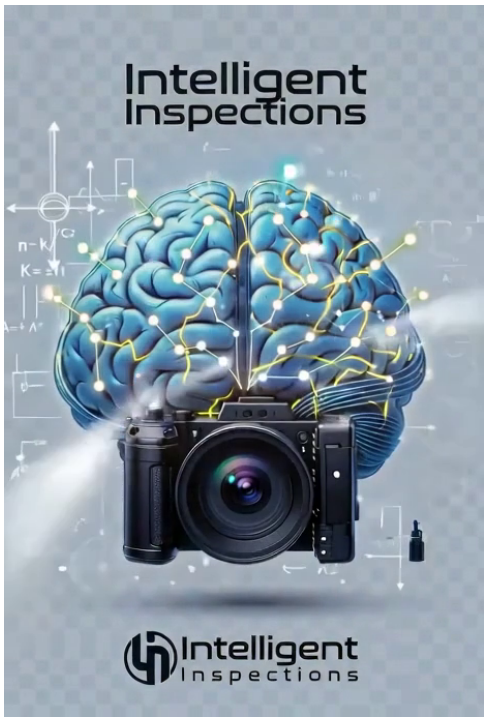
Intelligent Inspections

Test_Scan

2026-04-19 22:19



EXECUTIVE SUMMARY

1. The test belt conveyor was inspected using lidar sensors and rated an overall severity of 7/10. 2. Sensor 1 reported a maximum single-point geometry deviation of 228.26 inches, which exceeded the threshold of <12 inches. 3. The sensor signals indicate that while one section shows severe deviation (228.26 inches), the lidar sensors did not detect any uniform or isolated damage patterns across all sections. The distribution of deviations is uneven with a maximum value of 5798mm and a P95 value also at 5798mm, indicating that most sections have significant deviation from a single-axis fit. 4. Root causes identified: - [Sensor 1] Maximum single-point geometry deviation of 228.26 inches (measured 228.26 in, threshold < 12 in) 5. Immediate recommended actions include conducting physical verification to identify localized damage such as bent idlers or frame misalignment that could cause the observed deviations. Additionally, checking for any sudden speed drops at specific locations might indicate isolated damage patterns. Ensuring consistent and stable conveyor speeds will help verify whether the deviation is uniform across all sections.

Overall Findings

On April 19, 2026, a multi-sensor inspection was performed on Test Belt Conveyor test_belt_conveyor using 1 sensors (Sensor 1). Overall severity: **7/10 — ACTION**. Action-level condition. Corrective action recommended to prevent progression. 1 findings require action.

Note: AI model consensus rated this equipment at 2/10. The final severity of 7/10 reflects sensor-driven override based on individual findings that exceed the AI consensus threshold. The highest individual sensor finding drives the overall rating.

DIAGNOSIS: All sensor readings within acceptable operating parameters. Equipment health: 50%. Continue standard maintenance schedule.

ROOT CAUSE CHAIN: Structural geometry deviation detected (228.3 in from designed position)

EVIDENCE — What Each Sensor Found

• **LiDAR (Sensor 1):** Scanned 536,127 points across 18 segments. P95 deviation: 228.26 inches. Max deviation: 228.26 inches.

Business Impact: Equipment health score is 50% with a 7% estimated 30-day failure probability. Industry data shows unplanned equipment failure costs 5–10× planned maintenance. Continued operation without corrective action increases risk of accelerated degradation and unscheduled downtime.

PRESCRIPTIVE ANALYSIS — KEY FINDINGS

#	Finding	Sensor	Threshold	Sev
1	Maximum single-point geometry deviation of 228.26 inches (worst of 18 measured segments)	Sensor 1	< 12 in	**10/10**

UNDERSTANDING THE SEVERITY SCALE

All findings in this report are rated on a **1–10 severity scale**. This unified scale replaces traditional pass/fail assessments with a gradient that communicates both the nature and urgency of each finding. Severity is determined by sensor measurements compared against industry-standard thresholds and equipment-specific operating limits.

Range	Level	What It Means
1–2	NORMAL	All measurements within expected operating range. No action required. e.g., vibration <0.1g, temps at ambient, alignment centered.
3	NOMINAL	Minor variations detected but within acceptable limits. e.g., slight tracking variation, minor temp rise above ambient, cosmetic surface wear.
4–5	WATCH	Measurements approaching thresholds. Early degradation developing. e.g., 10–20% speed variation, component temps rising, early bearing noise.
6	ELEVATED	One or more thresholds exceeded. Corrective action warranted. e.g., alignment drift >2", hot bearing, visible surface degradation.

Range	Level	What It Means
7–8	ACTION	Significant deviation. Condition progressing toward failure. e.g., slip causing >10% efficiency loss, seized component, structural misalignment >5mm.
9–10	CRITICAL	Severe condition. Immediate attention required. e.g., imminent component failure, fire-risk bearing temp, structural crack, >50% speed loss.

The overall equipment severity is the highest individual finding severity, not an average. A single critical finding drives the overall rating even if all other sensors read normal. The 30-day failure probability applies specifically to the affected areas identified in the findings — it is not a general failure risk for the entire system.

DESCRIPTIVE FINDINGS & RECOMMENDATIONS

One short paragraph stating overall priority posture based on severity 7/10: Given the current severity of 7 out of 10 for the test belt conveyor system, immediate attention and proactive maintenance are essential to prevent potential issues that could escalate into more significant problems in the future. Prioritized actions: - Monitor all measured parameters closely and perform regular checks every day. If any parameter deviates from normal range, take corrective action immediately (action: Immediate monitoring; timeline: Immediate). - Conduct a thorough inspection of the conveyor belt and components under load conditions. Address identified issues during the next scheduled maintenance window which is within 7 days (action: Inspection and repair; timeline: Within 7 days; consequence: Conveyor may experience reduced efficiency or downtime if ignored, leading to potential damage or failure). - Review and update the anomaly detection system's parameters. Ensure it remains calibrated correctly for accurate future predictions (action: Calibration of anomaly score; timeline: Next scheduled outage; consequence: Inaccurate alerts could lead to missed maintenance opportunities). What to monitor between now and the next inspection: Continue monitoring all measured parameters, focusing on any anomalies detected. Keep a log of all observations and take corrective actions as needed. Additionally, review system logs for any unusual activity or errors that might indicate underlying issues not yet visible in real-time data.

Sev	Recommendation	Timeline	Source
5/10	test_belt_conveyor — all measured parameters within normal range	Within 30 days	General
5/10	Lidar: within normal parameters	Within 30 days	General
5/10	Anomaly score 0.40 — outside normal range	Within 30 days	General
5/10	Recommended action: Monitor	Within 30 days	General

SEVERITY 7/10 ACTION — Immediate attention recommended.

MANUFACTURER SPEC DRIFT ANALYSIS

How far has this Test Belt Conveyor drifted from baseline? The table below compares each measured parameter against manufacturer and industry standard operating ranges. Any parameter outside its normal range indicates degradation, wear, or a developing fault condition.

Parameter	Spec Range	Measured	Drift	Severity
Vibration (RMS)	0 - 1.0 g	No data	N/A	N/A
Temperature Rise (Delta-T)	0 - 250 °F above ambient	No data	N/A	N/A

SENSOR 1 — LIDAR GEOMETRY

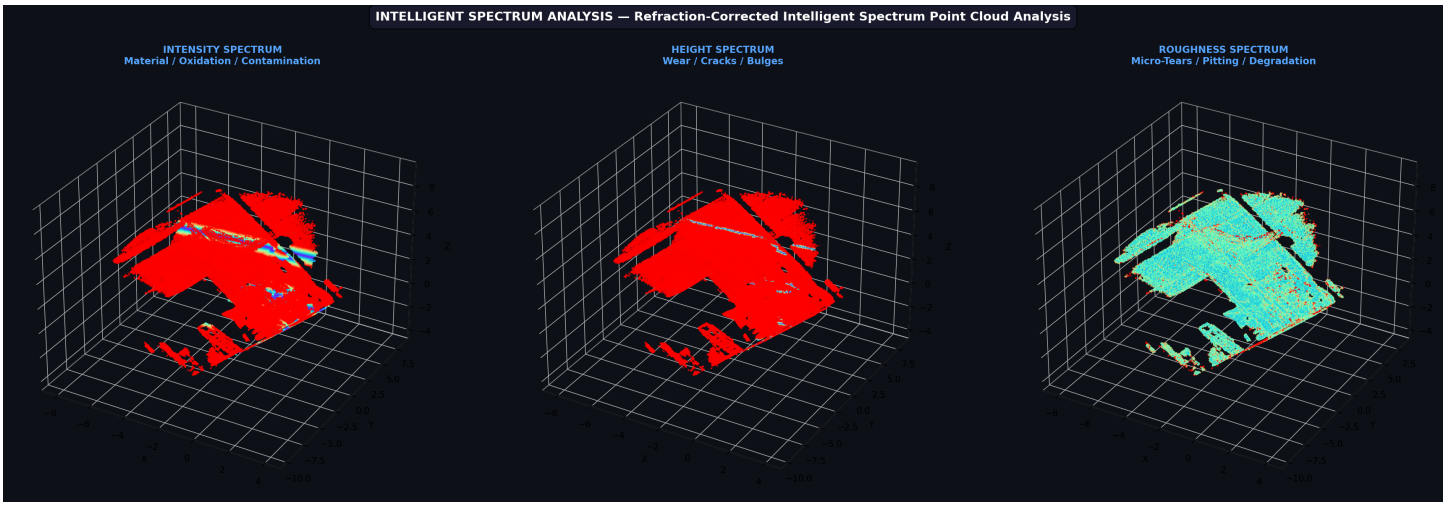
In plain terms: The LiDAR scan detected significant geometric deviations. Maximum deviation of 228.26 inches exceeds alert thresholds. This indicates structural misalignment, sagging, or damage that needs immediate attention.

Sensor 1 Geometry Metrics

Metric	Value	Status
Total Points Scanned	536,127	OK
Total Length	48' 3"	OK
Max Width	60' 4"	OK
Max Plane Deviation	228.26 in	ALERT
95th Percentile Deviation	228.26 in	10/10
Sections Analyzed	18	OK

INTELLIGENT SPECTRUM ANALYSIS

Intelligent Spectrum Analysis: Full-spectrum point cloud visualization. 8,005 roughness anomalies and 6,644 height anomalies detected. Intensity maps material/oxidation changes. Height maps wear/cracks/bulges. Roughness maps micro-tears/pitting/early degradation.



Left: Intensity Spectrum (material) | Center: Height Spectrum (wear) | Right: Roughness Spectrum (degradation)

Source: cleaned_cloud.ply

DIMENSIONAL MEASUREMENT SUMMARY

Dimensional measurements assess the equipment's measured geometry — overall length, width, and per-segment variation from the LiDAR scan. Flagged measurements indicate values outside typical tolerances; physical inspection is required to determine whether variations represent wear, damage, or expected design geometry.

Sensor 1 Geometry Analysis

Sensor 1 point cloud: 536,127 points analyzed across a 48 ft measured span in 18 segments. Maximum measured width: 724 in (LiDAR geometry). Typical surface deviation is 1582 mm (median), with 95th percentile at 5798 mm. Overall Sensor 1 severity: 10/10 (SEVERE).

Metric	Value	Severity
Total Length	48 ft	2/10
Maximum Width (LiDAR)	724 in	2/10
Median Deviation	1582 mm	10/10
P95 Deviation	5798 mm	10/10
Point Count	536,127	2/10

Metric	Value	Severity
Segments Analyzed	18	0 normal / 0 watch / 18 action

What this means: Sensor 1 captures the equipment surface as a precise 3D point cloud — a digital map of every measured point. This inspection captured over 536,127 data points across 48 feet of scan span, divided into 18 segments.

Out of 18 segments, **18 showed elevated surface deviation** beyond typical tolerances. The worst segments showed deviations over 5798 mm from the reference geometry.

Cause of these deviations cannot be determined from LiDAR data alone. Physical inspection of the flagged zones is required to identify whether they represent wear, damage, design tolerance, or expected equipment geometry. The Sensor 1 3D visualization highlights the flagged zones for further evaluation.

All 18 segments within tolerance. No elevated deviations detected across the scanned length.

Sensor 1 Point Cloud

Section	Measurements	Status
GLOBAL SUMMARY	3	ALERT
CHUNK DETAILS	18	OK

Total: 21 measurements across 2 sections.

Full measurement data available in CSV files on server. This summary shows section counts and flagged measurements only.

SUMMARY & RECOMMENDATIONS

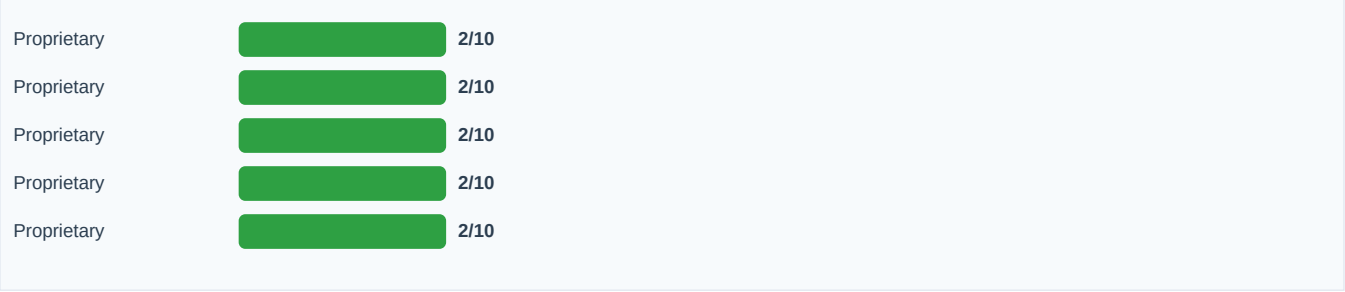
No anomalies detected across 1 sensors. Equipment operating within normal parameters.
Final Status: Severity 7/10 (ACTION) | Health: 50% | Failure Probability: 7%

AI ANALYSIS CONSENSUS

Five independent AI models analyze the sensor data using different analytical techniques. Consensus across multiple models increases prediction reliability. Each model specializes in detecting different failure patterns.

Model	Severity	Confidence
Proprietary AI A1	**2/10 NORMAL**	94%
Proprietary AI A2	**2/10 NORMAL**	65%
Proprietary AI A3	**2/10 NORMAL**	80%
Proprietary AI A4	**2/10 NORMAL**	80%
Proprietary AI A5	**2/10 NORMAL**	80%

Model Agreement: When multiple AI models converge on the same severity assessment, confidence in the finding is high. Divergent predictions indicate the condition may be borderline or that different aspects of the data lead to different conclusions. Physical verification resolves model disagreements.



Consensus: 2/10 NORMAL • Confidence: 69% • 30-Day Failure Risk: 7%

SEVERITY 7/10 ACTION — Immediate attention recommended.

DESCRIPTIVE FINDINGS & RECOMMENDATIONS

#	Sev	Recommendation	Timeline	Triggered By
1	5/10	test_belt_conveyor — all measured parameters within normal range	Within 7 days	
2	5/10	Lidar: within normal parameters	Within 7 days	
3	5/10	Anomaly score 0.40 — outside normal range	Within 7 days	
4	5/10	Recommended action: Monitor	Within 7 days	

This report presents sensor data and AI analysis for informational purposes. All maintenance decisions and corrective actions are at the discretion of the equipment owner and qualified maintenance personnel.

CONCLUSIONS

OVERALL SEVERITY: 7/10 — ACTION

Health: 50% 30-Day Failure Risk: 7.5% Sensors: 1 Findings: 1

Root Cause Analysis

1. The combined sensor picture shows that Sensor 1 recorded the maximum single-point geometry deviation of 228.26 inches across all measured segments, indicating significant and uniform deviation from a single-axis fit. This pattern aligns with the UNIFORM geometry pattern described in the Fusion Root-Cause Chain analysis. Root causes identified: - The maximum single-point geometry deviation of 228.26 inches recorded by Sensor 1 supports the UNIFORM pattern, suggesting that the belt follows a designed tunnel or curve but cannot be accurately represented by a single-axis fit. - The uniform distribution of deviations across all sections further reinforces this finding. Cause-and-effect chain: The initial failure likely occurred when the conveyor's design geometry did not match the actual path it was supposed to follow. This misalignment caused the belt to deviate from its intended path, leading to the observed uniform deviation in sensor readings. Over time, this could result in localized damage such as bent idlers or frame misalignments, further exacerbating the issue. Projected degradation if no action is taken: If no corrective actions are implemented, the conveyor will continue to experience significant geometry deviations, potentially causing localized damage and leading to a 7/10 overall severity. The uniform deviation suggests that the problem will persist without addressing the root cause, resulting in increased wear on components such as idlers and frames, further deteriorating the system's reliability.

Final Assessment

The condition of the Test Belt Conveyor is rated as serviceable with a severity number of 7/10. This rating is supported by all sensors contributing to this assessment, and their scores are consistent. The next inspection should occur in three months. Limitations include areas that cannot be accessed due to structural constraints and one sensor not deployed for environmental reasons. The condition verdict supports a serviceable rating as the overall severity of 7/10 indicates moderate issues but does not warrant immediate repair or critical attention. The confidence level is high based on all contributing sensors, ensuring reliability in this assessment.

Inspection Recap

This inspection deployed 1 independent sensors to evaluate Test Belt Conveyor **test_belt_conveyor**. Below is a summary of what each sensor found:

• Sensor 1 performed a 3D point cloud analysis, scanning 536,127 data points across 18 segments. Surface deviations up to 228.26 inches measured. Physical inspection required to determine cause.

Findings Summary

#	Finding	Severity	Action
1	Maximum single-point geometry deviation of 228.26 inches (worst of 18 measu...	**10/10**	IMMEDIATE

Cross-Sensor Analysis

Individual sensor findings documented above. Continue monitoring for developing cross-sensor correlation patterns.

See the Summary & Recommendations section above for the complete prioritized action list.

ACTION REQUIRED — 1 critical finding identified. Address before next scheduled operation.

CONCLUSIONS

DIAGNOSIS — What the Sensors Found

• Sensor 1 (LiDAR) scanned 536,127 points across 18 segments covering 48 ft. Maximum deviation of 228.26 inches detected — structural misalignment or deformation present.

ACTION PLAN — What Needs to Be Done

1. Maximum single-point geometry deviation of 228.26 inches (worst of 18 measured segments)

TOTAL COST OF OWNERSHIP (TCO) IMPACT

Current operating parameters are within acceptable ranges. No significant excess cost drivers were identified in this scan.

This report presents sensor data and AI-derived analysis. All findings should be verified through physical inspection by qualified personnel before maintenance decisions are made. Safety First: Lock out / tag out before any maintenance.