# PREDICTIVE MAINTENANCE CASE STUDY

## Steel Mill Roughing Stands

### AI-Driven Predictive Maintenance

SORBA.ai is a horizontal machine learning platform designed to be deployed and scaled easily.

www.SORBA.ai

info@sorbotics.ai

# INTRODUCTION

In steel rolling mills, the rollers are housed in stands through which the steel billets pass to achieve a desired shape. Stable operating conditions for these stands are vital to achieving a good dimensional quality of the final product.

Typically, steel rolling is done in three phases:

- The roughing stage
- The intermediate stage
- The finishing stage.

This case study was done on a roughing stand within a line of 8 total stands in which the material was alternated between being rolled vertically and horizontally.

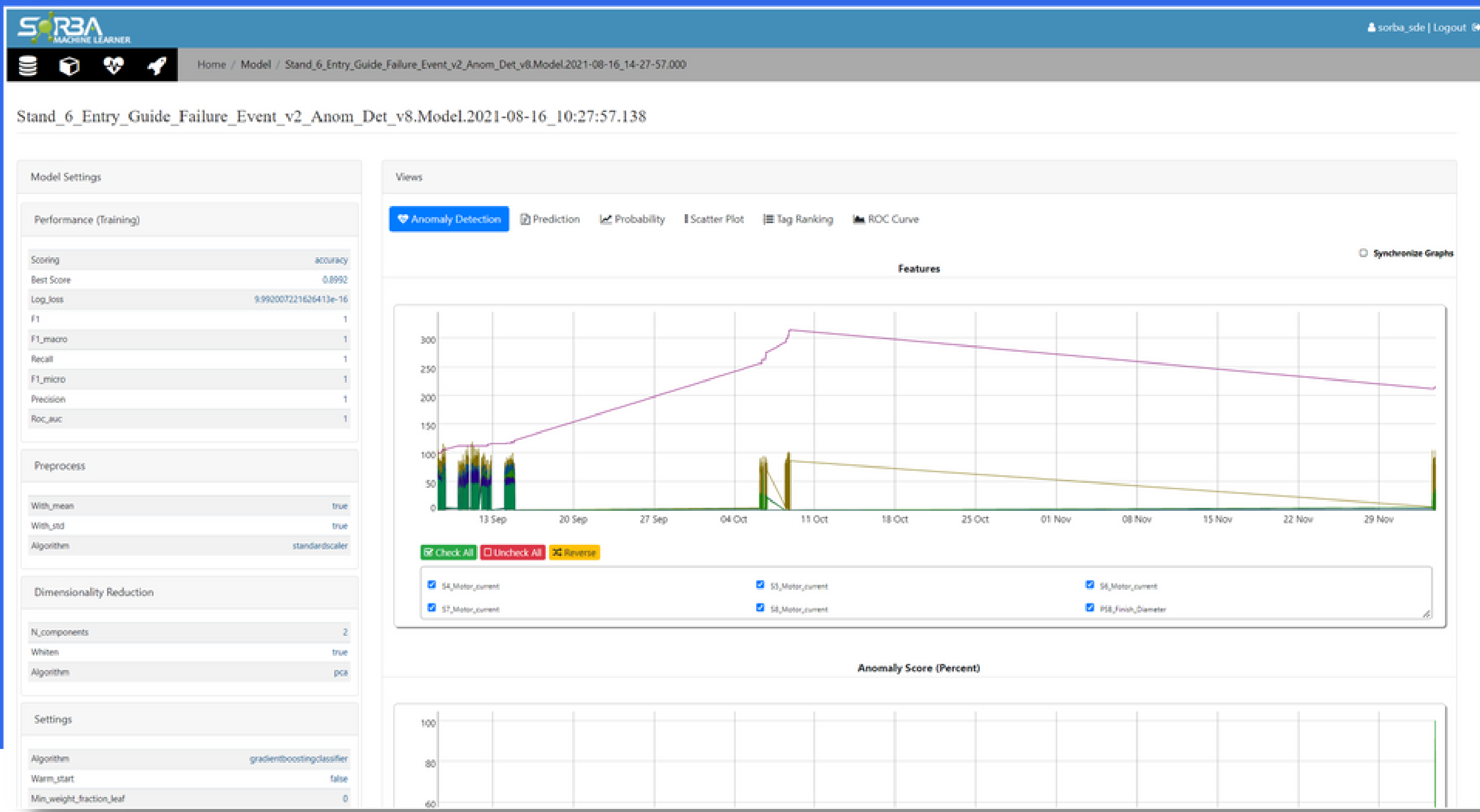
# SORBA.ai For Steel Mill

**SORBA.ai finds patterns in the data that cannot be identified by human intelligence alone.**

## WHY SORBA.ai for PdM?

SORBA.ai offers predictive maintenance capabilities by using machine learning models to detect anomalies in real time data and predict when failures will occur so that they can be mitigated or fixed prior to a failure occurring.

Predictive maintenance offers cost saving advantages over conducting maintenance on a set schedule by allowing for maintenance to only be conducted only when it is required. The use of machine learning methods to create these models offers even further advantages over other predictive methods; the incorporation of artificial intelligence allows the predictive maintenance model to change over time, reacting to changes to the machine that may occur over time and by finding patterns in the data that cannot be identified by human intelligence alone.




# Put an end to unplanned downtime in your steel mill.

For this application, sensor data was taken from the relevant stand as well as the stands before and after it in the line. The stand analyzed for the predictive maintenance application was the sixth in the process. Data was taken for the stand 4, 5, 6, and 7 motor currents as well as the finishing diameter for the product.

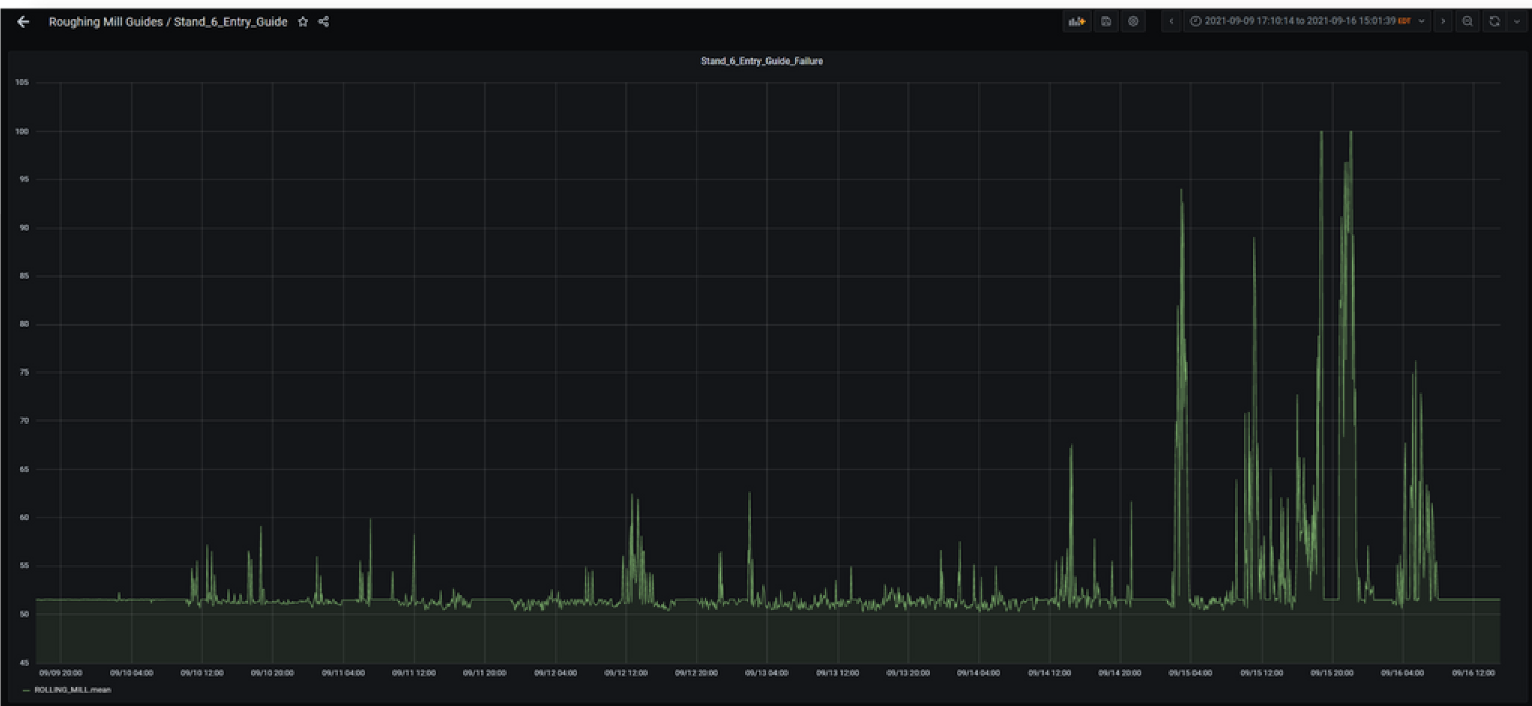
This data was used to create the classification model shown in the image above. A classification model works by creating a failure cluster and a non-failure cluster of data based on a past failure within the historical data. The model then analyzes real time data to look for similar patterns of data that existed in the time leading up to the historical data to give a lead time on the failure when it may happen again, giving a real time score for the current risk of failure. This model was trained from a failure with the entry guide for the stand.

# The Story

On September 15th, at approximately 9:00am, there was a failure on one of the roughing stands in which the entry guide for the stand came loose, leading to the material entering the rollers at an incorrect angle. The graph below shows the risk of failure score generated by the predictive maintenance model in the time leading up to the failure. Typically, scores above 80% on the risk of failure are used to identify when an issue may be occurring on the machine.

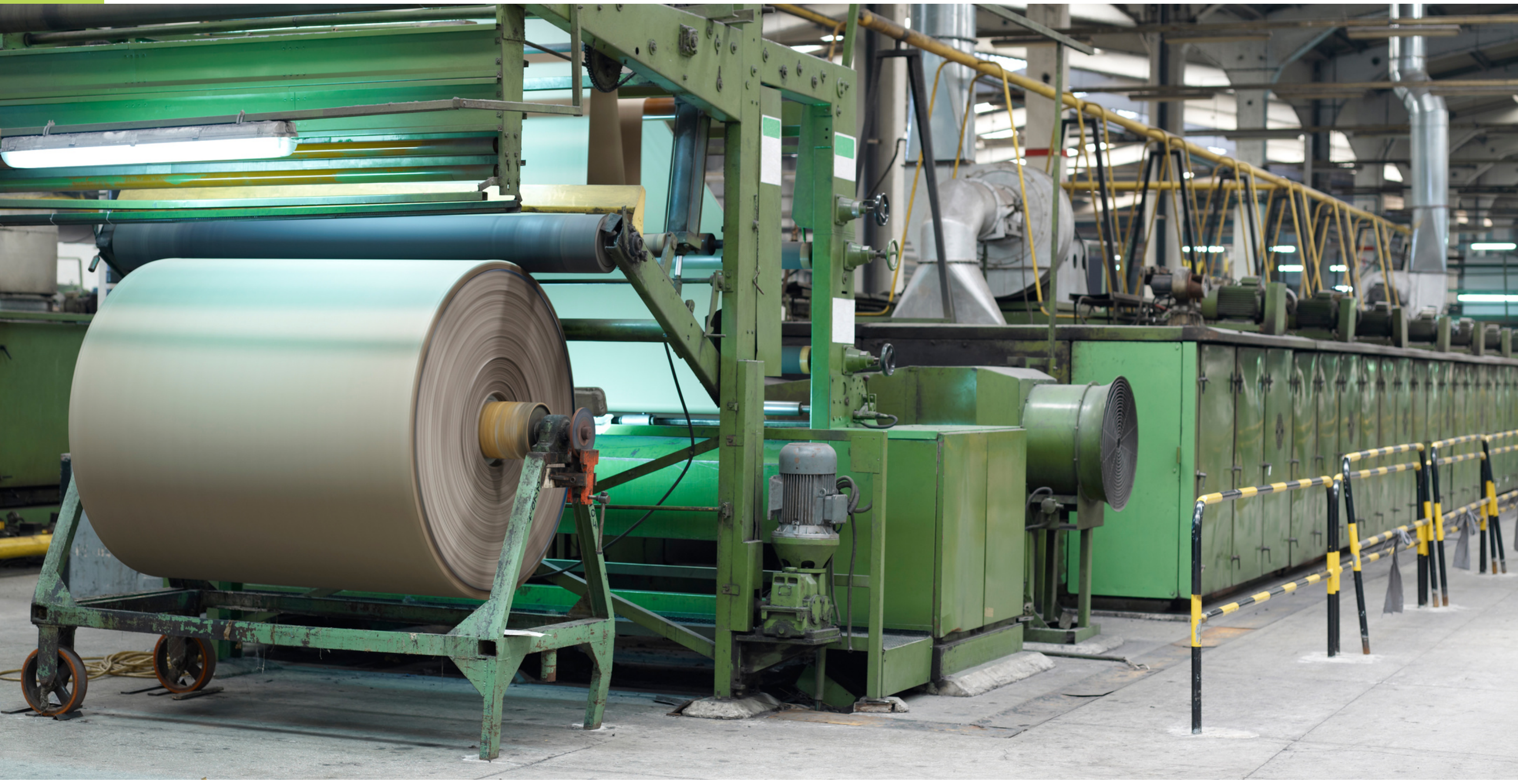
As we can see in the graph below, the model's risk of failure started to spike earlier in the day at approximately 4:00am, 5 hours prior to the failure event. The model continued to show spikes in the hours leading up to the failure, going to 100% risk of failure and staying elevated in the half hour leading up to the eventual failure.

The entry guide for the stand was then fixed, but the model continued to show an elevated risk of failure. It was found that the maintenance had not been conducted correctly, with the entry guide not being properly tightened, leading to a second failure several hours after the first which the model was also able to predict.



Prior to this failure, the model had been relatively quiet, always staying below 70% risk of failure and usually stabilizing around 50% for the two-month window between when it was deployed into a real time environment and when the failure occurred.

This shows that the predictive maintenance model generated by SORBA had a relatively low risk of identifying false positives, with the model only generating an elevated risk of failure when a failure was occurring. The model was also able to provide a decent lead time for the failure with the earliest anomaly spikes four hours prior to the failure. Work is currently underway to extend similar models to all the stands within the rolling mill.



SORBA.ai
SMART MACHINES. SIMPLE AI.

## Artificial Intelligence

# SCAN TO BOOK A DEMO

www.SORBA.ai

info@sorbotics.ai