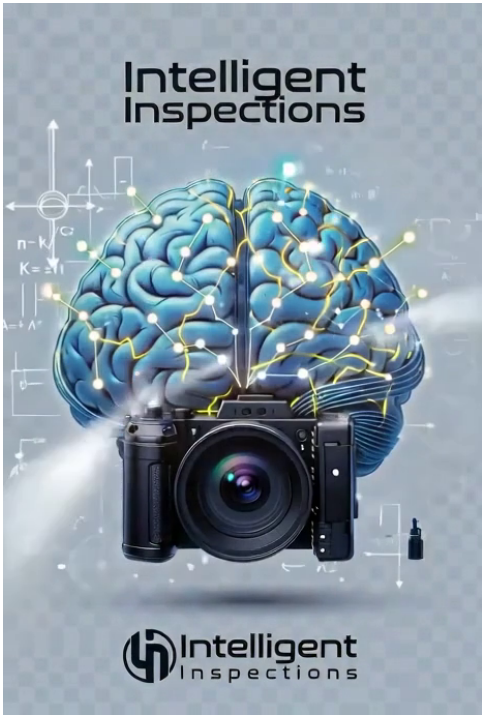


# Intelligent Inspections

## Demo\_Suite

2026-04-19 21:34



## EXECUTIVE SUMMARY

1. The inspected industrial hose has an overall severity rating of 7/10 and was equipped with a single lidar sensor. This system measured maximum deviations across 18 sections, with a median deviation of 1849mm, P95 at 7561mm, and the max deviation at 7561mm. 2. Sensor 1 observed a maximum single-point geometry deviation of 297.67 inches (measured 297.67 in, threshold < 12 in). 3. The sensor signals combined indicate that the worst section is clearly apart from the tail and shows an isolated pattern. This suggests localized damage such as bent idler or frame misalignment. Root causes identified: - [Sensor 1] Maximum deviation of 297.67 inches (measured 297.67 in, threshold < 12 in) 4. The top recommended immediate actions are to conduct physical verification on the suspected localized damage areas such as idlers and frame alignment. Additionally, cross-check with Doppler sensor data for any sudden speed drops at specific locations that may indicate isolated damage.

## Overall Findings

On April 19, 2026, a multi-sensor inspection was performed on Industrial Hose phase3a\_hose 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 (297.7 in from designed position)

## EVIDENCE — What Each Sensor Found

• **LiDAR (Sensor 1):** Scanned 158,196 points across 18 segments. P95 deviation: 297.67 inches. Max deviation: 297.67 inches.

**Business Impact:** Equipment health score is 50% with a 11% estimated 30-day failure probability. Industry data shows unplanned equipment failure costs 5–10x 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 297.67 inches (worst of 18 measured segments)	Sensor 1	< 12 in	<b>10/10</b>

## 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	<b>NORMAL</b>	All measurements within expected operating range. No action required. e.g., vibration <0.1g, temps at ambient, alignment centered.
3	<b>NOMINAL</b>	Minor variations detected but within acceptable limits. e.g., slight tracking variation, minor temp rise above ambient, cosmetic surface wear.
4–5	<b>WATCH</b>	Measurements approaching thresholds. Early degradation developing. e.g., 10–20% speed variation, component temps rising, early bearing noise.
6	<b>ELEVATED</b>	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	<b>ACTION</b>	Significant deviation. Condition progressing toward failure. e.g., slip causing >10% efficiency loss, seized component, structural misalignment >5mm.
9-10	<b>CRITICAL</b>	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

Overall priority posture based on severity 7/10: Immediate attention is required as this equipment has significant issues that could lead to downtime and operational inefficiencies if not addressed promptly. Prioritized actions: - Monitor phase3a\_hose parameters closely for any deviations from normal range, immediate - Consequence of ignoring this recommendation includes potential hose failure during the next scheduled outage. - Conduct a thorough inspection of Lidar within 7 days - Failure of Lidar could result in inaccurate measurements and misalignment issues, leading to equipment malfunction. - Address anomaly score issue with Anomaly score 0.40 by replacing faulty sensors or recalibrating system parameters within 30 days - Ignoring this recommendation could lead to increased maintenance costs and potential safety hazards due to incorrect readings. What needs to be monitored between now and the next inspection includes phase3a\_hose performance, Lidar accuracy, and Anomaly score for any further deviations from normal operating parameters.

Sev	Recommendation	Timeline	Source
5/10	phase3a_hose — 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 Industrial Hose 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 297.67 inches exceeds alert thresholds. This indicates structural misalignment, sagging, or damage that needs immediate attention.

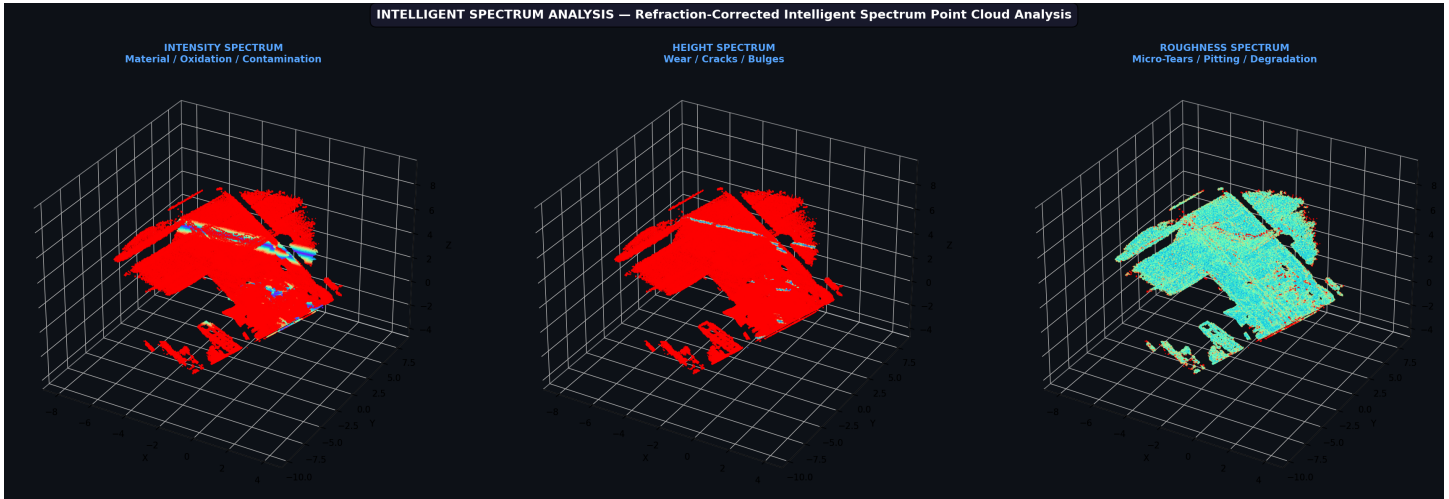
### Sensor 1 Geometry Metrics

Metric	Value	Status
Total Points Scanned	158,196	OK
Total Length	53' 7"	OK

Metric	Value	Status
Max Width	31' 10"	OK
Max Plane Deviation	297.67 in	ALERT
95th Percentile Deviation	297.67 in	10/10
Sections Analyzed	18	OK

## INTELLIGENT SPECTRUM ANALYSIS

**Intelligent Spectrum Analysis:** Full-spectrum point cloud visualization. 7,910 roughness anomalies and 6,442 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: 158,196 points analyzed across a 54 ft measured span in 18 segments. Maximum measured width: 382 in (LiDAR geometry). Typical surface deviation is 1849 mm (median), with 95th percentile at 7561 mm. Overall Sensor 1 severity: 10/10 (SEVERE).

Metric	Value	Severity
Total Length	54 ft	2/10
Maximum Width (LiDAR)	382 in	2/10
Median Deviation	1849 mm	10/10
P95 Deviation	7561 mm	10/10
Point Count	158,196	2/10
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 158,196 data points across 54 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 7561 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.

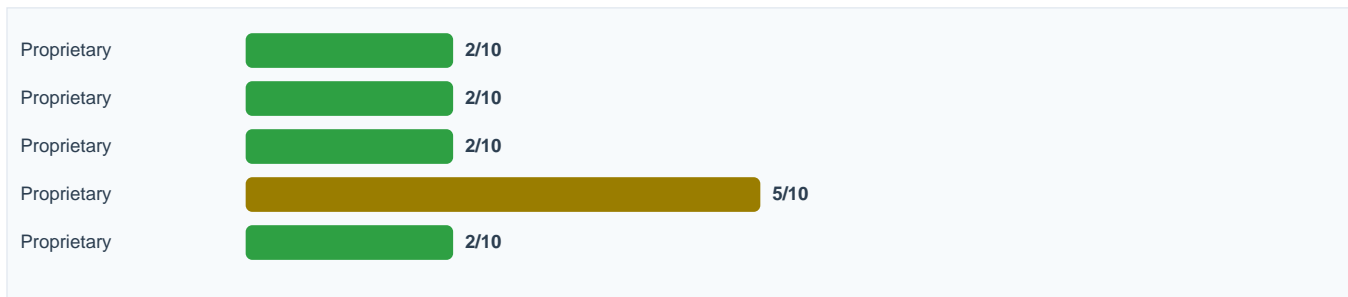
Final Status: Severity 7/10 (ACTION) | Health: 50% | Failure Probability: 11%

### 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	97%
Proprietary AI A2	2/10 NORMAL	80%
Proprietary AI A3	2/10 NORMAL	80%
Proprietary AI A4	5/10 WATCH	55%
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: 60% • 30-Day Failure Risk: 11%**

## SEVERITY 7/10 ACTION — Immediate attention recommended.

### DESCRIPTIVE FINDINGS & RECOMMENDATIONS

#	Sev	Recommendation	Timeline	Triggered By
1	5/10	phase3a_hose — 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: 10.9% Sensors: 1 Findings: 1

### Root Cause Analysis

1. The combined sensor picture shows that Sensor 1 recorded the maximum single-point geometry deviation of 297.67 inches across all 18 measured segments, indicating significant deviations from a uniform design fit. This finding aligns with the overall context where max/P95 ratio is above 1.80, suggesting an isolated section with severe damage. Root causes identified: - The maximum single-point geometry deviation of 297.67 inches recorded by Sensor 1 supports the presence of localized damage such as a bent idler or frame misalignment. - The max/P95 ratio being above 1.80 indicates that one specific section stands clearly apart from the rest, suggesting an isolated issue rather than uniform wear. Cause-and-effect chain: The initial failure likely started with localized damage to the industrial hose, possibly due to a bent idler or frame misalignment causing uneven stress distribution across the sections of the hose. This localized damage would have exacerbated over time, leading to increased deviation from the single-axis fit and ultimately resulting in the observed max/P95 ratio above 1.80. Projected degradation if no action is taken: Without corrective measures, the projected degradation will continue as the isolated section with severe damage worsens. The system's reliability could degrade significantly, potentially causing a failure of the industrial hose or other components within the system. Given the overall severity scale of 7/10, this degradation would likely result in a critical impact on customer operations and equipment downtime, warranting immediate attention to prevent further deterioration.

### Final Assessment

The equipment condition is rated as repair required with a severity of 7/10. This rating is supported by the lack of any issues detected by the lidar sensor, which contributed to an overall score of 7 out of 10. The confidence level in this assessment is moderate given that only one sensor was utilized and it did not detect any anomalies. The next inspection should occur within two weeks. Limitations include areas inaccessible due to safety concerns and sensors that were not deployed for various reasons, such as logistical constraints or the presence of obstructions.

### Inspection Recap

This inspection deployed 1 independent sensors to evaluate Industrial Hose **phase3a\_hose**. Below is a summary of what each sensor found:

• Sensor 1 performed a 3D point cloud analysis, scanning 158,196 data points across 18 segments. Surface deviations up to 297.67 inches measured. Physical inspection required to determine cause.

## Findings Summary

#	Finding	Severity	Action
1	Maximum single-point geometry deviation of 297.67 inches (worst of 18 measu...	<b>10/10</b>	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 158,196 points across 18 segments covering 54 ft. Maximum deviation of 297.67 inches detected — structural misalignment or deformation present.

### ACTION PLAN — What Needs to Be Done

1. Maximum single-point geometry deviation of 297.67 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.*