# Advanced Black Belt Tools 3 days

This course is the final statistical tools module of Black Belt training and is based on Minitab software.

The course builds on the statistical toolset covered in the previous modules and adds advanced techniques which will enable you to discover and understand the factors and factor-interactions which drive process performance in almost any business environment.

Topics include:
- Design of Experiments
- General Linear Model
- Logistic Regression
- Non-parametric hypothesis tests
- Seasonal data
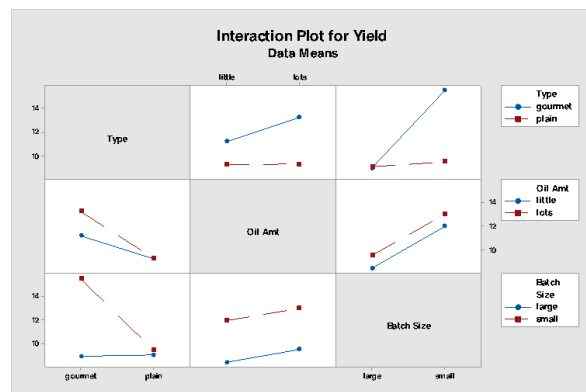
Who is the course for?
- Anyone who needs to learn the application of advanced tools to data analysis. Engineers, business analysts, quality professionals, scientists, business consultants
- Green Belts who have completed intermediate level statistical training and are now working towards Black Belt
- This course is one of the five modules required to complete Black Belt training

Pre-requisites
- You will need to have a high level of competence with Minitab and statistical tools equivalent to attending
  - **Process Measurement using Minitab** and **Data Analysis using Minitab**
  or
  - **Data Driven Insight and Decisions and Further Process Measurement and Analysis Techniques**
- You do not need to have completed Yellow or Green Belt prior to attending this course
- You will need previous knowledge of Hypothesis Testing and Regression

Learning Outcomes
- You will be able to use advanced statistical tools to analyse challenging business problems (Black Belt level)
- Many of the tools taught on previous stats modules will be reviewed so your confidence in these will be enhanced
- You will be able to support others in the use of statistical tools

Follow-on Options

- Lean Six Sigma Black Belt Certification
- Lean Six Sigma for Innovation and Design (Design for Lean Six Sigma)
- Master Black Belt

Advanced Black Belt Tools - Course Content

- Advanced ANOVA
  - o General Linear Model - ANOVA with 2 or more factors
  - o Main Effects and Interactions, co-variates
  - o Model building and validation
- Further t-test topics
  - o Transforming data for robustness
  - o 1 sided tests and 1 sample tests
- Non-Parametric Hypothesis Tests
- Advanced Regression
  - o Regression model with continuous and discrete Xs
  - o Transforming data to improve the model
  - o Introduction to stepwise and best subsets regression
- Logistic Regression
  - o Single and Multiple Binary Logistic Regression
  - o Ordinal Logistic Regression
- Design of Experiments
  - o Full Factorial and Fractional Factorial Experiments
  - o Planning and Designing the experiment - blocking, randomising and replication, practical considerations
  - o Analysing the Experiment – plots, residuals analysis, reducing the model
  - o Using the final model – response optimiser, predictions
- Time-Weighted Control Charts
- Time Series and Seasonality