

QC Hero Platform

Technical Overview | LM3 Technologies



Technical Overview

AI-powered defect detection and model training platform

QC Hero Training Pipeline

TPU-Powered AI Training

QC Hero leverages **Google TPUs for fast AI training**, significantly reducing **training times to under 2 hours**.

- | **TPU Acceleration:** Optimized for **deep learning workloads**, reducing training costs and energy consumption.
- | **Cloud-Based Processing:** AI models are trained in **Google Cloud**, ensuring **scalability and redundancy**.
- | **Batch Processing:** Supports **parallel model training**, enabling **faster deployment cycles**.

Model Deployment

QC Hero provides scalable AI deployment options. Businesses can choose the flexibility, control, and cost structure that best suits their AI-powered quality control strategy.

1. **Upload Images & Labels** - Users submit defect images and corresponding labels to QC Hero.
2. **Data Storage & Preparation** - QC Hero securely stores images and labels for AI model training.
3. **AI Model Training** - Google TPUs process the data, optimizing the model for defect detection.
4. **Training Results Provided** - QC Hero generates performance metrics and validation results.
5. **Model Deployment** - The trained model is available for **download and on-premise deployment**, enabling real-time defect detection.



TensorFlow



Google's Infrastructure

By integrating **Google's AI and cloud infrastructure**, QC Hero ensures high-performance, scalable, and secure AI-driven quality control. **Vertex AI** automates model tuning, while **TPU acceleration** cuts training times to **under 2 hours**. Cloud-based AI management enables model updates across multiple PAQi units, ensuring **enterprise-wide synchronization**.

Features

Cloud-Native Scaling

- AI models train across multiple instances simultaneously.
- On-demand computing power ensures optimal performance.

Multi-User Access &

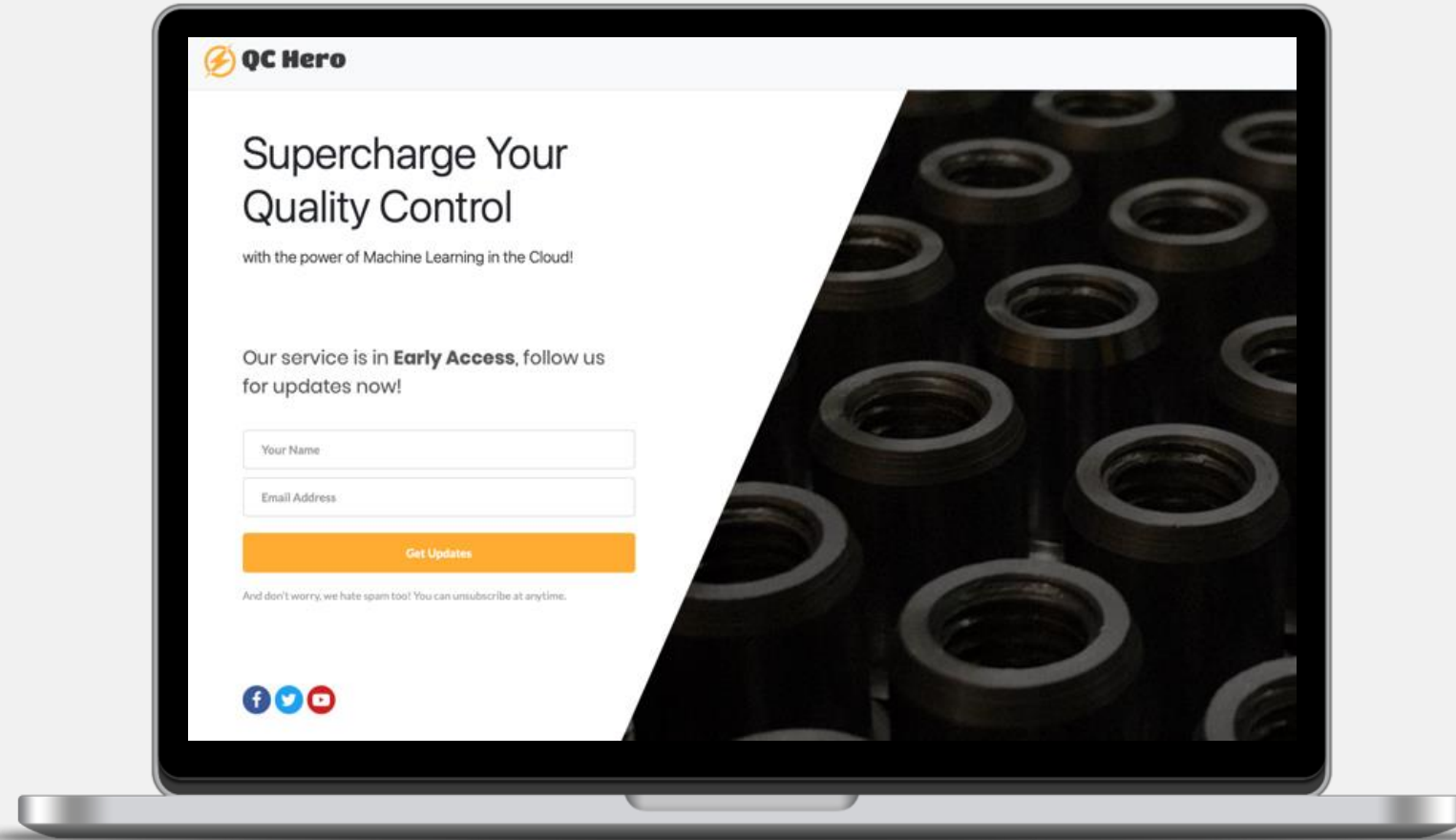
- Users create accounts via email or Gmail.
- Google IAM (Identity and Access Management) ensures secure role-based access.

Enterprise-Wide AI

- Models can be pushed to multiple PAQi units across different locations.
- Plant-specific AI customization while maintaining centralized oversight.

System Architecture

QC Hero is a cloud-native, modular AI training system optimized for high-speed model training, deployment, and real-time defect detection.



AI Framework

Built on TensorFlow, utilizing ResNet50 for defect detection.

Containerized Deployment

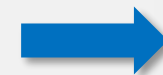
AI models are Docker-based, running on industrial PCs, cloud, or edge devices.

API Integration

Allows programmatic access for model training, deployment, and inference requests.

Training & Model Management

Uses Google Vertex AI for automated tuning, deployment, and optimization.



PAQi Integration

→ Trained AI models from QC Hero are deployed to PAQi units for inspections on-premise.

→ PAQi segments defect data for labeling and QC Hero continuous AI learning.

→ Models can be centrally updated and pushed to multiple PAQi units

AI MODEL TRAINING OPTIONS

QC Hero offers flexible deployment options to accommodate different manufacturing environments, ensuring that businesses can integrate AI-powered defect detection in a way that aligns with their operational and financial needs.

Feature	Pay-Per-Use	Subscription	White-Label
AI Model Training	✓	✓	✓
TPU-Accelerated Fast Training	✓	✓	✓
Cloud-Based Processing	✓	✓	✓
Enterprise Deployment to Multiple Units	X	✓	✓
Automated Versioning & Rollback	X	✓	✓
Multi-User Access with Google IAM	X	✓	✓
Unlimited AI Model Updates	X	✓	✓
Dedicated Cloud Resources	X	✓	✓
API Access for Integration	X	✓	✓
Custom Branding / Private Cloud	X	X	✓

Cybersecurity and Data Protection

Security is a **critical component** of QC Hero, ensuring that AI models and sensitive production data are **protected against cyber threats**.

Data Security & Encryption:

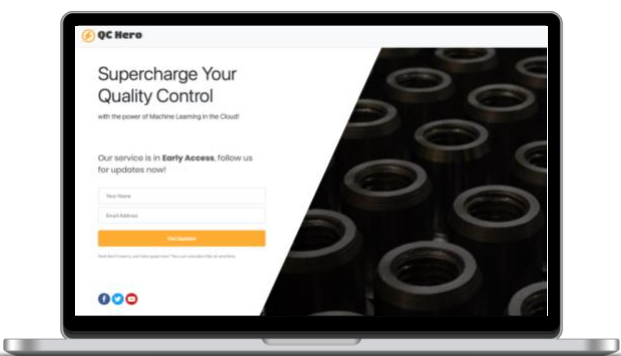
- **256-bit AES encryption** for stored data.
- **TLS encryption** for secure data transfers.

Role-Based Access Control (RBAC):

- Ensures **only authorized users** can train or modify AI models.

Compliance Standards:

- Meets **ISO 27001, GDPR, CCPA, and SOC 2 compliance** for enterprise security



Cost Effective and Scalable

QC Hero provides a highly cost-effective AI training solution by eliminating the need for expensive on-premise infrastructure. Using cloud-based TPU acceleration, it minimizes training times and compute costs while offering flexible pay-per-use, subscription, or white-label models.

QC Hero's cloud-native architecture allows scalable deployment across multiple plants with centralized management, ensuring manufacturers can expand AI inspection capabilities without added hardware investments.