Oil Refinery Assets Reliability
Furnace Flooding Predictions

DATAWISEN transform data into real results

The Situation

Maintaining stable combustion is critical to the safe operation of a furnace in an oil refinery. If the combustion process becomes unstable and this condition is not recognized and acted upon, furnace may flood and eventually an explosion may occur.
Flooding occurs 12 to 20 times per year in oil refinery furnaces. In each case, the furnace needs to shut down to avoid explosion. Cost in disrupt production is estimated at millions of dollars annually

The Need

A reliable on-line prediction of furnace flooding to enable timely operators' response.

A solution should predict likelihood of a furnace flooding 20 minutes prior to event. False alerts need to be minimized to ensure operators' trust in the model

The Solution

Using furnace sensors data and leveraging ML learning techniques, we developed a two stage solution:

- Stage 1 models "normal" furnace operations and detects anomalies.
- Stage 2 is a reinforced learning model which classifies anomalies as flood leading vs inefficiencies.

Both models self-adjust in response to changing operating conditions.

The Benefit

- ✓ 98% hit rate in identifying flood cases 20 minutes prior to event
- ✓ The model self trains for different furnaces leveraging historic data for that furnace, without loss of detection precision
- ✓ Decreasing the number of false alerts dramatically improves operational efficiency