



Predictive Maintenance & Repairs Using Artificial Intelligence Technologies

Predictive maintenance monitors performance and condition of equipment during normal operation to reduce a likelihood of failures. Our ultimate goal is an ability to predict when equipment failure could occur, and to perform maintenance prior to this, i.e. in a most cost-effective way.

Industry

Predictive maintenance solutions can be applied in a variety of industries, including Automotive, Railway, Oil and Gas, E-commerce, Finance and Healthcare.

Business Needs

Main business needs are reduction of downtime, cost savings and customer satisfaction.

Benefits

- Ability to monitor online failure predictor and plan all related actions in advance.
- Make very specific part replacement rather than a costly bulk screening of all potential causes.
- Timely detection of failures can help reduce amount of unplanned downtime repairs and relevant costs.
- Increase the customer satisfaction and retention.

The Challenge

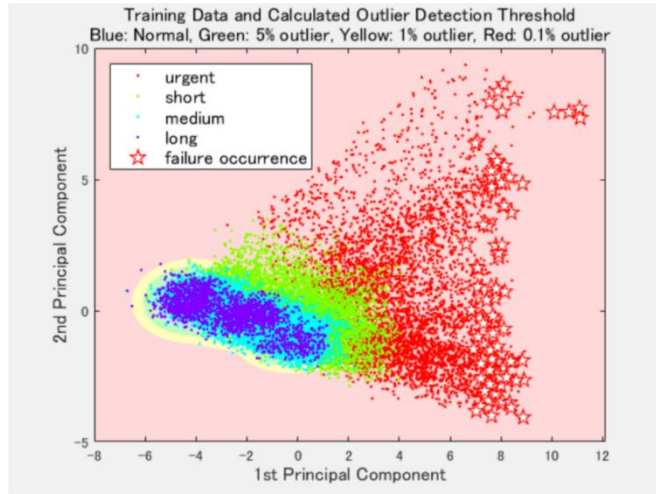
Time-based maintenance is labor intensive, ineffective in identifying problems that develop between scheduled inspections. Repair costs can be up to hundreds of thousands per day depending on industry. The fundamental idea is to transform the traditional “fail and fix” maintenance practice to a “predict and prevent” approach.

The Solution

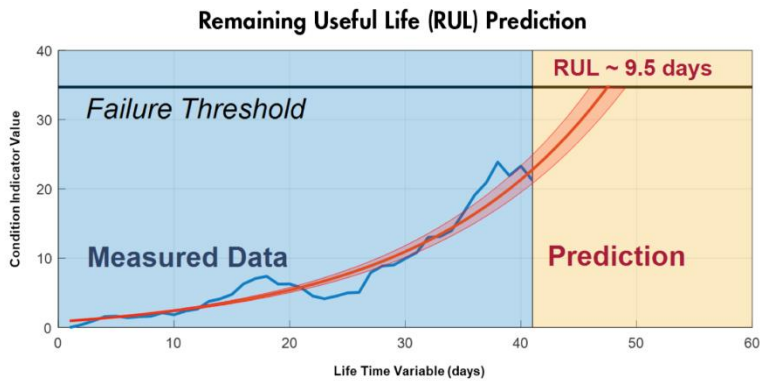
Some of the main components that are necessary for implementing predictive maintenance are data collection and preprocessing, learning from time series of historical data with known healthy periods of operation and also time points when certain failures occurred. Using this data one can train models that would be able to detect anomalies in data and predict probability of a failure. Main steps include:

- Discuss the available data, operational regimes and types of failures that should be addressed. Determine most influential variables related to failures.
- Develop AI based integrated solution to detect anomalies in data streams. Predict future failures.
- Run models using online data streams. Develop dashboard that would help track sensor behavior and failure status.

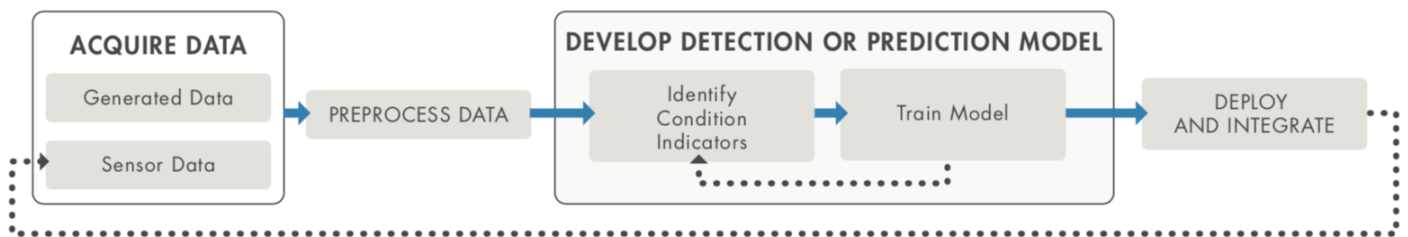
Using principal component analysis to visualize how equipment trends prior to failure.



Training predictive models that can estimate remaining useful life and provide confidence intervals associated with the prediction.



Basic workflow for predictive maintenance.



The Results

Xen.AI PdM - Predictive maintenance solutions can help to do:

- Online condition monitoring and anomaly detection in time series data.
- Classification of time series (e.g. normal and types of failures).
- Time to failure prediction.
- Survival analysis.

Applications

Predictive maintenance solutions can be applied in a variety of industries, including Automotive & Railway (e.g. monitoring of moving vehicles and trains that send telematics data), Oil and Gas (detection and prediction of equipment failures), E-commerce (detecting false clicks or orders), Finance (detecting fraudulent credit card activities), Healthcare (prediction of patient state in a hospital/ICU, detecting heart failures), and churn prediction / CLV for most industries.

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