

# **PREDICTIVE MAINTENANCE FOR MACHINE FAILURES**

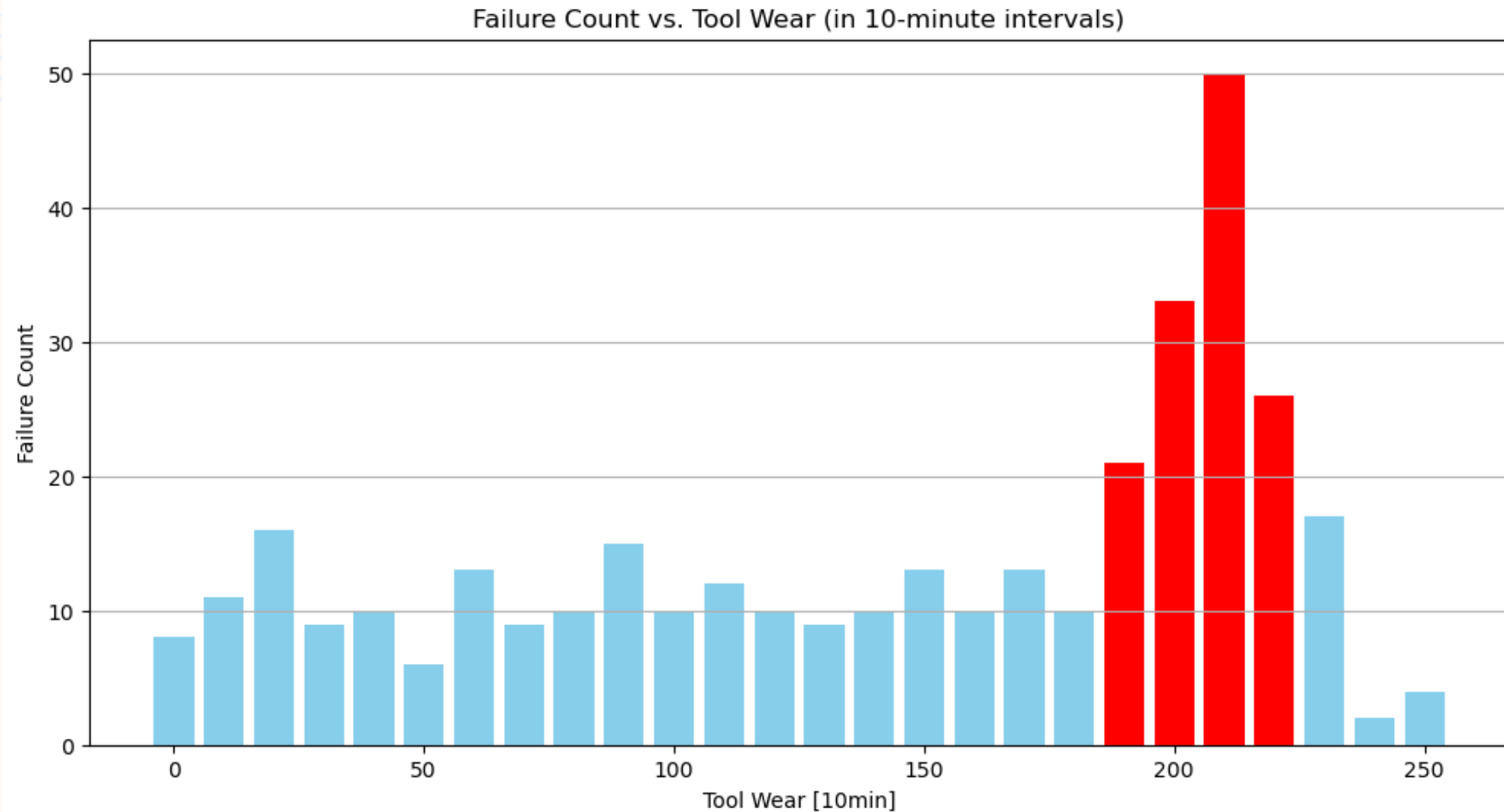
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Springboard

# The Problem

- High Machine Failure Rate: 3.57%
- Escalating Repair Costs
- Production Time Delays
- Excessive Machine Wear

# Failure Rate **Increasing** with Tool Wear



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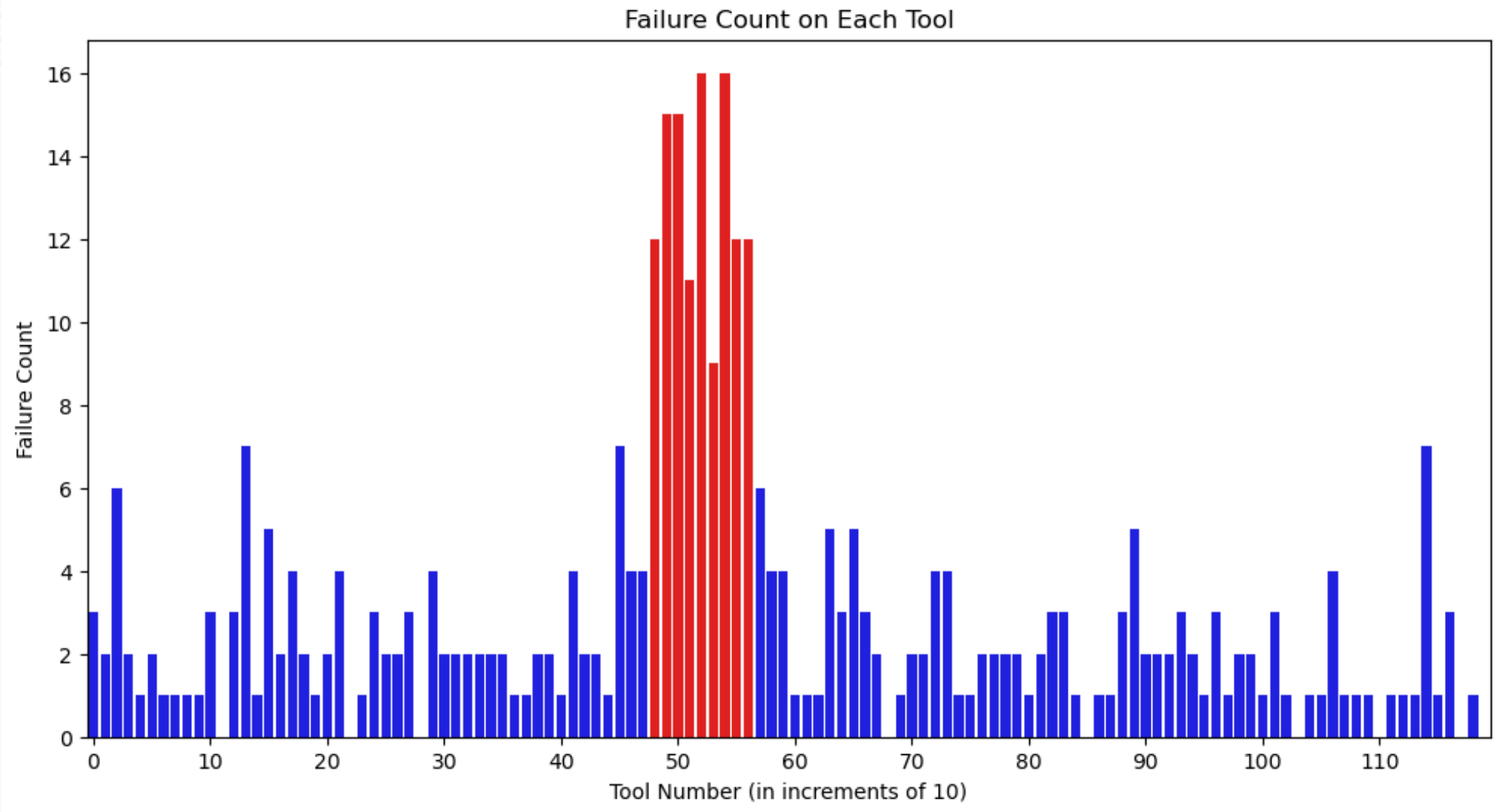
Fact:

- Tools are changed every **220** minutes of usage

Potential Solution:

- Change Tools more frequently (Every **180** minutes)
- Upgrade tools

# High Failure Rate in Continuous Tools



# High Failure Rate in Continuous Tools

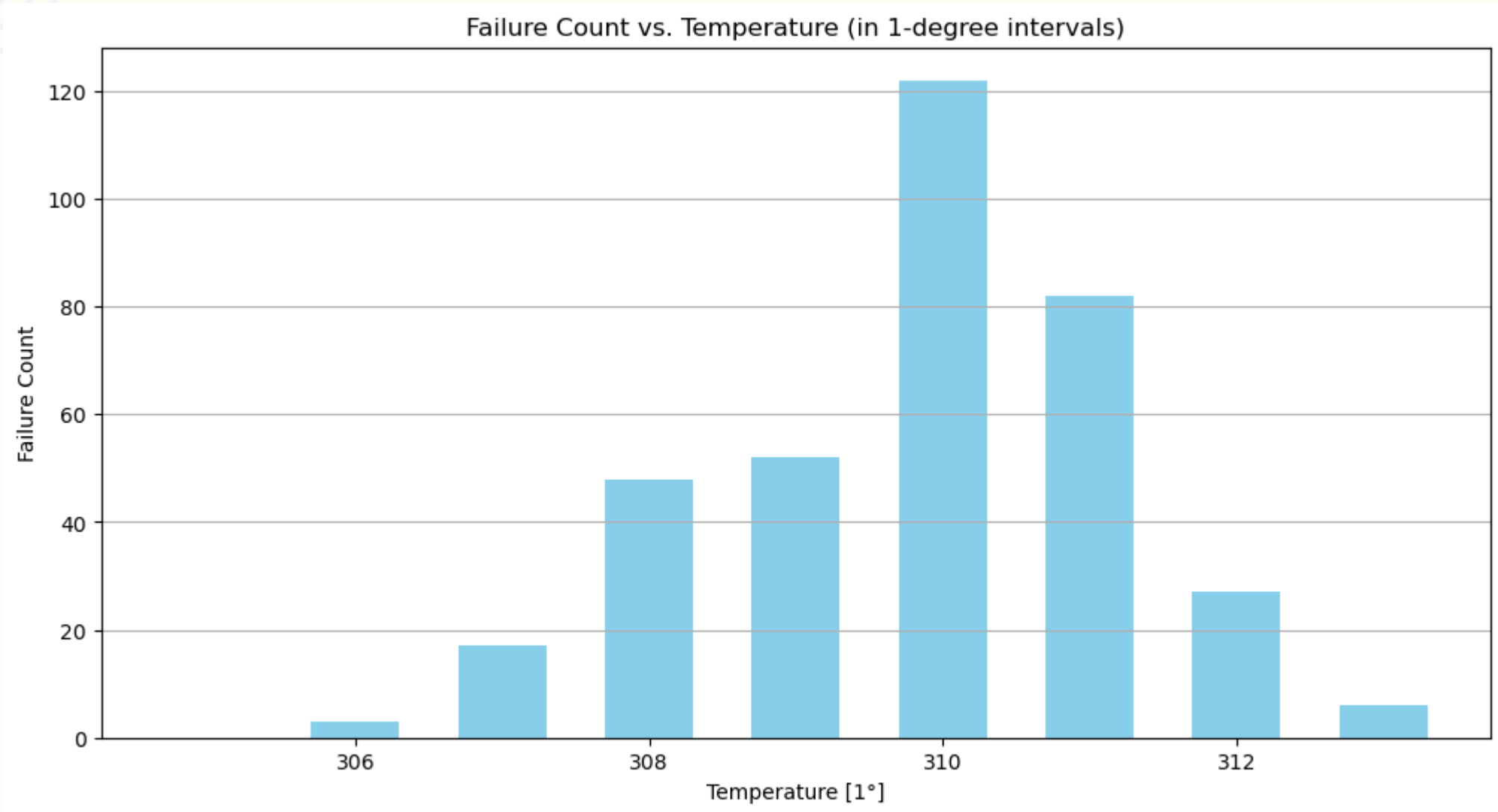
## Fact:

- Tool number 49 to 57 have Continuous abnormal performance

## Potential Solution:

- Check tool orders and report them to Tool Suppliers
- Troubleshoot with Operators who were working during tool number 49 to 57

# High Failure Rate with High Temperature



# High Failure Rate with High Temperature

Fact:

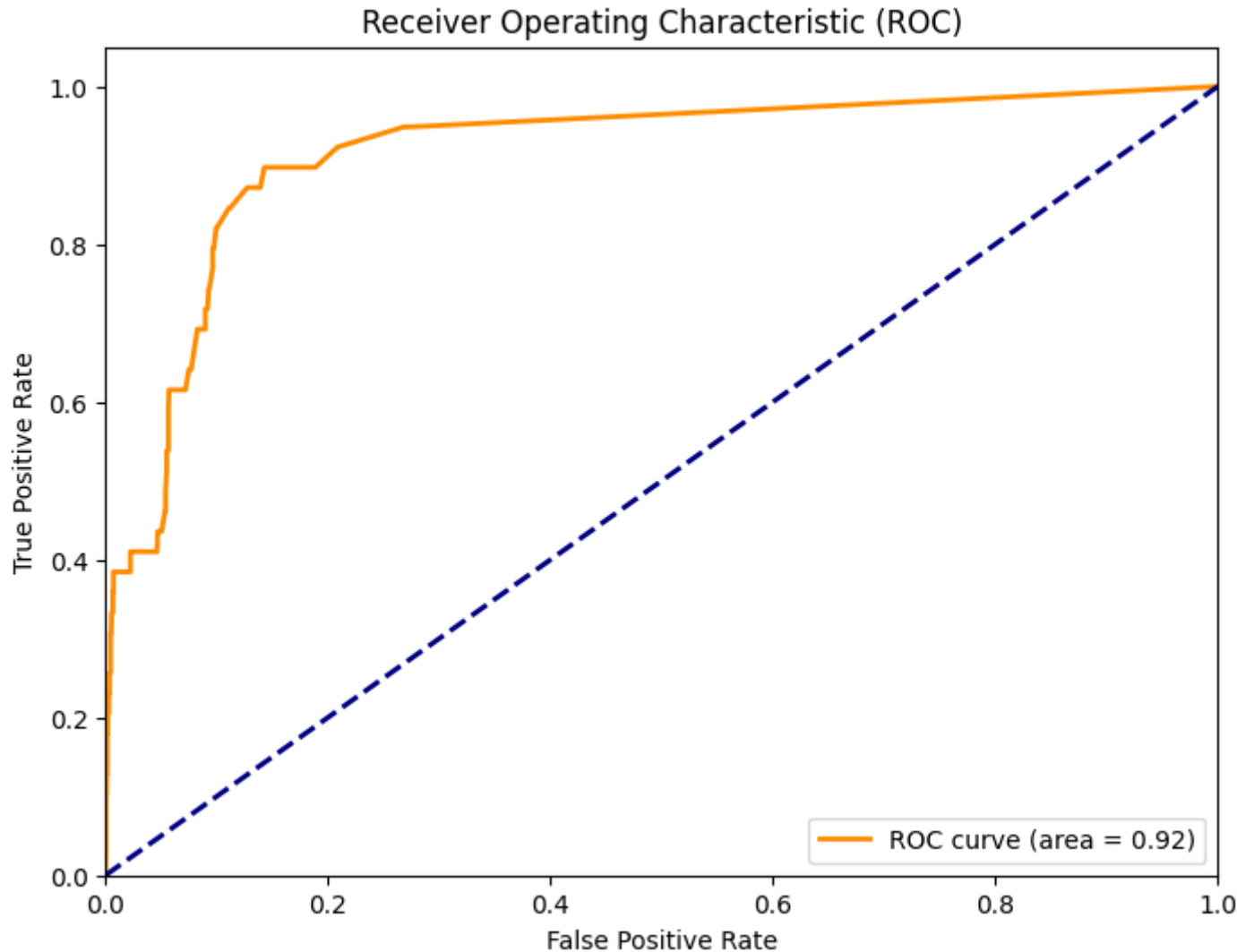
- Failure Rate Dramatically Increase after 310 K

Potential Solution:

- Set Working Temperature Alarm (Above 310K)
- Control Air Temperature (A/C, fan)



# Gradient Boosting Classifier



- Accuracy: 0.9815
- Precision (Class 1): 0.57
- Recall (Class 1): 0.21
- F1-score (Class 1): 0.30
- ROC AUC Score: 0.916

# Gradient Boosting Classifier

- Implement the model in maintenance process
- Continuously collect new data and retrain the model periodically

# The Actions

- Engineering Department:
  1. Change Tools more frequently (Every 180 minutes)
  2. Upgrade Tools
  3. Troubleshoot with Operators who was working during tools with High Failure Rate
  4. Set Working Temperature Alarm (Above 310K)
  5. Control Air Temperature (A/C, fan)

# The Actions

- Purchasing Department:
  1. Report tool orders with high failure rate to **Suppliers**
- Data Department:
  1. Implement the Gradient Boosting Classifier in maintenance process
  2. Continuously collect new data and retrain the model periodically



# **THANK YOU**

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