CHAPTER 6

CONCLUSION

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Introduction

Manufacturing always face the difficulties in testing the product at various test insert on different testers, i.e. yield variation from tester to tester. We would like to analysis if there is any significant different in yield due to tester at each test insert. In addition, we also interested to know if any day to day variation as well. The statistical analysis methods used are of variance, non-parametric tests, Tukey’s test and etc. The result of finding was summarized in subsequent section.

Summary of Findings

We would like to determine whether there are any significant differences average yield by tester at TOS, TLO and THI test process. The analysis is from non-parametric Kruskal-Wallis test shown that the median scores our testers are equal at TOS test insert. As for TLO and THI test insert, we e that there is significance differences in the average yield performance the testers. In order to determine which of the means are significantly it from each other, Tukey’s T method was used and we found that that no significant difference between each pair of means at TLO test insert. er, there is significance difference between tester KLM53 and KLM58 at it insert, we conclude that KLM58’s yield performance is the best.

We wanted to determine whether there is evidence of a difference in yield nance by day at each test insert. Kruskal-Wallis test was used due to both ity and homogeneity-of-variance is seriously violated. From the analysis
we conclude that the yield were the same with respect to median yield ance.

We have examined the yield across the various test inserts and have d that TLO insert is the lowest yield, which results in most defects. We ed the analysis and investigated the major defect type from TLO test from Pareto chart, we observed that the most defects fell in bin 6.

Discussion

We found that there is day to day variation in yield performance. There gnificant yield differences at the THI test insert and KLM 58 was the best s determined by Tukey’s test. In examining yield across the test insert, we nat TLO insert is the lowest yield as compared to the other two test inserts. her investigated and discover that the highest reject bin was contributed by it would be useful to identify and select process variable in bin 6 which ate most to yield loss.

The engineer at company A analyzed the defects in bin 6. There are process variables that are categorized under bin six. In order to increase ciency of integrated circuit process surveillance and simplify the task, only cey process variables and disturbances that have a significant effect on s output were selected for monitoring. The selection of these process es was based on the results of sensitivity analysis (Sharifzadeh S et al,
among all the process variables and disturbances, one variable was each time to be shifted from its nominal value by $3\delta$, while keeping all variables at their nominal values. $\delta$ is the standard deviation of the and manufacturing variation. If the yield lost (reject quantity divided by 3) being observed showed a significant shift from its nominal values, or yond the predetermined control limits, then this unusual shift was 1 to the change of the process variables disturbance shifted. This process was then taken as one of the process variables that have significant on yield lost, and thus placed in the set of process variables to be ed. If yield loss showed a significant shift, on the other hand, the variable shifted was considered insignificant and no further monitoring necessary his procedure was used to identify one of the process variables, DRET, as ting to the greatest yield loss at TLO.
among all the process variables, the engineer found that DRET has caused significant shift from its nominal values. The outcome is given in Table 6.2 below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>DRET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>64.121</td>
</tr>
<tr>
<td>2</td>
<td>64.093</td>
</tr>
<tr>
<td>3</td>
<td>64.125</td>
</tr>
<tr>
<td>4</td>
<td>64.153</td>
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<tr>
<td>5</td>
<td>64.127</td>
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<tr>
<td>6</td>
<td>64.116</td>
</tr>
<tr>
<td>7</td>
<td>64.126</td>
</tr>
<tr>
<td>8</td>
<td>64.075</td>
</tr>
<tr>
<td>9</td>
<td>64.097</td>
</tr>
<tr>
<td>10</td>
<td>64.095</td>
</tr>
<tr>
<td>( \overline{x} )</td>
<td>64.1128</td>
</tr>
<tr>
<td>S</td>
<td>2.2622e-2</td>
</tr>
</tbody>
</table>
Using the equation as stated below:

\[ t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \]

\[ = \frac{64.1128 - 64.3706}{0.0226/\sqrt{10}} \]

\[ = -36.0387 \]

Decision rule: \(|t_0| > t_{0.005,9} = \]

\[ \alpha = 0.001, \text{ so the hypothesis } H_1: \mu \neq \mu_0 \text{ holds true with } 100(1-\alpha) = \]

confidence. These findings actually correlated with the daily highest yield data for lot's data that had been gathered regularly by engineer, which showed being the highest functional fallout or greatest yield lost at TLO.
Shortcoming or Limitation of Analysis

The primary factor that has not been addressed in this analysis is the
rs in the line. In industry, variability in the production line introduced by
rs is an important concern. This study only covered one aspect of operator
c. day to day variation but not shift to shift variation.

A manufacturing line undergoes a lot of changes during its lifetime.
ent are removed or added as old products are phased out or new products
roduced. This might increase machine-to-machine variations.

There are unequal sample sizes in different groups exist in the data set.
il variances from group to group can have serious effects on drawing
ces made from the analysis of variance. Furthermore, power computations
duce, as it is depends on the magnitude of the true differences and the
: size too (Marija J. Norusis, 1994).

We were not able to quantify and rank which process variable or defect
as the most or the second most and etc. significant contributor to yield loss.
ition, the main reject test was not able to analyze in depth too.
Prospects for Further Work

It is recommended that further investigations be made in the following:

Firstly, one can perform analysis-of-variance to determine if there is any yield different by shift, which the variation in yield might introduced.

Secondly, to present multiple regression analysis, it is used to quantify the defect units on yield at different test insert. Multiple regression is used to a dependent variable by several independent variables, where it is that the dependent variable is normal distributed. The coefficient of migration ($R^2$) expresses the proportion of the total variation in the values of dependent variable that can be accounted for or explained by the linear iship with the values of the independent variables.

Thirdly, to present a generalized linear model (GLM). It is a process e correlated with the reject rate of an electrical test. GLM is an extension of regression in which two main factors – linearity and the normality of the lent variable are not assumed (Bergeret, F, 1999). The principle, however, is the same, i.e. to calculate a test statistic to determine whether the ndent variables have a significant effect on the dependent variable. A rd multiple regression was also performed, i.e. a stepwise selection was o determine the main significant test rejects.