

# Examples of DOE in Non-Manufacturing / Service Processes

**Table 1** Real benefits of DoE in non-manufacturing/service processes

| Area                                                 | Design                                                                                                                          | Benefits achieved                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bill processing in a utility company                 | A one-way randomized ANOVA design with three experimental treatments was selected                                               | <ul style="list-style-type: none"> <li>Reduction of 70% in the number of hours taken to process bills without incurring capital cost or increasing any human resource</li> <li>Savings generated from the project were estimated to be well over \$100 000 US per annum</li> <li>Better understanding and a greater insight into how process works</li> </ul> |
| Direct mail response at <i>Mother Jones</i> magazine | 16 trial fractional factorial design was executed to study seven factors at two levels                                          | <ul style="list-style-type: none"> <li>Two factor interactions were studied to understand the effect of one factor on the response at different levels of the other factor</li> <li>Better understanding of the process</li> <li>The number of people who returned the reply card without payment decreased from 10 to 5%</li> </ul>                          |
| Account receivables                                  | 8 trial fractional factorial design was performed to study four factors at two levels                                           | <ul style="list-style-type: none"> <li>The receivables age can be reduced from the current average of 200 days to 44 days</li> <li>Improvement in the cash flow in the company</li> </ul>                                                                                                                                                                     |
| Manpower planning in Royal Navy                      | 27 trial full factorial experiment (simulation) was performed to study three risk variables within the manpower planning system | <ul style="list-style-type: none"> <li>Identified the optimal condition of risk variables that reduces the existing gapping at sea</li> <li>40 % improvement over the current gapping at sea</li> </ul>                                                                                                                                                       |
| Computer downtime in a small export company          | 18 trial Taguchi orthogonal array experiment was performed to study eight factors at three levels                               | <ul style="list-style-type: none"> <li>Improved the system response time by over 10%</li> <li>Increased awareness of the use of more scientific approach to understand the system among many senior managers in the company</li> </ul>                                                                                                                        |
| Response rate for a web retailer                     | 16 trial fractional factorial experiment was carried out to study five factors at two levels                                    | <ul style="list-style-type: none"> <li>The response rate was improved by 75%</li> </ul>                                                                                                                                                                                                                                                                       |
| Billing process                                      | Two level factorial experiment, studied over a dozen factors at two levels                                                      | <ul style="list-style-type: none"> <li>Savings of \$2 million in postage</li> <li>Developed a better telephone bill</li> </ul>                                                                                                                                                                                                                                |
| IT services                                          | A full factorial experiment was executed to study three factors at two levels                                                   | <ul style="list-style-type: none"> <li>The company did not have to replace and upgrade the existing server, thus avoid an expense of nearly \$50,000</li> </ul>                                                                                                                                                                                               |
| Hospital                                             | 12 trial Taguchi orthogonal array experiment was performed to study 11 factors at two levels                                    | <ul style="list-style-type: none"> <li>Length of Stay (LOS) in Emergency Dept has been reduced from 100 minutes to 80 minutes</li> <li>Cost savings was estimated to be well over \$50,000</li> </ul>                                                                                                                                                         |
| Financial services                                   | 16 trial fractional factorial design was selected to study five factors at two levels                                           | <ul style="list-style-type: none"> <li>Reduced rework rate due to incomplete information provided by the customer</li> <li>Increased application completeness from 60 to 95%</li> <li>Reduced cycle time for the loan and lease application process</li> </ul>                                                                                                |

**Table 6** Experimental design for debt collection experiment

| Contact regime | Written contact | Phone contact | Timing  |
|----------------|-----------------|---------------|---------|
| A              | No letter       | No phone      | 10 days |
| B              | Letter          | No phone      | 10 days |
| C              | No letter       | Phone         | 10 days |
| D              | Letter          | Phone         | 10 days |
| E              | No letter       | No phone      | 30 days |
| F              | Letter          | No phone      | 30 days |
| G              | No letter       | Phone         | 30 days |
| H              | Letter          | Phone         | 30 days |

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