**For assignment 5, I would recommend adopting the more straightforward analysis approach outlined in the worked example above. You may wish to analyse response means, standard deviations, ranges or other relevant values that achieve your experimental objectives, and this can be done via contrasting average values for the relevant statistic.**

I advise the following approach:

Step 1 Choose your factors and levels, and write out your resulting design matrix

Step 2 Randomise the order of your experimental runs using an appropriate method, such as a calculator random number generator, tables of random numbers or numbers from a hat!

Step 3 Perform the experiment according to your randomised run order, and collect / record your data. Replicate the experiment if necessary, economical or appropriate.

Step 4 Plot a run chart (not a control chart – no need to include limits since data will hopefully vary significantly) to show the data in the order of collection. Look for obvious non-random behaviour, evidence of special causes or nuisance variables.

Step 5 Analyse the experiment by comparing the mean scores for each factor level and interaction as in the worked example above.

Step 6 Plot the responses on appropriate graphs, as in the example above.

Step 7 State your conclusions, in terms of the optimal combination of factor levels that will achieve you experimental objective.

Concluding comments on DOE There are strengths and weaknesses inherent in all the approaches of DOE. There are trade-offs with statistical rigor, ease of application, ease of interpretation and the quality of information obtained through the experiment. Your choice of method should be based on a careful study of the process, a thorough understanding of its peculiarities, a clear definition of objectives and a systematic scheme of process improvement techniques. These efforts may direct you straight to the philosophy of Fisher or they may direct you to use a combination of classical, Taguchi and Shainin. Whether it is one approach or a blend of the best parts of each, DOE is a powerful weapon in the war against special cause variation. Designed experiments have a wide range of application of which testing solutions to the removal special cause variation is just one. They are heavily utilised in the development of new manufacturing processes as well as in the engineering design phase for new products. In Unit 5, we will briefly revisit designed experiments and explore their usefulness in reducing common cause variation and for sorting out complex relationships among process variables in a process that has been brought under control but may not be performing as required