Component Failure Analysis in Engineering and Manufacturing

Everyday, we depend on many systems and machines. We use a car to travel , a lift goes up and down, and a plane to fly. Electricity comes through turbines and in a hospital machine keeps us alive. These systems can fail.
Some failures are just an inconvenience, while others could mean life or death.

Failure analysis is the process of analyzing the component data or the component itself to determine the reason(s) for degraded performance or catastrophic failure of a

component either, during component manufacturing and testing, during incoming inspection, or after delivery to the customer, at the final application.

Component failure in engineering equipment, manufactured products or plant infrastructure not only causes damage and affects operation, production and performance, but it can impact your company brand and reputation.

Collecting and analysing data is vital to deciding on remedial action and preventing future occurrence.

When stakes are high, we perform regular maintenance on our systems.

For example, cars are serviced once every few months and aircrafts are serviced daily.

#Brief Description dataset

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This dataset reflects real component failure prediction encountered in the automobile and other industries with measurements from real equipment. The features description: -

The six features are: -

Type: the quality of the product, consisting of a letter L, M, or H.
Meaning low, medium, and high, respectively.

Air temperature [K]: generated using a random walk process .

Process temperature [K]: generated using a random walk process .

Rotational speed [rpm]: calculated from power of 2860 W, overlaid with a normally distributed noise.

Torque [Nm]: torque values are normally distributed around 40 Nm

Tool wear: The quality variants H/M/L of tool wear
in the process.

The targets are:
Target: failure or no failure (to perform binary classification).
Failure Type: type of failure (to perform multiclass classification).