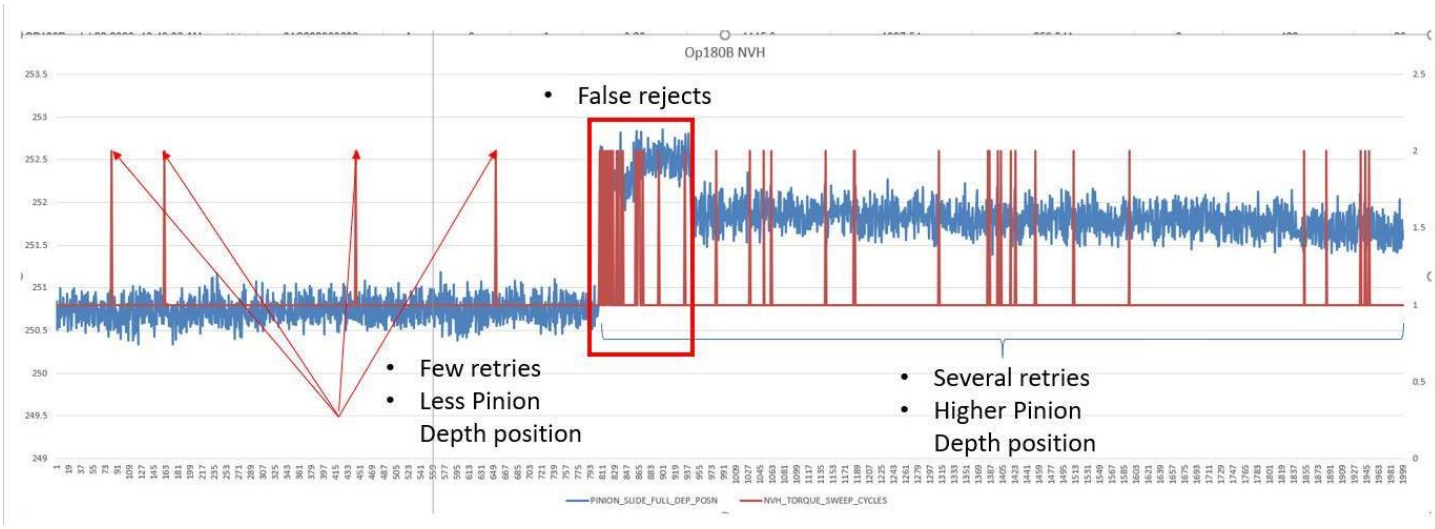
Early warning and predictive maintenance system

Data dictionary : A machine in plant processes parts and a dataset is generated from the machine. The columns are

1. SITENAME: Constant value
2. LINENAME : Constant Value
3. STATIONNAME : Constant Value
4. PARTNUMBER: Partnumber of the part being produced
5. STATUS: A or X (A – Accepted, X – Rejected)
6. TOPLEVELSERIALNUMBER: Unique serial number of the part being produced
7. PROD_TIMESTAMP: Time stamp of the data
8. COLLID: Collection id. This is a grouping of a single pass of a serial number on the machine.
9. CHARDESC: In one pass (collection id) the group of characteristics are getting captured. Char desc show the name of the characteristic
10. CHARVALUE: Value of the characteristic

The 4 characteristics being captured for the given machine are

1. NVH Torque Sweep Test Cycle Count : When this value is greater than 1 and status = 'A' then it means the part was rejected on first pass but got accepted as it was processed again. This event is called as false reject.
2. Pinion Slide To Full Depth Posn
3. LH Slide To Full Depth Posn
4. RH Slide To Full Depth Posn



Above is a graph of "Pinion Slide To Full Depth Posn" and highlighted in red are false rejects. Fewer false rejects are ok and happen everytime. But it has been observed that an increase in "Pinion Slide To Full Depth Posn" results in increase in number of false rejects. When false rejects increase then the maintenance needs to be done on the machine.

Objective:

1. We need to identify the shift in pattern programmatically and alert the user that there is some problem in machine.
2. We need to predict as much as possible in advance the possibility of pattern shift so that a maintenance can be planned and downtime can be avoided.