



IX® Case Study

Automating Weld Quality Control with AI in Heavy Manufacturing

 **VOOBAN**



**IMPLEMENTATION
ENGINEERS®**
BEYOND CONSULTING



\$6.5M
annualized
financial
benefit

Our client was a leading North American manufacturer of engineered steel components for mission-critical infrastructure and large-scale construction projects. Operating multiple high-volume plants and employing thousands, the company produces hundreds of thousands of structural assemblies each year — every one defective weld can jeopardize safety, delay multi-million-dollar projects, and trigger costly rework.

The Challenge

Weld inspection had become the single largest constraint on growth:

- 100% manual visual inspection by certified technicians
- Severe shortage of qualified inspectors in a tightening labor market
- Rising production volumes outpacing inspection capacity
- Inherent human variability, fatigue, and shift-to-shift inconsistency
- Quality risk escalating as throughput demands increased

The Solution: AI Embedded AI Inspection System

Implementation Engineers and Vooban partnered to design, validate, and deploy an AI system that operates as a core element of the production line — not alongside it.

Key Capabilities

- Real-time computer vision analyzing live overhead and side-camera feeds
- Simultaneous multi-object detection across stacked, complex steel assemblies
- Classification of 15+ weld defect types (missing welds, undercuts, porosity, misalignment, etc.) with enterprise-grade precision and recall
- Edge-based inference delivering sub-second decisioning with zero cloud latency
- Intuitive operator HMI that highlights defects instantly with bounding boxes and confidence scores
- Automated continuous-learning loop: low-confidence images are routed for human review and automatically re-ingested to improve the model
- Fully scalable architecture already replicating across additional lines and facilities

Results: \$6.5M+ Annual Impact and a New Competitive Edge in Weld Quality

The production-grade AI weld inspection system eliminated routine manual checks with near-perfect accuracy, removed the inspection bottleneck, and unlocked 24/7 throughput. It now delivers >\$6.5M in annual value through higher volume, better yield, and labor optimization while standardizing quality across plants and freeing scarce inspectors for higher-value work—transforming a major constraint into a competitive advantage.

Let's Turn Your Vision Into Results

Implementation Engineers and Vooban deliver together — turning strategy into operational reality through AI-enabled execution.

Our proven **Align-Design-Execute** framework ensures your strategy doesn't stall at planning. From aligning leadership around priorities, to designing AI-driven operating models, to executing change inside your operations, we work side-by-side to deliver results that scale.

Ready to Get Started?

Let's explore how we deliver together. Contact us today to schedule a conversation. Together, we'll chart the path from vision to execution.

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