Using machine learning to improve manufacturing workflows

How Northeastern partnered with Diodes U.S. Manufacturing to solve complex operational challenges

Partner Snapshot

Diodes Incorporated delivers semiconductor solutions to the world's leading technology companies, enabling innovation, efficiency, and performance across high-growth markets.

South Portland, Maine is home to Diode Incorporated's flagship wafer fabrication facility in the United States, which specializes in semiconductor manufacturing.

The Challenge: Data-Driven Workflow Improvements

Diodes U.S. Manufacturing needed an early-warning system that would help reduce scrap, strengthen process controls, and help flag quality control issues as soon as possible.

The Solution: Machine Learning Applications and Training

- A machine learning discovery process that produced a data dictionary, data analysis, and data preparation guide that supported data cleanup and refined algorithm selection
- An unsupervised model serving as a fast, scalable anomaly screen
- Guidance to establish a repeatable foundation for future machine learning use cases

Project Scope & Execution

Data dictionary preparation, exploratory data analysis, machine learning discovery process, model development, asset delivery

Key Program Components:

Capacity building

- Expanded internal data engineering capacity
- Improved cross-team efficiency

Strategic value

- Reusable machine learning capabilities
- Faster path to AI use cases

Documentation

- Reduced duplication and knowledge loss
- Reusable data dictionary and preparation guides

The Result: Cost Savings and Increased Efficiency

Automated early warning system that reduces costs and wasted materials

Automated anomaly detection reduced manual effort from 4–5 hours to 3 minutes

Increased knowledge base to drive future machine learning use cases

An accelerated process to pinpoint data quality issues

About the AI Solutions Hub

The AI Solutions Hub collaborates with multidisciplinary faculty, industry-expert researchers, applied engineers, co-op students, and staff from the Roux Institute, the Institute for Experiential AI, and across Northeastern University to design and deliver production-ready AI solutions for industry partners.

Diodes Team Members:

Josh Madore:
General Manager
Joseph Marquis:
Equipment Maintenance Technician
Matthew Reynolds:
Process Engineer
Philip Sampson:
IT Manager
Donnell Weldon:
Full-stack Developer

"The Roux's structured approach **helped us strengthen our data foundation** and build confidence in applying machine learning to real manufacturing challenges."

Philip Sampson,
IT Manager, Diodes U.S. Manufacturing

Ready to Transform Your Business with AI?

Explore how a university partnership can empower your employees and accelerate your digital journey. Connect with our team today!