

CASE STUDY

CLIENT IDENTITY WITHHELD
BY MUTUAL AGREEMENT

--

ALL DATA ANONYMIZED



Soledad Data Solutions partnered with a confidential manufacturing client to replace a fatigue-prone, manual inspection process with a fully integrated, AI-driven anomaly detection platform — delivering real-time inferences from a live X-ray video feed directly to technicians on the production floor, within latency tolerances required for actionable, in-process quality control.

THE CHALLENGE

A Human Attention Problem at Industrial Scale

Legacy Process

A dedicated technician was required to monitor a continuous X-ray video feed for an entire eight-hour shift, manually identifying product anomalies and making routing decisions in real time — a task demanding sustained, high-stakes concentration with zero margin for lapse.

Operational Cost

Beyond the physical and cognitive burden on individual employees, the process created a single point of failure in the quality control chain. Missed detections meant defective units advancing downstream, while false positives caused unnecessary rework and throughput loss.

8h

CONTINUOUS MANUAL MONITORING PER SHIFT

Decision Stakes

Each anomaly identified required an immediate binary judgment: could the item be returned upstream for remediation, or was it a discard? This decision had direct cost implications, demanding consistency no human shift could reliably sustain.

OUR APPROACH

Four Disciplines, One Integrated Solution

01

Business Process Assessment

SOLUTIONS ENGINEERING

Our Solutions Engineers conducted deep-dive process discovery sessions on the manufacturing floor — mapping the complete inspection workflow, documenting anomaly taxonomies used by experienced technicians, defining remediation routing logic, and establishing the latency and availability requirements that any technology solution would need to meet. This phase translated domain expertise into precise technical requirements, ensuring the platform would reflect how real decisions were made, not just how they were described.



02

Computer Vision Model Development

DATA SCIENCE

Our Data Science team worked from an extensive archive of historical X-ray feed footage, collaborating with client subject-matter experts to label and validate a training corpus spanning the full range of anomaly classes. A YOLO-architecture object detection model was selected for its balance of detection accuracy and inference speed — critical for a streaming video use case. The team iteratively refined detection thresholds across anomaly categories, producing a model performant enough for production deployment with confidence scores meaningful to technicians.



03

Full-Stack Application Development

ENGINEERING

Our Full-Stack Engineering team built a purpose-designed application to bridge the physical X-ray feed and the inference model. The platform handles continuous video ingestion, real-time frame delivery to the YOLO model, and renders inference results as an annotated, human-readable overlay for technicians. Interface design centered on reducing cognitive load — displaying confidence-graded anomaly flags, recommended routing actions, and a feed history log — while keeping technicians in control of final decisions.

VIDEO STREAMING

REAL-TIME INFERENCE UI

OPERATOR DASHBOARD

REST / WEBSOCKET

04

Infrastructure Architecture

SYSTEMS ARCHITECTURE

Cloud-hosted inference was assessed and ruled out: round-trip latency over wide-area networks was incompatible with the real-time requirements of a streaming production environment. Our Systems Architects specified and led the deployment of AWS Outposts — bringing AWS-managed compute physically into the manufacturing facility. This architecture delivered cloud-consistent infrastructure and tooling while keeping inference local to the production floor, enabling the consistent, low-latency response times the use case demanded.

AWS OUTPOSTS

EDGE INFERENCE

ON-PREMISES CLOUD

LATENCY OPTIMIZATION

INFRASTRUCTURE DESIGN

Why AWS Outposts?

Routing video frames to a cloud-hosted model and returning inference results introduced latency incompatible with a real-time quality control environment. By deploying AWS Outposts directly within the client's facility, Soledad's architects achieved sub-threshold inference latency while preserving the operational benefits of AWS-managed infrastructure — security, scalability, and tooling consistency — without the round-trip penalty of a remote data center.

- Cloud-only architectures failed latency tolerance testing during initial assessment
- Outposts provided AWS-native tooling on dedicated on-premises hardware
- Inference remained physically co-located with the production feed source
- Consistent performance maintained across varying network conditions

OUTCOMES

From Fatigue Risk to Reliable Detection



Continuous Coverage

Anomaly monitoring no longer dependent on sustained human attention. The system operates across full production shifts without degradation in detection performance.



Actionable Routing Intelligence

Technicians receive confidence-scored anomaly flags with remediation recommendations, enabling faster, more consistent routing decisions throughout the shift.



Real-Time at Production Scale

AWS Outposts deployment delivers inference results within the latency envelope required for in-process intervention — at the speed manufacturing demands.

ABOUT THIS ENGAGEMENT

This engagement reflects Soledad Data Solutions' commitment to deploying production-grade AI at the frontier of what the industry has broadly adopted. The combination of edge-deployed computer vision, real-time video inference

pipelines, and YOLO-based industrial inspection represents a class of solutions that many organizations are only beginning to explore. Soledad's teams operated at the leading edge of these technologies — delivering working systems in production environments, not proofs of concept.

Soledad Data Solutions

INTELLIGENCE AT SCALE

CONFIDENTIALITY NOTICE – The client organization, facility location, production line specifications, and all identifying details have been withheld pursuant to the terms of the engagement agreement. Anomaly classes, model performance metrics, and throughput figures are not disclosed. This document is intended for illustrative purposes and does not constitute a disclosure of proprietary client information.