Statistics

Engineering

Introduction Statistics is a useful tool in process evaluation more especially in instances where data samples are necessary in analysis. In this report, data samples for plastic knob sizes are gathered for analysis. The acceptable range for knob sizes is given as,

0. 137" ≤ acceptable ≤ 0. 143"

Materials and Methods

Although raw data is presented in the study, the data was grouped using 0. 002 range and their respective frequencies identified. The resulting grouped data was then subjected to statistical analysis. Manual calculations (using excel) based on formulas was done while excel analysis tool was also used to generate descriptive statistics for the raw data. The result was then compared against each other. Additionally, a further randomly generated data based on the mean and SD for the previous data was generated and its descriptive statistics generated and compared against the previous data.

Results

Histogram

The histogram shows that although the data displays a near-normal distribution, it is slightly skewed to the right.

All measurements fall within the range of 0. 134 and 0. 149 and hence a measurement of 0. 114 would be caused by a serious external flaw rather than internal causes.

The sample mean is calculated using the formula, while the sample variance and standard deviation are calculated using the formulas,

On the other and the standard error is calculated as,

Based on the Z score tables, for 90%, z = 1. 645 and the margin of error is given as,

Margin of error is E = z * SE

The results are shown below,

Sample Mean

0. 142

sample variance

0. 0000048

standard deviation

0. 00219089

std. error

0. 000326599

margin of error

0. 000537255

lower limit

0. 1415

upper limit

0. 143

The excel results are also generated and both tabulated as shown below,

Excel Output

Calculations

Random numbers

Mean

0. 141622222

142

0. 141613419

Sample Variance

0. 000014286

0. 0000048

0. 000016902

Sample Standard Deviation

0. 003779664

0. 00219089

0. 004111138

Standard Error

0. 000563439

0. 000326599

0. 000612852

Population Mean with 90% Confidence Interval

0. 000946707

0. 00107

0. 001029733

Discussion

Marginal differences are recorded amongst the descriptive statistics generated for the 3 sets of data. Nonetheless, the results for the excel analysis output are much closer to the results for then generated random numbers; a result of which can be attributed to the fact that the mean and standard deviation used in generation of the random numbers were from the excel analysis results. Nonetheless, the differences can be attributed to seed element included in the generated random numbers. The calculation results are based on the grouped data whereby various assumptions are made. These assumptions potentially produce some marginal areas resulting into the differences.

Conclusions

The study reveals marginal differences in the approach used in calculation of statistics variables.

APPENDIces- Figures and Tables