TSI | movITHERM
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Thermal Seal Inspection for Pouches

Your Partner in Seal Quality Optimization

Tackling Inefficiencies in Seal Quality & Production Efficiency

Maintaining consistent seal quality can be a daunting task. Manual inspection methods are not only time-consuming but also prone to human error, leading to missed defects and compromised product integrity. This often results in wasted products, increased costs, and dissatisfied customers. Traditional inspection methods struggle to keep up with high production speeds, making it challenging to detect and address seal issues promptly.

Enhancing Seal Integrity & Operational Efficiency

The TSI System is an advanced, automated solution designed to ensure the highest quality in pouch seal inspection. Utilizing thermal imaging technology, the TSI system detects and rejects faulty seals in real-time, while also measuring your process variability. This dual functionality allows you to not only maintain consistent seal integrity but also gain insights into your production process to achieve greater efficiency and reduce wasted product.

How it works?

1. After pouches are sealed, they retain heat from the sealing process.
2. The TSI system captures a thermal image of each seal to evaluate its quality.
3. The system classifies each seal as either a **Good Seal (PASS)** or **Bad Seal (FAIL)**.
4. Failed pouch seals get flagged to prevent it from continuing down the line.
5. The system categorizes failure types and tracks production performance to help identify areas for improvement.

Seamlessly Integrate with Your Production Line

The TSI system is designed for effortless integration into your existing production line. It speaks the most common industrial languages, ensuring compatibility with your current setup. With a standard Ethernet/IP interface and built-in digital I/O for alerting and bottle rejection, the TSI system fits right in. For those requiring strict regulatory compliance, it also offers optional FDA CFR 21 Part 11 compliance for electronic records keeping.

Features & Benefits

Enhanced Quality Control

Ensure every seal meets the highest quality standards.

- Perform accurate quality checks on every seal.
- Eliminate human error with automated inspection.
- Ensure only perfect seals continue down the line.

Significant Cost Savings

Reduce waste and save money across your production.

- Automatically reject faulty pouches to prevent costly mistakes.
- Lower expenses by reducing product waste and rework.
- Cut costs associated with recalls and excess labor.

Actionable Insights

Use insights to drive continuous improvement.

- Identify and understand the root causes of seal failures.
- Monitor production line performance to implement improvements.
- Generate statistical reports for data-driven decisions.

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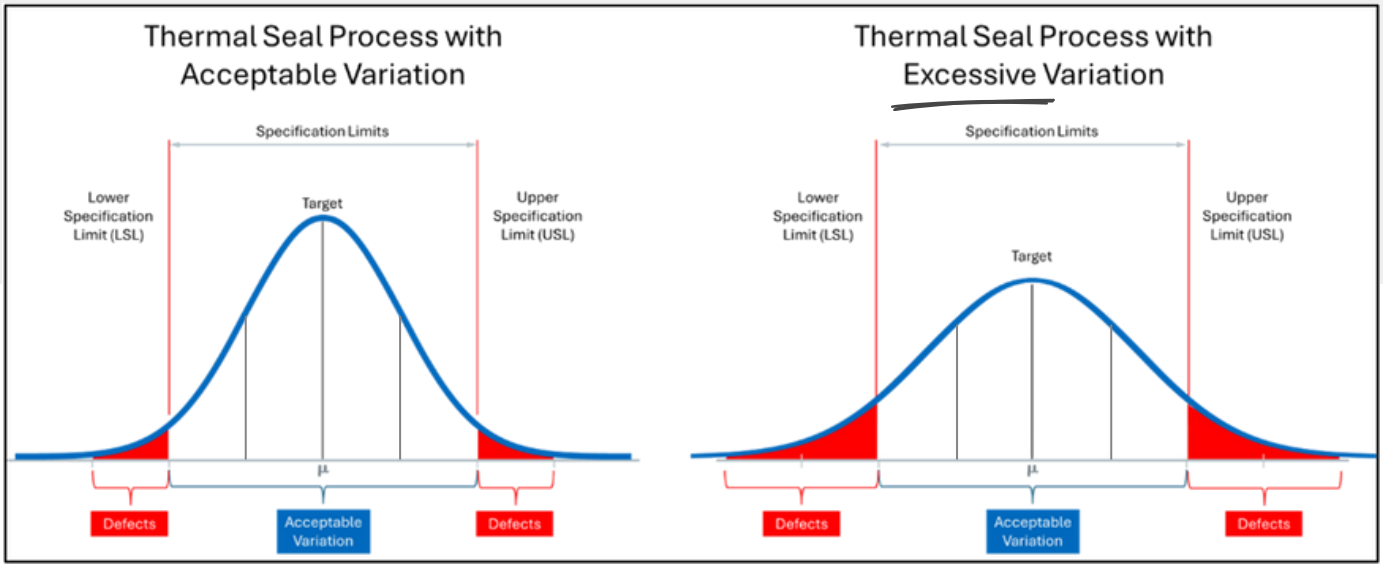
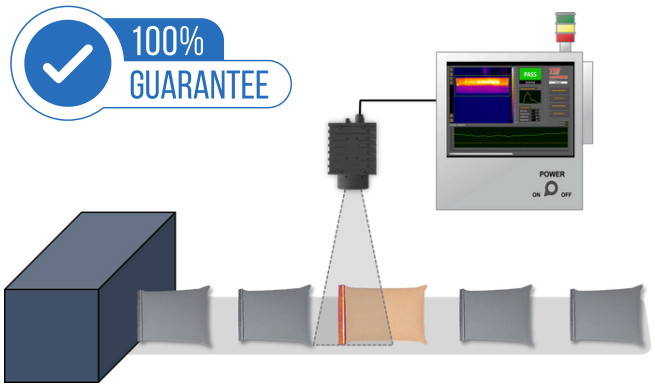
Understanding Seal Process Variability

In heat-sealed packaging, the consistency of your sealing process can greatly influence the effectiveness of our pass-fail seal inspection system. Process variability refers to how much your sealing process deviates from the norm. Think of it like baking cookies: if your oven's temperature fluctuates wildly, some cookies might burn while others stay raw. Similarly, if your sealing process isn't consistent, it creates varying thermal profiles—essentially, the heat patterns our system uses to detect good and bad seals.

The Challenge of Excessive Variability

When your sealing process is stable, it produces predictable thermal profiles. Our system can then easily distinguish between a good seal (one that will keep your product safe and fresh) and a bad seal (one that might fail and lead to product loss). However, if your process has excessive variability, it's like trying to spot a friend in a crowd—everything blends together, making it harder to detect finer defects. While our system can still catch major seal issues, smaller ones might slip through unnoticed.





Achieving Precision with TSI

But there's good news! Even if your process has a lot of variability, our Thermal Seal Inspection (TSI) system can help you "dial in" and monitor your process. By providing direct thermal feedback, we can help you adjust and reduce variability to an acceptable level. Once you achieve this consistency, our TSI system will be even more effective, giving you precise pass or fail defect detection, ensuring your products meet the highest quality standards.

Technical Specifications

	IRS336/IRS640	FLIR A50/A70	FLIR A6301
Camera Pixel Resolution	IRS336: 336 x 256 px IRS640: 640 x 512 px	FLIR A50: 464 × 348 px FLIR A70: 640 × 480 px	640 × 512 px
Temperature Accuracy	+/- 2°C (+/- 5°F)		
Thermal sensitivity (NETD)	< 0.05mK NETD @30°C	< 0.05mK NETD @30°C	≤15mK NETD @25°C
Defect Detection or Pass/Fail (Low Temperature)	The Lower Reject Limit (LRL) is threshold based and adjustable. This value is usually set below the Lower Specification Limit (LSL) of the sealing process.		
Defect Detection or Pass/Fail (High Temperature)	The Upper Reject Limit (URL) is threshold based and adjustable. This value is usually set above the Upper Specification Limit (USL) of the sealing process.		
Defect Detection Capability			
Wrong Sealing Temperature and Drift *1	Possible Causes: Operator error, malfunctioning sealer, broken heating element, contamination of sealing surface, loss of pressure for sealing mechanism, mechanical issues of sealing mechanism		
Malformed, Partial Seal or Missing Seal *1	Possible Causes: Material issues, sealer issues, mechanical issues		
Wrinkles & Fold overs *1	Possible Causes: Material issues, sealer issues, mechanical issues		
Part or Product in Seal *1	Possible Causes: Product debris present in the sealing area during the sealing process		
Pinholes & Small Leakers *1	Possible Causes: Material Defects, Material handling issues, sealing issues		

**1 Defect is detectable if the temperature fluctuation caused by the defect is either above the Upper Reject Limit (URL) or below the Lower Reject Limit (LRL).*

System Components

Thermal Camera

Thermal imaging with infrared cameras is effective for inspecting heat-sealed packaging as it detects temperature differences on the package's surface. Heat-sealed packages are formed by melting and fusing the material to create a uniform seal without gaps or defects. If there are issues like incomplete sealing, contamination, or defects, they affect the surface temperature distribution.

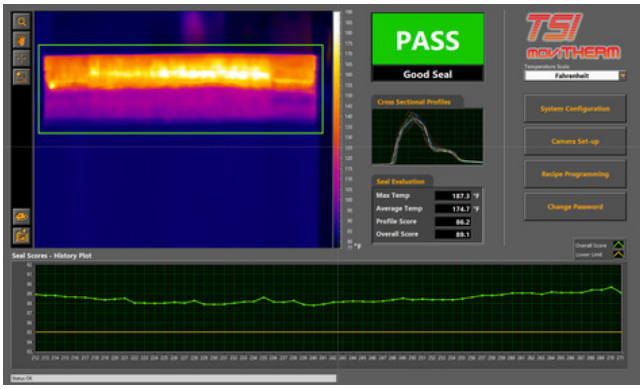
Automated thermal imaging can quickly and non-destructively identify these variations, ensuring packaging quality. Infrared cameras are available in various wavebands, resolutions, and speeds, with multiple lens options to provide the necessary imaging and measurement for effective seal evaluation.

TSI Controller

The MoviTHERM TSI industrial controller is housed in a standard powder-coated Industrial Electrical Enclosure, with a Touch-Screen PC and an application-specific software GUI interface. An optional Stainless-Steel enclosure is available for those in the food and beverage or pharmaceutical sectors. This controller boasts an Interactive Inspection Recipe Programmer, allowing for the accommodation of multiple products and enabling users to experiment with various "what-if" scenarios.

Further enhancing its capabilities, it has a robust bi-directional PLC interface that facilitates the transfer of status messages and PASS/FAIL results to a plant PLC, compatible with either Ethernet/IP or Modbus. Additionally, its Image FTP feature enables the transfer of fault images to a remote server, allowing for offline review and analysis

TSI Inspection Software



The MoviTHERM TSI inspection software is the backbone of the Thermal Seal Inspection (TSI) system, employing proprietary inspection techniques to identify seal conditions and their locations accurately. It features a vibrant Main Viewing Area for detailed thermal imaging, supplemented by Zoom, Pan, and Spot Temperature Functions. Users can choose from various color palettes for the best visual clarity.

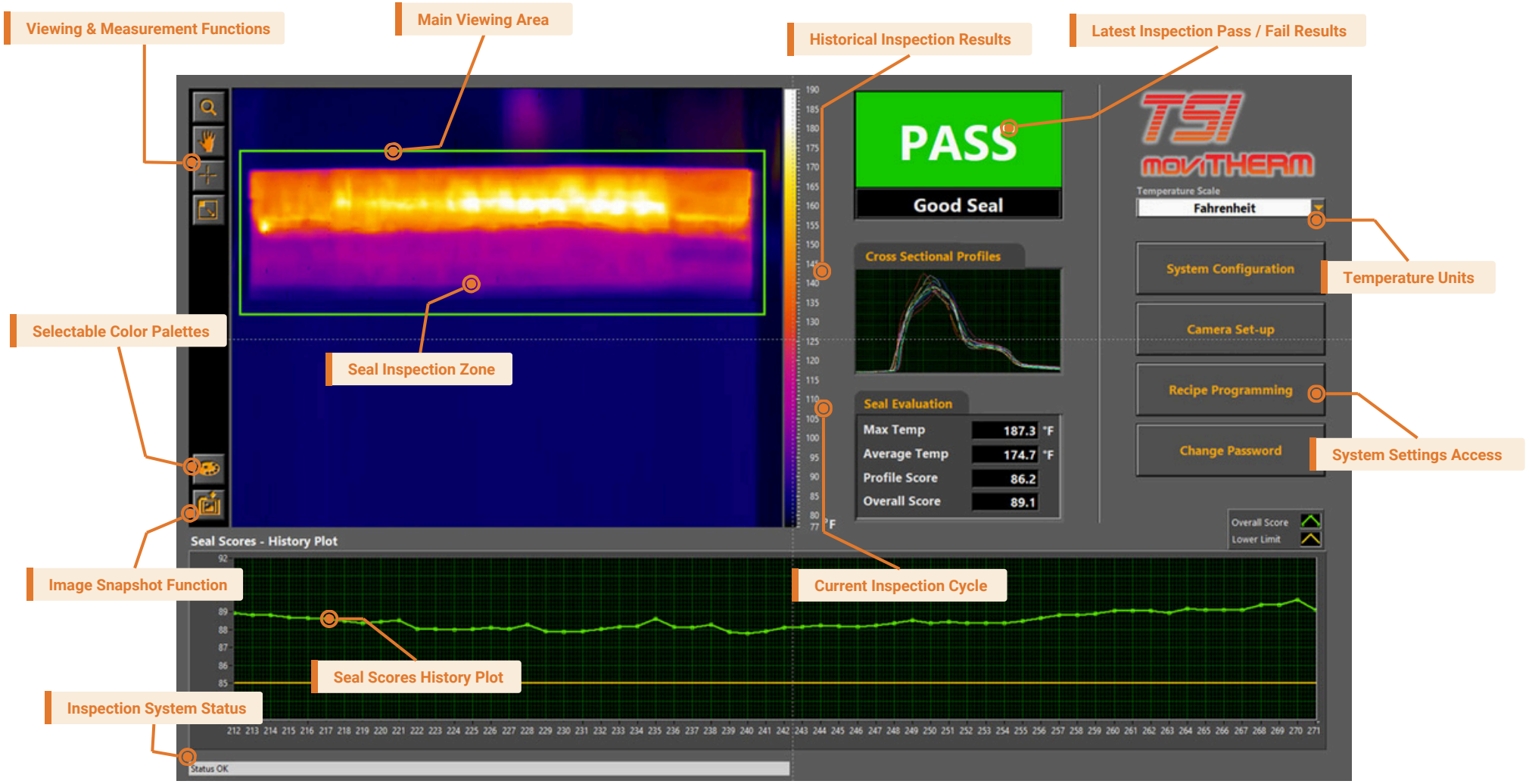
The software's interactive inspection recipe programmer accommodates multiple products, allowing experimentation with "what-if" scenarios. Additionally, the platform offers quick image snapshots, a history plot for seal scores, and straightforward Pass/Fail indicators. The software streamlines the inspection process and ensures precision and accuracy in its results.

Add-On Component

TSI Signal Tower

Enhance your TSI System with a Signal Tower, providing clear visual and audible alerts. With three LED tiers in red, amber, and green, it offers permanent or flashing lights. Four selectable alarms, 85 dB loudness at 1 meter, and a 360-degree viewing angle ensure you stay informed about your production status. Keep your production line running smoothly with reliable signals.

SOFTWARE OVERVIEW



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