

AI Transformation in Root Cause Intelligence for a Semiconductor Major

Business Problem



- Manual, engineer-dependent RCA on the Out of Control Action Plan (OCAP) delayed diagnosis and issue resolution
- Inconsistent root-cause conclusions across plants
- Limited scalability as volumes and process complexity increased
- Existing analytics lacked explainability, making them unsuitable for audits
- OCAP turnaround time became a direct constraint on yield, cycle time, and operational scalability

Solution



- Statistical techniques (correlation, regression, mass balance)
- Causal ML models for true root-cause inference
- Anomaly detection and genealogy-aware analysis
- Delivered explainable AI by design:
 - Ranked root causes with statistical evidence
 - Engineer-friendly charts, tables, and lineage views
 - Full traceability for quality audits and compliance
- Architected for cloud-scale performance, governance, and extensibility to future predictive quality use cases

Value Delivered



- ✓ **35—45% reduction in OCAP** RCA cycle time
- ✓ **~60%+ first-pass root-cause accuracy**, improving consistency across plants
- ✓ **Significant reduction** in dependency on senior process engineers
- ✓ **Standardized, auditable OCAP** decisioning across global manufacturing sites
- ✓ Established a **future-ready foundation** for scalable manufacturing AI and advanced analytics

 **34-45%**

Faster Root-Cause Analysis Through OCAP Standardization

 **~60%+**

First-Pass Root-Cause Accuracy, Reducing Expert Dependency

 **Future Ready**

Foundation for Scalable Manufacturing AI and Advanced Analytics