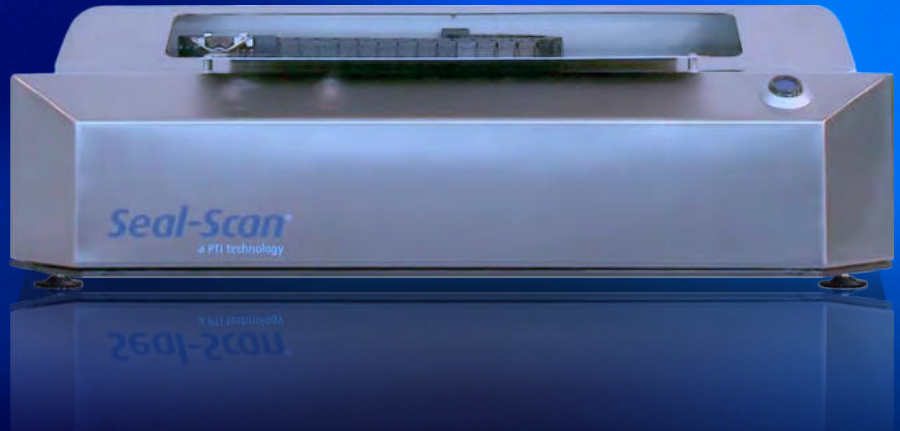


Seal-Scan

SEAL QUALITY INSPECTION



Setting the Standard

The ASTM Test Method F3004-13, "Evaluation of Seal Quality and Integrity using Airborne Ultrasound Technology", was developed using PTI's ABUS technology.

Product Overview

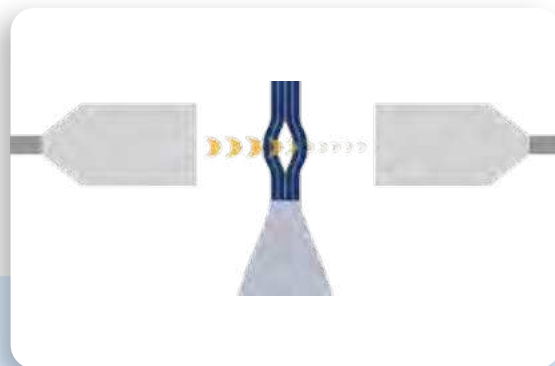
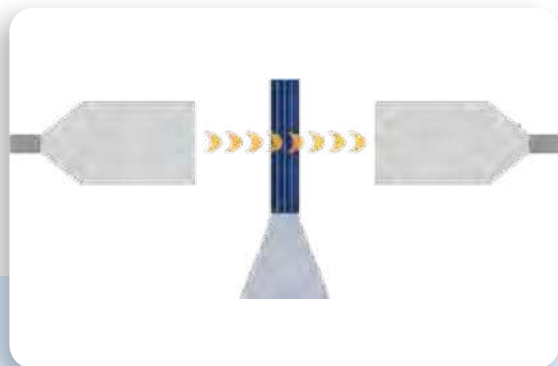
Seal-Scan® is an Airborne Ultrasonic (ABUS) Technology that offers a deterministic, quantitative, high resolution method that inspects **pouch seals** for defects and **seal integrity** for consistency.

Testing is **non-destructive**, **non-invasive**, and requires **no sample preparation**. Seal-Scan® provides advanced digital imaging software tools for process control, which offer in-depth seal quality analysis.

- Deterministic inspection method producing quantitative results
- Works for any material and combinations regardless of color, transparency, print, surface finish and porosity
- Produces high resolution Opto-Acoustic image of seal
- Characterizes overall quality and uniformity of the seal

Pouch seal or package material is scanned between two focused ultrasonic sensors. Ultrasonic waves propagate through **single or multiple layers of bonded materials**.

Ultrasonic propagation through different mediums causes reflection of sound waves, and reduces/eliminates signal strength. The level of signal passing through the seal is a function of the quality of the seal. **Various types of defects**, leaking and non-leaking, process-related and random, are detectable.



Seal-Scan® is capable of producing Opto-Acoustic images as well as detailed statistical analysis by offering two scan modes: **L-Scan and C-Scan**.

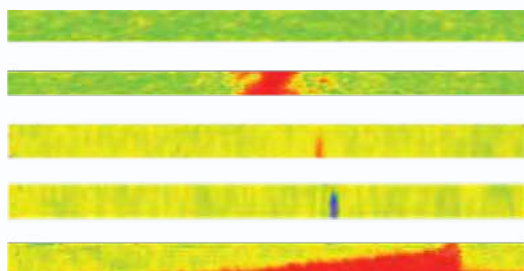
An L-Scan is a single linear scan along the X-axis of the seal that provides a line graph of seal integrity and simulates online inspection



Avg.	Min.	Max.	StD
73.44	41	92	5.79



Avg.	Min.	Max.	StD
64.12	3	94	18.87



- Good Seal
- Side Seal Inclusion
- Side Seal with 0.75mm Defect
- Side Seal with Pinhole
- Side Seal with Product Contaminant

C-Scan provides a detailed seal analysis by producing a pixel-by-pixel evaluation of the seal (Opto-Acoustic image). In this mode, multiple scans are made along the X and Y-axis of the seal area, providing a high-resolution ultrasonic image of the seal structure.

This technology can be integrated into a pouch production line via the Seal-Sensor for 100% on-line seal defect detection.

APPLICATION	Semi-automated offline seal quality inspection and analysis
TECHNOLOGY	Airborne Ultrasound Technology*
RECOGNIZED TEST METHOD	ASTM F3004-13, referenced in USP <1207>
PACKAGE TYPE	Pouches, flexible packaging and laminated materials
PACKAGE MATERIAL & COMBINATIONS	Any pouch material: Tyvek®, Paper, Foil. Film, Aluminum, Plastic, Poly
INSPECTION SPEED X-AXIS	Adjustable to 500mm/sec.
INSPECTION RATE	Up to 1,000 pulses/sec.
POUCH PLACEMENT	Manual
SCAN MODES	◦ L-Scan (X-Axis Linear Scan) ◦ C-Scan (X & Y Axes for Opto-Acoustic Image)
SEAL DEFECTS	◦ Incomplete seal – inclusions, wrinkles, channel defect, misaligned seal, delamination or blisters ◦ Inconsistent seal – analysis pixel by pixel
MINIMUM DEFECT SIZE	500 microns
LOCATIONS OF DEFECT	Yes
TEST RESULTS	Quantitative Analysis - Opto-Acoustic Ultrasonic Images of Seal Quality
INSPECTION DATA	Statistical results: Signal Avg/Min/Max/Standard Deviation/# of scans/Scan score and Seal Width and Seal Length
DATA COLLECTION	◦ ETHOS 21 CFR11 compatible for data collection and protection ◦ Automated data collection via SQL server ◦ Automated live imaging of scans
STATISTICAL SEALING TREND ANALYSIS	Yes
OPERATOR INTERFACE	PC Based System (Computer & monitor supplied by customer)
SYSTEM ENCLOSURE	Stainless steel workstation, with X-Y drive, operator interface, software package for seal analysis
POWER	100-240 VAC 50/60 Hz.
SYSTEM DIMENSIONS	32"W x 22.5"D x 9"H
OPTIONS	Validation Qualification Package (IQ/OQ/PQ)
TOTAL SEAL-SCAN® SHIPPING WEIGHT	60 lb.

*U.S. Patents 6,840,108 – 6,920,793 – 7,167,415