STRATEGIC RESEARCH REPORT

From Inspection to Autonomous Quality

How 36ZERO Vision becomes the operating system for manufacturing quality — and why the timing is now.

15–20%
COST OF POOR QUALITY (% REV.)

80%
MANUAL DETECTION RATE

$41.7B
MARKET SIZE 2030

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Executive Summary

The opportunity is bigger than the current vision.

36ZERO Vision has a strong technological foundation: data-efficient AI (5–20 images), customers like Siemens, Bosch, and LEONI, partnerships with SAP and Bosch Rexroth. But "AI Visual Inspection" is a feature, not a company. The vision must grow.

> The core insight: Inspection is only the data layer. The real value lies above it — in diagnosis, knowledge building, and autonomous correction.

The Evolution — Three Stages Beyond Today

→ **Prerequisite: Vision — "What is broken?"**
Visual defect detection. Where 36ZERO stands today. Fast, reliable, data-efficient.

1 **Memory — "Why is it broken?"**
Knowledge base + ERP data. Root cause analysis, industry knowledge, collective intelligence.

2 **Autonomous Quality — "How do we prevent it?"**
Agentic AI. Agent detects → diagnoses → corrects. Self-Improving: learns from every part.

3 **Manufacturing Quality OS — "The Platform"**
Predictive Quality, Cross-Plant Benchmarking, Manufacturing GPT, Quality-as-a-Service.

Each stage triples customer value and addressable market. Competitors remain stuck at the prerequisite.

$30B	3–5x	0
AI INSPECTION MARKET	CUSTOMER VALUE PER STAGE	CLOSED-LOOP COMPETITORS

The Customer Problem

Why visual quality control fails today — and what it costs.

Manual inspection is the foundation of quality control. And it's crumbling:

80–85%
INSPECTOR DETECTION RATE

up to 40%
FALSE POSITIVE RATE

15–20%
COPQ (% OF REVENUE)

The Five Biggest Pain Points

Fatigue & Inconsistency

Inspectors achieve max. 80–85% detection. After 2h, attention drops significantly. *Source: Pharmaceutical Technology*

Knowledge Drain

13–20M workers retiring by 2036. 30 years of expertise disappear irreversibly.

Scaling Problem

More production = more inspectors. Linear costs, no economies of scale.

Scrap & Rework

COPQ: 8–15% of revenue in Automotive, Aerospace, Medtech. Up to 20% for typical manufacturers. *Source: ASQ*

Recall Costs

28M vehicles recalled in USA 2024 (445 campaigns). Single recall: $97–194M. *Source: NHTSA, GM*

How 36ZERO Solves These Problems

24/7 Consistency

AI doesn't fatigue. Every part, every shift, around the clock.

Digitize Knowledge

20 images → 30 years of expertise as an AI model.

Early Detection

Catch defects at the source. Costs multiply 10x per stage.

Data-Efficient

5–20 images instead of thousands. Perfect for rare defects.

ROI: Real Numbers

What AI-based inspection delivers in practice — documented results.

Industry	Problem	Result
Medical Devices	12,000 False Rejects/Week	Reduced to 246 → **$18M/Year saved**
Semiconductor	60 Manual Inspectors	Reduced to 24 → **$691K/Year**
Semiconductor	+0.1% Yield	**+$75M/Year** (TSMC scale)
Automotive	Closed-Loop QC	**–23% Defects**, €89K avoided

Cost Comparison: Manual vs. 36ZERO

Cost Factor	Manual	36ZERO
Personnel (3-Shift)	€150–250K/Year per Line	€0 (AI replaces)
Detection Rate	80–85% (declining)	>95% (constant, 24/7)
False Positives	Up to 40% (rule-based)	<5% (data-driven)
New Product Setup	Weeks	Hours (5–20 images)
Scaling	Linear (more = costlier)	Marginal cost near 0

The ROI Multiplier

1x
DETECTION IN PRODUCTION

10x
DETECTION AT ASSEMBLY

100x
DETECTION AT CUSTOMER

> The earlier in the process a defect is caught, the more dramatic the savings. 36ZERO's inline inspection detects defects at the point of origin.

Agentic Quality

Autonomous agents that don’t just find defects — they fix them.

Agentic AI is the hottest trend in industrial software. AI agents that act autonomously — without human intervention.

The Concrete Workflow

01 **Detect**

Camera identifies a crack on a brake disc. This is what 36ZERO does today — fast, reliable, with 5 training images.

02 **Diagnose**

System queries knowledge base: “Crack type 3B = typical for spindle temperature >180°C.” Root cause identified.

03 **Prescribe**

Automatic recommendation: Calibrate spindle, replace tool, inspect next 50 parts.

04 **Act**

Via Bosch ctrlX: Agent sends correction command directly to PLC. Machine parameters adjusted. No operator needed.

Why Now?

Enabler	Status 2026
Agentic AI Frameworks	40% Enterprise Apps integrate AI Agents by 2026 (Gartner)
PLC Connectivity	Bosch ctrlX = open platform, API-driven
Edge Computing	NVIDIA Jetson/Orin: 275 TOPS on-premise
Regulation	EU GMP Annex 22 creates framework for AI in Pharma

Detect → Diagnose → Prescribe → Act. No single competitor offers this complete loop. The white space is real and measurable.

Self-Improving AI

Already reality today — and the key to the Autonomous Quality loop.

36ZERO uses self-improving principles today: data-efficient training with 5–20 images, active learning from user feedback. Next step: full automation.

Three Dimensions of Self-Improvement

01 **Self-Training: AI Learns From Every Part**

Every inspected part is a training data point. Active Learning: The system specifically requests labels for edge cases. Detection rate improves with every shift.

02 **Self-Calibrating: AI Controls the Environment**

Actively controls lighting (brightness, angle, wavelength). Cameras self-calibrate during vibrations or temperature changes.

03 **Self-Adapting: New Product? No Problem.**

Product changes traditionally require weeks. Self-Improving AI recognizes the new baseline and begins defect detection immediately.

0	1 Click	99%
PROGRAMMERS NEEDED	USER CONFIRMS	DEFECT REDUCTION (WEF)

The Flywheel Effect: More inspections → more data → better model → fewer defects → more trust → more inspections. Traditional systems degrade. Self-Improving AI gets better over time.

ERP Integration

The fastest path to more customer value — and the strongest lock-in.

The most acute customer problem: Inspection and ERP live in separate worlds. Defect data in the camera, production data in SAP. No connection.

SAP QM Connector

01 **Batch Traceability**

Every defect automatically linked to the SAP production order. Batch tracing in seconds instead of days.

02 **Supplier Scoring**

Defect rate per supplier, automatically calculated. Basis for data-driven supplier evaluation.

03 **Quality Analytics in ERP**

Dashboard directly in SAP: scrap rate, trends, costs. The quality manager never leaves their system.

Bosch ctrlX World: 1-Click Install

The Bosch ctrlX platform is the “App Store” for industrial automation. 36ZERO as an app in ctrlX World = Product-Led Growth for Manufacturing.

> Strategic significance: ERP integration creates the strongest lock-in in B2B software. Once integrated into SAP, customers don’t switch.

Knowledge Base & Workforce Shortage

Digitize knowledge before it retires.

13–20M	30 Yrs	3 Days
RETIRING BY 2036	EXPERIENCE LOST	KNOWLEDGE DIGITIZED

> *"Your best quality inspector retires in three years. We digitize their knowledge in three days."*

Manufacturing Knowledge Base

For every detected defect, the system searches an industry-specific knowledge base and automatically suggests root causes and solutions. Standards: IATF 16949, VDA 6.3/6.5, IPC-A-610, EU GMP, DIN EN ISO 5817.

The Network Effect — The True Moat

01 **Customers Contribute Anonymously**
Every solved cause-effect chain flows into the shared knowledge base.

02 **Database Gets Smarter With Every Customer**
Customer A solves crack problem → helps customers B–Z automatically. Stack Overflow for manufacturing.

03 **Switching Cost Becomes Impossible**
Collective knowledge of 100+ manufacturers. Not a feature — a moat.

Workflow: Expert + 36ZERO + 20 images → model trained → 30 years of experience digitized → new employees benefit immediately.

Competition & New Markets

The landscape — and where the white spaces are.

Company	Revenue	Strength	Weakness
Cognex	$1.34B	Market leader, Deep Learning	Hardware-locked, no SaaS
Keyence	$7B	Sales strength	Proprietary, limited AI
Landing AI	$57M raised	Andrew Ng, PLG	No Enterprise
Instrumental	—	PCB expertise	Electronics only
Elementary	$66M raised	Fast deployment	No Tier-1 customers

The White Space

Autonomous Quality

Detect → Diagnose → Prescribe → Act. No competitor goes beyond detection.

Cross-Industry Knowledge

Nobody aggregates defect-cause-solution across customers and industries.

ERP-Native Intelligence

All are siloed solutions alongside ERP. Nobody delivers Quality Intelligence directly into SAP.

Knowledge Digitization

No platform positions itself as the solution to the workforce shortage.

New Markets

Industry	Market	Opportunity
Pharma & Medtech	$5.7B+	3–5x pricing, compliance = must-have
Semiconductor	$14.4B	Software layer open despite KLA dominance
Energy (Solar + Wind)	$1.5B+	Drone Inspection, 21.4% CAGR
Infrastructure	$34.4B	40,000+ bridges, EU mandate

Product Roadmap

Four phases — from prerequisite to paradigm shift.

→ **Prerequisite: Vision — Laying the Data Layer**

SAP QM Connector. 1-Click Install in Bosch ctrlX World. Pre-Trained Models per industry. Workforce shortage messaging.

P1 **Phase 1: Memory — Building the Knowledge Base**

Process Parameter Correlation Engine. Manufacturing Knowledge Base v1 (IATF 16949, VDA, ISO). Auto-8D Reports. Pharma Module (GMP).

P2 **Phase 2: Autonomous Quality — Closed Loop**

Agentic Quality: AI detects → diagnoses → corrects via ctrlX. Customer Knowledge Network. Self-Improving.

P3 **Phase 3: Manufacturing Quality OS**

Predictive Quality. Cross-Plant Benchmarking. Manufacturing GPT. Quality-as-a-Service for SMEs.

Top 3 Moves — Immediately Actionable

01 **ERP Integration + PLG via Marketplace**

Impact: High. Feasibility: High (partnerships exist). Solves the most acute problem with existing assets.

02 **Process Correlation Engine + Knowledge Base**

Impact: Very high (3–5x customer value, unique moat). Fundamentally differentiates from all competitors.

03 **Pharma / Regulated Industries Expansion**

3–5x higher prices, shorter sales cycle. Compliance = must-have = budget available.

The New Vision

Six formulations — from pragmatic to revolutionary.

Option A — Autonomous Quality

"36ZERO makes quality control autonomous. Our AI detects defects, diagnoses root causes, and corrects processes — without a human in the loop."

Option B — The Quality Intelligence Company

"We're building the intelligence layer for manufacturing quality. Inspection was the beginning. Today we deliver what's wrong — why, and what to do about it."

Option C — Zero-Defect Manufacturing

"Zero defects. Not as a goal, but as a system. 36ZERO connects inspection with industry knowledge and autonomous correction."

Option D — Manufacturing Memory

"Machines don't forget. 36ZERO gives manufacturing a memory — every defect, every cause, every solution."

Option E — Agentic Quality Platform

"The first AI platform with Quality Agents. Our agents see, understand, and act — in seconds."

Option F — Self-Improving Quality Intelligence

"AI that improves while you produce. 36ZERO learns from every part and gets smarter with every customer."

36ZERO has a choice: Remain a good inspection tool — or become the platform for Autonomous Quality. The building blocks are there. Only the decision is missing.

Market Potential: TAM, SAM, SOM

From total market to addressable revenue potential.

$41.7B
TAM — MACHINE VISION 2030

$5.2B
SAM — AI SOFT-WARE LAYER

$120–350M
SOM — IN 5 YEARS

The Waterfall

TAM $41.7B — Machine Vision Total Market 2030
Cameras, optics, software, services. CAGR 13%. *Grand View Research*

SAM $5.2B — AI Software Layer (12.5% of TAM)
Automotive 28%, Electronics 19%, Pharma 15%. *MarketsandMarkets*

SOM $120–350M — Achievable in 5 Years
DACH + EU core markets. 500–1,500 customers at €80–230K ACV.

Industry	Share	36ZERO Fit
Automotive	28%	Very high — Siemens, LEONI
Electronics/Semi	19%	High — PCB, Wafer
Pharma/Medtech	15%	Very high — 3–5x Pricing
Energy	8%	Medium — Drone Inspection
Food & Packaging	12%	Medium — Commodity risk

Competitive Deep Dive

Feature matrix — and where 36ZERO wins.

Feature	36ZERO	Cognex	Landing	Keyence	Elementary
Deep Learning	✓ 5–20	✓ ViDi	✓	Partial	✓
Hardware	Agnostic	Proprietary	Agnostic	Proprietary	Own+3rd
ERP Integr.	✓ SAP	No	No	No	No
Closed-Loop	Roadmap	No	No	No	No
Knowledge Base	Roadmap	No	No	No	No
Self-Improving	✓ Active	No	Partial	No	No
Pharma/GMP	Possible	✓	No	✓	No
Pricing	SaaS	HW+License	SaaS	HW+License	SaaS+HW
Tier-1 Customers	Siemens+	Top-50 OEM	Mid-Market	Top-50 OEM	Scale-ups

36ZERO's unique advantage: No competitor combines ERP integration + Self-Improving AI + Closed-Loop roadmap. Hardware incumbents are locked in proprietary ecosystems. Software startups lack enterprise customers.

Strategic Implication

Against Cognex/Keyence

Don't compete on hardware. Software layer for any hardware. SaaS vs. licenses. PLG via SAP/Bosch Marketplace.

Against Landing AI/Elementary

Enterprise references as moat. Siemens/Bosch = credibility. Vertical depth over horizontal.

Revenue Scenarios

Three paths — from status quo to Manufacturing Quality OS.

Scenarios based on market data and comparable SaaS companies. Precise projections require 36ZERO's internal KPIs.

Scenario A: Status Quo — "Good Inspection Tool"

€5–10M	€30–50K	High
ARR IN 3 YEARS	AVG. ACV	COMMODITY RISK

Linear growth, feature competition. No moat. Commodity risk increases every year.

Scenario B: ERP + Pharma — "Quality Intelligence"

€15–30M	€80–150K	Medium
ARR IN 3 YEARS	AVG. ACV	DEFENSIBILITY

SAP Marketplace + Pharma. 3x ACVs. ERP lock-in. Achievable with existing team + 1–2 Pharma hires.

Scenario C: Full Platform — "Manufacturing Quality OS"

€50–100M+	€150–300K	Very High
ARR IN 5 YEARS	AVG. ACV	DEFENSIBILITY

> Recommendation: Start Scenario B immediately, prepare Scenario C. Scenario A is not an option — the market window for pure inspection closes in 18–24 months.

Risk Analysis

The 8 biggest strategic risks — and how to address them.

#	Risk	Impact	Prob.	Mitigation
1	Cognex: Autonomous Quality	Very High	Medium	Speed + ERP as moat. Pivot takes 2–3 yrs.
2	Commoditization	Very High	High	Now: Knowledge Base + Closed-Loop.
3	Foundation Models	High	Medium	Domain data = moat. VLMs need fine-tuning.
4	AI Talent Shortage	High	High	Remote-first, university partnerships, equity.
5	EU AI Act Delays	Medium	Medium	Compliance as feature and barrier.
6	Customer Concentration	High	Medium	PLG via Marketplace. Max 15% ARR.
7	Long Sales Cycles	Medium	High	PLG: Self-Service, Land, Expand.
8	Economic Downturn	High	Medium	ROI story: saves money. Payback <6 mo.

Most critical risk: **No. 2 — Commoditization.** Every month without differentiation beyond inspection narrows the strategic window. The top 3 moves on the roadmap directly address this risk.

Sources & References

26 Tier-1 sources — Research paper format.

[1] ASQ, “Cost of Quality.” COPQ: 15–20%.

[2] McKinsey, “Lighthouse Factories,” Apr. 2024.

[3] Averroes.ai / IEEE, Medtech Case Study.

[4] SEMI, Industry Reports, 2024.

[5] Deloitte & Manufacturing Inst., 2021/2024.

[6] German Federal Statistical Office / IAB.

[7] WEF, “Future of Jobs,” 2025.

[8] Grand View Research, MV Market, 2025.

[9] PwC, “Sizing the Prize,” AI Impact.

[10] Menlo Ventures, “GenAI Report,” 2025.

[11] MarketsandMarkets, Defect Detection.

[12] Gartner, AI Agents Forecast, Aug. 2025.

[13] McKinsey/WEF, Lighthouses, Apr. 2024.

[14] McKinsey, “State of AI,” Nov. 2025.

[15] NHTSA, 2024 Recall Report.

[16] GM, SEC Filings, 2024.

[17] Cognex, 10-K Filing, Feb. 2025.

[18] KLA Corporation, FY2024/25.

[19] SEMI, Fab Equipment Forecast, 2025.

[20] Deloitte, “Smart Mfg Survey,” 2025.

[21] Accenture, “Reinventing Ops,” 2024.

[22] FDA, PCCP, Dec. 2024.

[23] EU Commission, GMP Annex 22, Jul. 2025.

[24] Pharmaceutical Technology, Inspection.

[25] IISE, “Cost of Quality,” COPQ Study.

[26] NVIDIA, VLMs for Defects, Jan. 2026.

All sources accessed and verified in January/February 2026.

Florian Ziesche

florian@ainaryventures.com

+1 347 740 1465

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