Case Study

SG Analytics
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# Cost reduction in wafer testing through machine learning application

## Client

Leading US-based semi-conductor manufacturer.

## Opportunity

The client's traditional way of testing a wafer(a thin slice of semiconductor, such as a crystalline silicon) was too time consuming and involved lot of voltage testing to understand if a wafer is worth a particular voltage or it fails consuming that much amount of voltage. Client engaged SG Analytics to craft a strategy to reduce the amount of testing done per wafer, saving the testing time worth money.

## Value Delivered

1. Provided insights on the group of dies (is a small block of semiconducting material on which a given functional circuit is fabricated) with similar properties and made from similar materials on how each one fails and passes the test.
2. Allowed business users to design scenarios and predict the effect of changes in failure testing strategy.
3. It was found that model can help in saving max to 75% of the time consumed in traditional testing.

## Solution

SG Analytics team had multiple conversations with the client teams to understand the intricacies of their business, and devised the following solution:

- Our data scientists developed a framework to mix traditional and unconventional techniques and suggested a better way of testing
- Our team developed a way to integrate and aggregating the historical wafer testing data which helped our team in building a statistical model to understand when does a wafer usually fail the test. Since its an electronic item it is very difficult to understand when can it fail given the properties of the material.
- For ease of primary analysis and modeling, the team defined the business rules to standardize the data and brought all data sources at the same level.
- SG Analytics built one model for each voltage testing as the wafers undergo different voltage testings. The model predicted a voltage level at which a wafer can fail not necessarily it could be the exact voltage. Thus after model predicts the voltage level, calculations were devised to understand as per the historical data, how much time the manufacturer would have saved if had used the model to predict failure voltage levels.
- So if the voltage predicted is correct then the wafer fails but the voltage should be the exact 1st voltage of failure. Thus we start testing the wafer with predicted voltage + some voltage defined by client as the constant and if the wafer fails at this voltage level, means predicted value is not correct hence we start testing from the voltage value the traditional method offers. If the wafer passes the voltage then we continue testing the wafer until we reach the failure voltage. This helps in the number of rounds of testing happens to find out the failure voltage level.

To know more about our Data Science Services
write to us on **dataanalaytics@sganalytics.com** or
contact us on **+1 315 503 4760**