

CASE STUDY

Data Science & ML - CNC Machine data

Client Objective

To develop an AI & ML-based Intelligent Control System for predictive maintenance, anomaly detection, tool wear detection & predicting the remaining useful life of the tool for CNC machines.

SOLUTION

01 Data Ingestion

Using AWS IOT core, machine data is ingested into the cloud and the same is displayed on the dashboard in real-time.

02 Data Preprocessing & Analysis

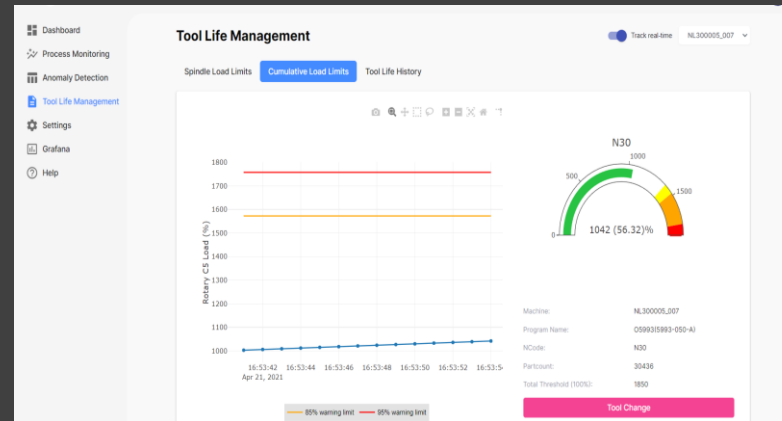
Raw data from machines were preprocessed & converted to time-series data. Anomaly & tool wear detection models were generated to predict the remaining useful life of the tools.

03 Executing ML Models

Data At the back end, we used Web API for exposing Machine Learning Models

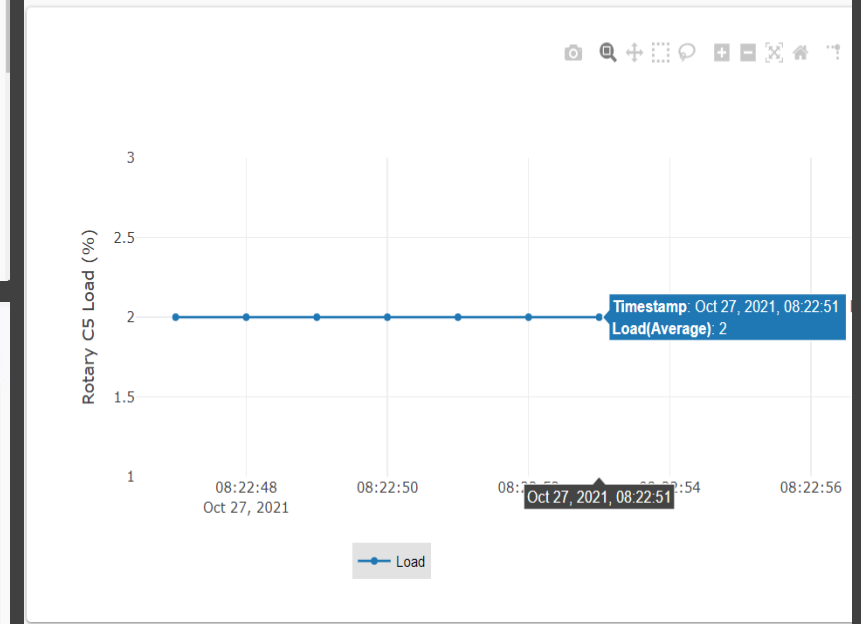
04 Interactive User Interface

Dashboard was implemented for Machine & Data Management, Action panel etc.



Tool Status	Machine	Machine / Current Tool Utilization(%)	Current / Most Recent Program Name	Current / Most Recent N Code	Current / Most Recent Partcount
Moderate utilization (25%-75%)	NL300005_007	N90- 41%	0599315993-050-AJ	N90	30435
Moderate utilization (25%-75%)	NL300005_007	N10- 25%	0599315993-050-AJ	N10	30435
Low utilization (0%-25%)	NL300005_007	N30- 18%	0599315993-050-AJ	N30	30439
Low utilization (0%-25%)	NL300005_007	N20- 7%	0599315993-050-AJ	N20	30439
Low utilization (0%-25%)	NL300005_007	N456- 13%	0599315993-050-AJ	N456	30435
Low utilization (0%-25%)	NL300005_007	N80- 14%	0599315993-050-AJ	N80	30438
Low utilization (0%-25%)	NL300005_007	N70- 21%	0599315993-050-AJ	N70	30438

Anomaly Detection



TECHNOLOGIES

- Angular 12
- Python
- AWS
- Timescale
- AWS QuickSight
- AWS SageMaker

VALUE TO THE CLIENT

- Continuous Monitoring and improvement of the production process
- Operator is pro-actively notified when an unexpected deviation in parameters is identified
- Detect tool degradation and predict the remaining tool life