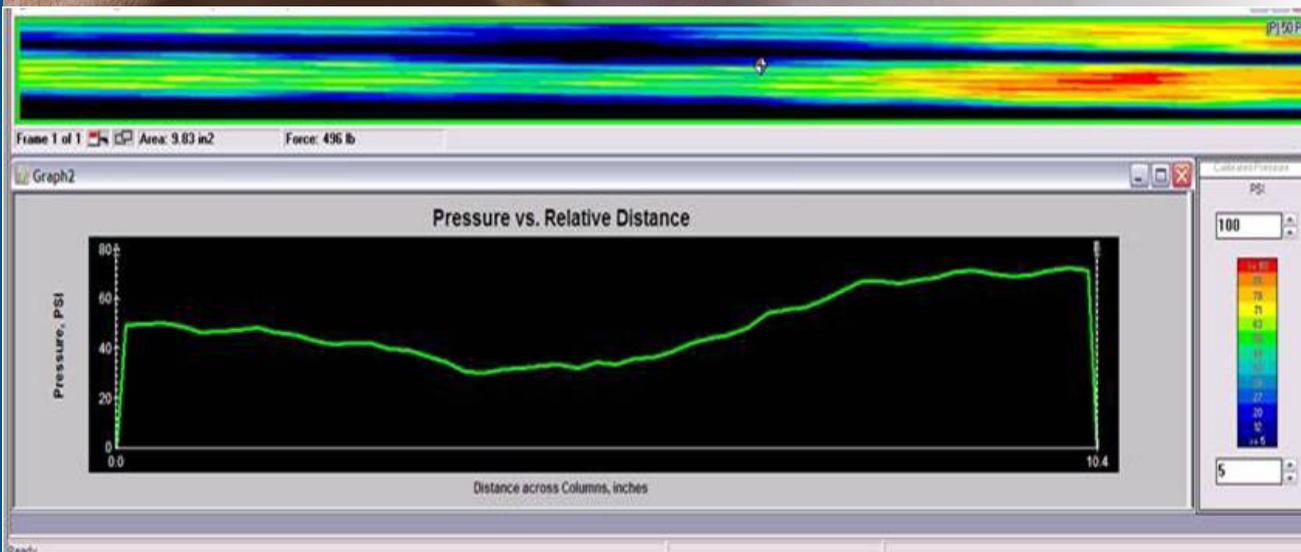
Sealing Bar: The Streamlined Packaging Solution

The food packaging industry must maintain high standards for seal inspection. These standards are to protect the consumer from tampering and/or receiving a damaged product. As stated in the previous application, a proper seal results in a safe top quality product.

Sealing bars are used to properly seal two parts of a package in a high temperature environment. Machine designers can embed pressure mapping technology into their machine to ensure a proper seal.

This technology can be integrated into their software to streamline their process, creating a easier user experience.

High temperature sensors are used for this type of application. This allows the user to take pressure measurements without waiting for the machine to cool down. The integration of this measurement technology allows for less downtime and a better controlled process.



Similar Applications:

- Medical Supplies
- Cereal Bags
- Toothpaste
- Coffee Bags

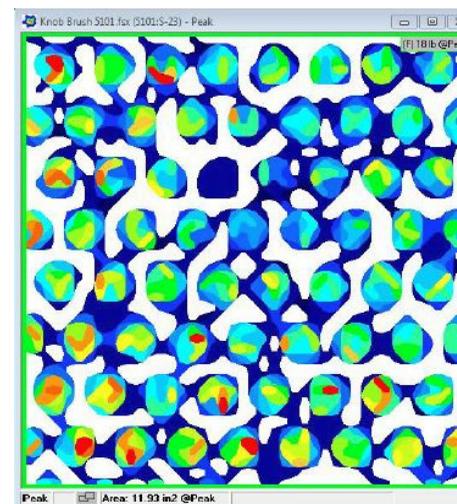
Electronic Assembly: The Pick and Place Solution

Today, a majority of the electronic assembly process is done by robots. These robotic parts are tasked to properly pick up delicate components and place them on a circuit board. This process requires the proper application of pressure, and a highly precise placement.

Embedding pressure measurement technology into an assembly machine verifies that the robotic elements are interfacing with

the board properly, and that this interface occurs with the correct amount of force. This insight helps prevent both equipment and product damage that can be extremely costly.

Integrating high resolution pressure sensors, electronics, and customized software creates a seamless procedure for such a high precision process.



Similar Applications:

- Robotic Chip Placement
- Probe Card Testing
- Heat Sinks
- Wafer Polishing
- Chemical Machine Polishing (CMP)

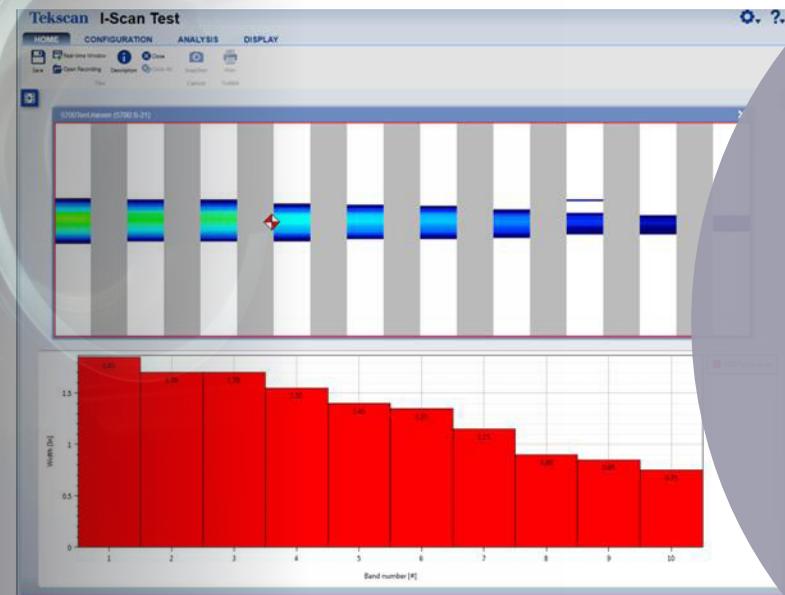
Nip Alignment: The Roll Misalignment Solution

When it comes to a printing press, time is money. Roll misalignment can be an expensive burden to a production run. Five minutes of run time on misaligned rolls can result in thousands of dollars in damaged product.

A production line integrated with pressure mapping technology results in a line with easily actionable data. The integrated software tells the user what is wrong with the nip rolls and how to fix it. This feedback is clear and

directional, allowing for quick and proper machine setup before or after a run.

This actionable data also allows the user to evaluate crowning, diameter variations, and deflections. A system integrated with this technology allows for less machine downtime, which can lead to increased yields, reduced waste, and lower costs.



Similar Applications:

- Paper Printing
- Laminating
- Textiles
- Packaging
- Converting

CONCLUSION

Invest Today in Pressure Mapping

The examples and successes shared in this paper are the result of machine designers partnering with Tekscan to provide a solution to meet their specific goals. While every process is different, our team at Tekscan can help you every step of the way when integrating pressure mapping into your machine.

Let's discuss your application

We at Tekscan understand the challenges OEMs face, and the risks they take when investing in new technology to achieve a competitive edge. Whether it's a standard pressure mapping system, or a custom integrated solution, Tekscan has a proven track record for helping OEMs achieve a better understanding of their machines and procedures by providing trustworthy, actionable data. Your return on investment comes in the form of confidence in your machine design, a streamlined process, and an improved end user experience.

Visit www.tekscan.com or call 1.617.464.4282 for more information.

INTEGRATION INTO MACHINE U.I.

