

PREDICTIVE MAINTENANCE FOR MACHINE FAILURES

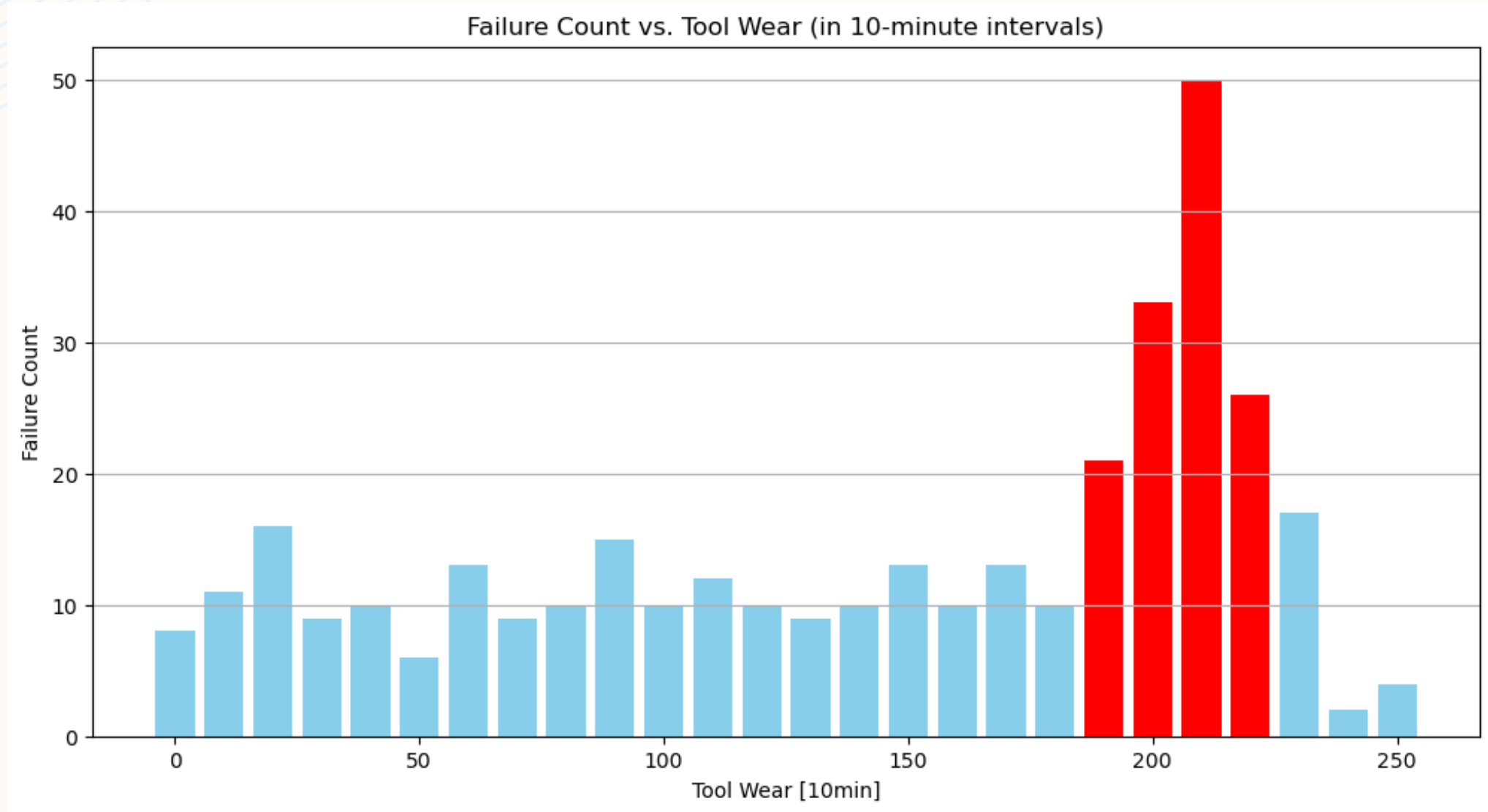
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Springboard

The Problem

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

Failure Rate **Increase** with Tool Wear



Failure Rate **Increase** with Tool Wear

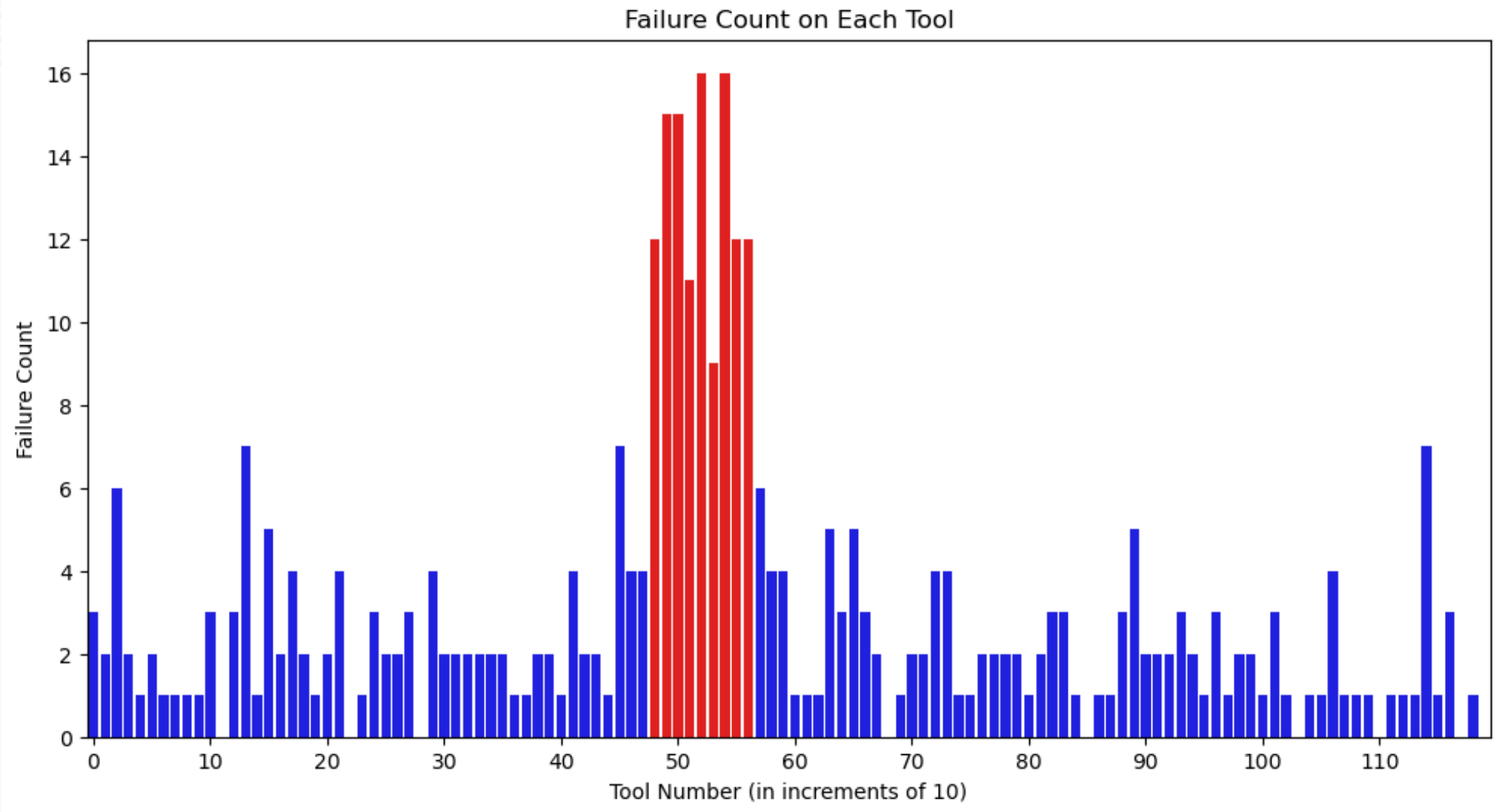
Fact:

- 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

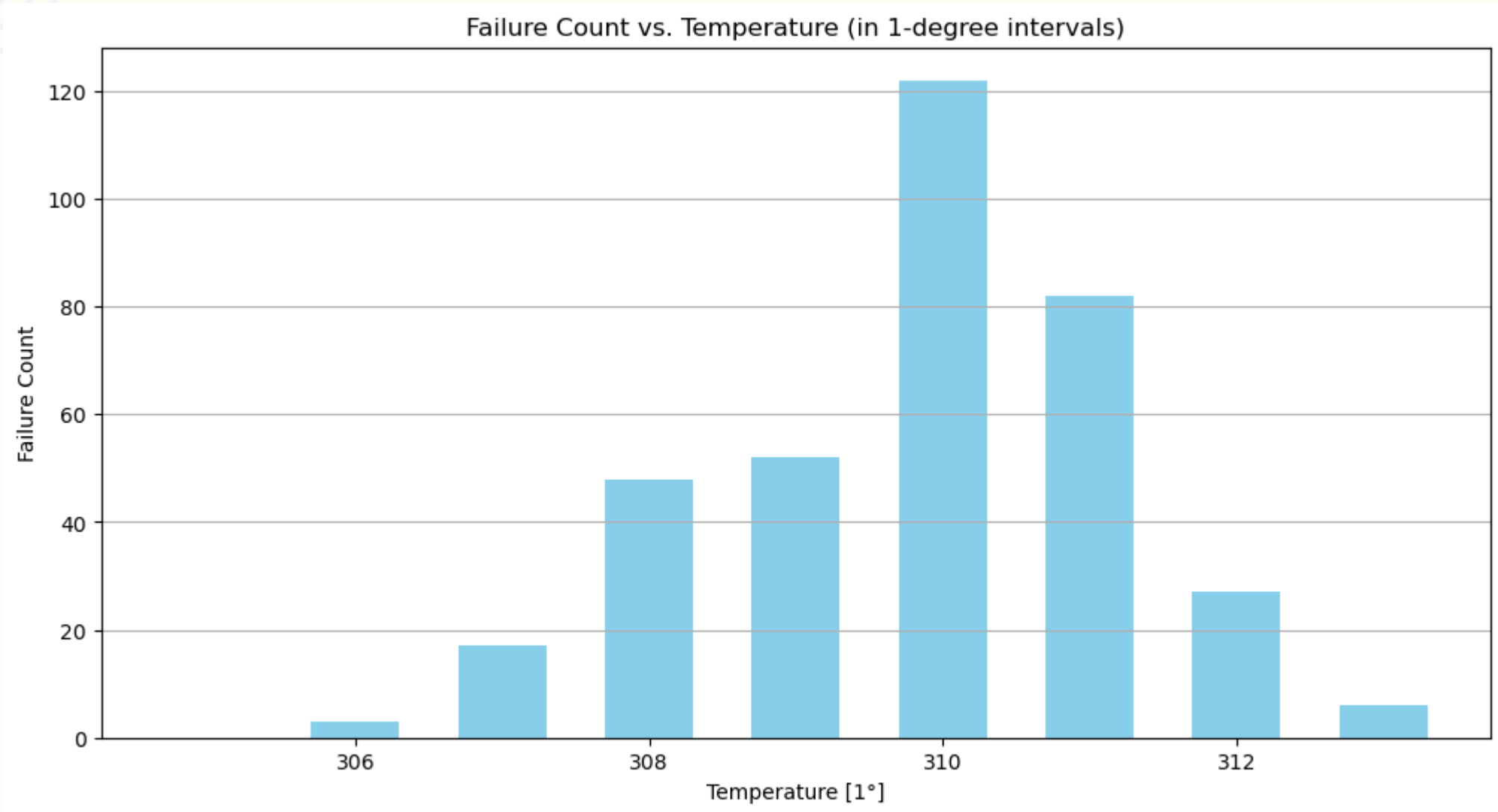
Fact:

- 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

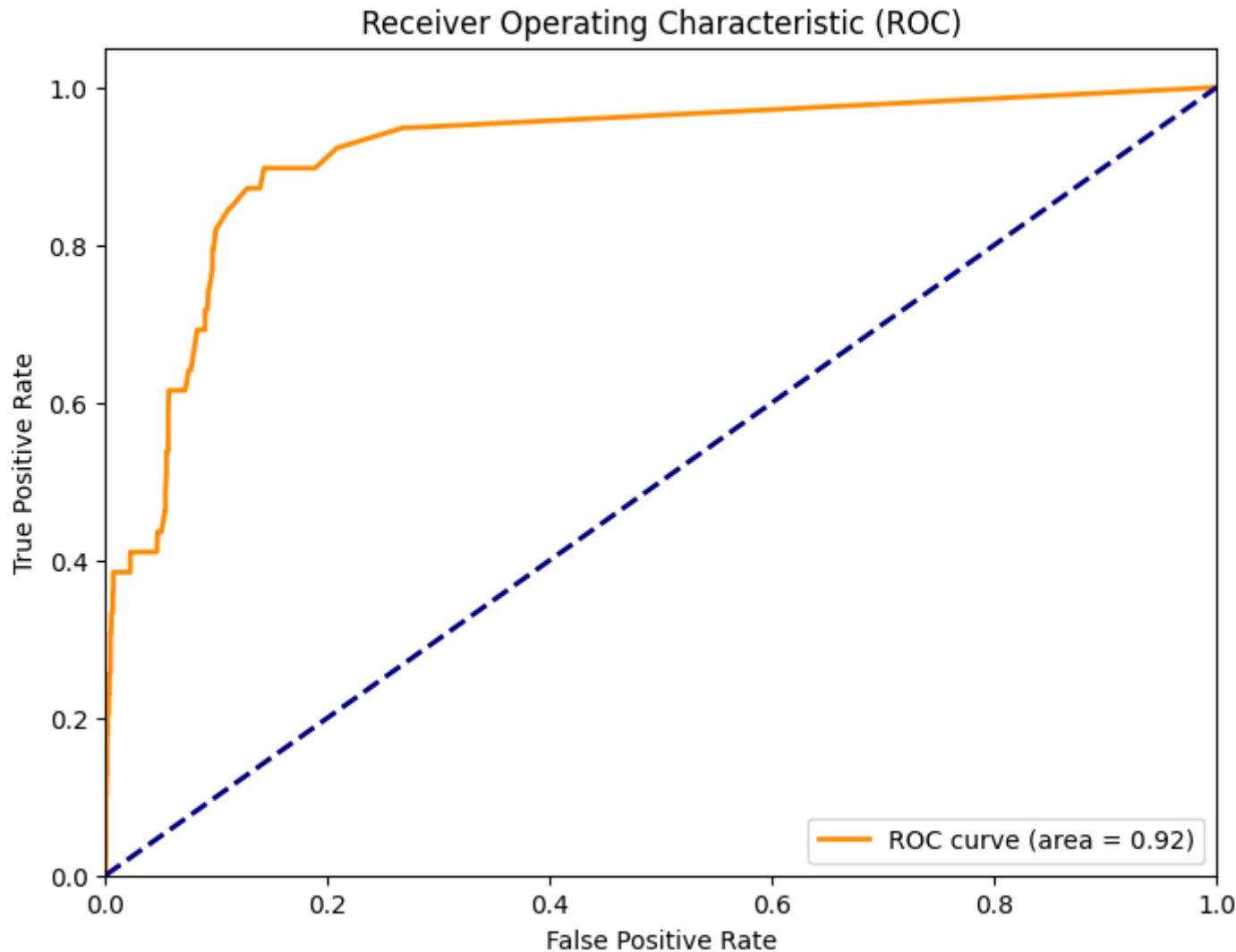
Fact:

- 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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