BUSINESS CHALLENGE

Class I Railroads are the largest operating rail companies in North America in terms of revenue. Currently, there are seven Class I railroad companies in North America. Of the 140,000 miles of rail track there are over 6,000 Hot Box Detectors (HBDs). As part of a wayside detection equipment strategy, HBDs are used as a precautionary measure along the track as a means of measuring the wheel-bearing temperature for each train wheel that passes overhead.

Predikto’s customer provides HBD data, with 800+ devices, for all rail-based transportation of their 21,000+ miles of track in North America. When an HBD signals a hot bearing alert, the train is required to stop so that a conductor can manually validate the alarm. At times, an HBD will stop a train erroneously (aka “bad-stops”), which impacts a railroad’s average velocity, and decreases efficiency.

Despite Six Sigma levels and preventive maintenance best practices of uptime for HBDs, unnecessary stops result in significant costs to the railroad. For this particular customer, the costs resulting from HBD “bad stops” are $10M per year.

The customer routinely provides large volumes of data (train movement, HBD alarm data, maintenance records, etc.) to Predikto for the development of an automated predictive maintenance solution. The results help trigger predictive maintenance alerts for those HBDs at the highest risk for “bad-stops” so that these devices can be scheduled for repair or calibrated prior to failure.

Like many, this customer had invested heavily in data capturing devices, communication technology, and the IT infrastructure required to store and maintain HBD and Train related data, but never utilized
them for automated predictive maintenance. Their goal was to reduce train delays, improve reliability, and reduce maintenance costs, however, this cannot be done with data collection alone. In the end they wanted simple, yet actionable, information about the current and historical “health” of their HBD network predictions. This included if and when an HBD was likely to malfunction, as well as information of the impact on operations.

THE SOLUTION
Predikto was engaged to develop a solution to their HBD reliability problem. Our goal was to provide a prediction of which HBDs would fail within the next seven days and a dashboard to help manage their HBD reliability and health across their twelve divisions.

A ‘health score’ was created to combine different input factors including the number of alarms from an HBD, the number of trains stopped due to those alarms, predicted failures, and other metrics to concisely assess the health of an HBD.

The predictions leveraged historical data associated with each brand of HBDs and provided our client with a warning that the HBD may cause a bad train stop. A stop is said to be ‘bad’ when the ground team finds no problem with the train car or axle upon inspection after an HBD triggers a stop. Other railroads call this scenario an “Unknown Stop” or “Nil Found”. Conversely, when an HDB generates an alarm and the conductor or mechanics confirm an issue with the wheel bearings, then that stop is flagged as a good stop.

RESULTS
For this solution, Predikto has been able to automatically predict with very high precision whether an HBD will produce one or more “bad stops” with 7 days advance notice. The customer estimated that during the first month of deployment, Predikto was able to identify over $1.5M worth of “bad stops” before they occurred.

An interactive module (i.e., dashboard) was developed enabling the customer to quickly visualize the current and historical health their HBD network, predicted failures, and operational impact all via a single interface. Illustrated in the figures at the bottom you will find examples of a week’s predicted “bad stops” along with an illustration of the corresponding overall impact on operations.

BUSINESS CHALLENGES
The railroad company was spending significant resources with reliability problems on the Hot Box Detectors.

SOLUTION
Actionable and tailored prediction of Hot Box Detector failure over the next 7 days delivered via the “Cloud”

RESULTS
Identification of bad stops ($1.5M+ worth) before they occurred

Visualization of predicted failures using a simple web-based dashboard

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