



**CQE Training & Consultancy Plt** (Reg No. : LLP 0003668 LGN)

Registered Office : No. 46, Lorong Bintang, Taman Tasik Permai, 34000 Taiping, Perak. Malaysia.

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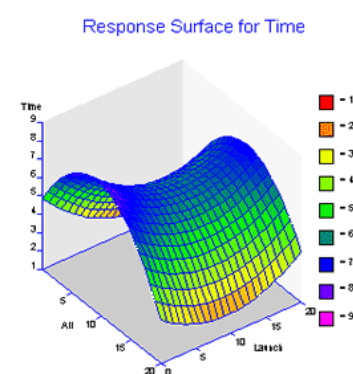
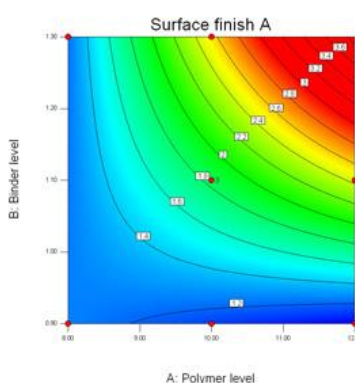
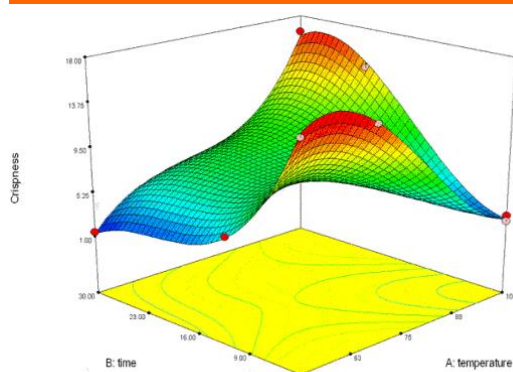
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# MINITAB Statistical Analysis

## Application Training

(IN HOUSE / PUBLIC TRAINING PROGRAMME)

SBL  
Scheme



## Introduction

There is an increasing awareness that problem solving skill among employees is an important and essential critical skill for organization success and to remain viable in today's very competitive business environment. Employee empowerment and involvement has made a breakthrough in employees' thinking to take responsibility for the processes that are under their control. However employees' today are plagued with increasing demands for attaining higher performance goals and sustaining performance that demands employees ability to solve problems and apply discretion where they do not normally do so until very recently.

The quality revolution has brought about increasing customers' demands and higher expectation to lower cost of production to maintain profitability. These twins conflicting objectives mean that the workforce including management personnel must constantly collaborate and deploy intelligence throughout the organization. This is necessitated by the need to co-opt the whole workforce in this collaborate process to deal with problematic issues that are being faced by all organizations with incessant rapidity. The workforces' improved capability to solve problem especially with **Fact and Data Driven Approach** become a necessary requirements in any continuous improvement journey embarked by any organizations. Basic Manufacturing Statistics (BMS) become an important knowledge and skills that every employee must master in order to have a proper and meaningful analysis to extract useful information to assist in decision making and problem solving processes. One of the key and important statistical analysis software that can assist the employees in getting their job more easier is Minitab. This course will concentrate on how to use Minitab **to perform analyses and how to interpret and present the output. Selecting an appropriate analysis will inevitably arise during discussions.**



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## Learning Outcomes/Objectives

Also available as  
in-house programme.

After attending the course, participants should be able to :-

- To refresh and regain the basic concepts of statistics;
- Experienced using computer Analytical Software “Minitab” to analyse experimental and survey data using a range of suitable standard statistical techniques.
- To gain sufficient confidence and greater understanding of Minitab when conducting statistical trials, experiment and strengthen in the analytical skills in the real workplace environments.
- To improve participants ability to communicate the results of statistical analyses.

## Program Contents

### Day 1

#### Session #1 - Introduction

- ⇒ Minitab's windows
- ⇒ Understanding of “pull-down” menu : File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Windows and Help and its related sub-menu.
- ⇒ Start a new project, opening a worksheet
- ⇒ Entering and importing data and data structure
- ⇒ Transforming, recoding and restructuring data
- ⇒ Data Saving and data recording options

#### Session #2 - Descriptive Statistics

- ⇒ Summarising data
- ⇒ Graphical displays
- ⇒ Compute descriptive statistics

#### Session #3 - 7 Quality Tools

- ⇒ Checksheets
- ⇒ Pareto Charts
- ⇒ Fishbone Diagram
- ⇒ Histogram
- ⇒ Scatter Diagram



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⇒ Graph and Charting

⇒ Flow Charts

### Day 2

#### Session #4 - Statistical Inference (Refrehser)

⇒ Attributes of Statistical Inference.

⇒ Hypothesis Testing.

1. Hypothesis Statements & Test Statistics.
2. Types of Errors and Experimental Risks.
3. One Tail Test versus Two Tails Test.

⇒ Normal z Test

⇒ Student's t Test.

⇒ F Test.

⇒ Summary of Inference Tests.

⇒ Exercises

⇒ Software application (i.e. Minitab or MS Excel)

#### Session #5 - SPC Control Charts

⇒ Basic concepts on SPC control charts

⇒ Type - Variable and Attribute control charts

⇒ Variable control charts – Xbar-R, Xbar-S, I-MR, Pre-control charts

⇒ Attribute control charts – p, np, c and u charts

⇒ Examine stability and repeatability with R and S chart

⇒ Examine centering with Xbar chart

⇒ Testing for Special Causes of out-of-control situations

⇒ Performing Process Capability analysis

⇒ Process Capability Indexes – CR, Cp, Cpk, Cpm, Pp, Ppk



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### Day 3

#### Session #6 - Analysis of Variance (ANOVA)

- ⇒ One Way ANOVA
- ⇒ One Way ANOVA (unstacked)
- ⇒ Two Way ANOVA
- ⇒ Analysis of Means
- ⇒ General Linear Models
- ⇒ Main Effects Plot
- ⇒ Interaction Plots

#### Session #7 - Fractional Factorial Design Experiment (Quick Summary)

- ⇒ The General Factorial Design.
- ⇒ Full Factorial Design.
- ⇒ Design with 2 Factors and 2 Levels ( $2^2$  Design Experiment).
- ⇒ Related Examples.
- ⇒ Design Matrix and Table of Contrast.
- ⇒ Effects Calculation, Effect Graphical Plotting and Interpretation.
- ⇒ Main Effects and Interaction Effects : Analysis and Interpretation.
- ⇒ ANOVA Table Construction and Analysis.
- ⇒ Design with 3 Factors and 2 Levels ( $2^3$  Design Experiment).
- ⇒ Examples and Exercises
- ⇒ Fractional Factorial Design.
- ⇒ Confounding Effects



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## Who Should Attend

**M**anagers, Engineers, Executives, Quality Practitioners and any member of an organisation who is from Research and Development, Quality and Production will find this course relevant and beneficial to their job function.

## Methodology

**T**he program would be conducted by using the following materials / aids :-

- ⇒ Course Notes
- ⇒ OHP and LCD
- ⇒ Case Study
- ⇒ Group Activities ( Computer Simulation )
- ⇒ Lecturettes

## Duration

3 Days

## Facilities Needed

LCD Projector, OHP Projector, Whiteboard, Flip Chart, Normal scientific calculator and 3~4 computers loaded with Minitab Software.

