

## Carrying out evolutionary operations (EVOP)

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### Overview

This standard covers the competencies required for carrying out evolutionary operations (EVOP). It involves applying the principles and processes of EVOP to the selected process over a period of time whilst the plant/process is still in production.

You will need to calculate the correct sample size required and identify a suitable sampling plan to reduce systematic errors. You will be expected to determine the scope/parameters of the experiment and carry out the experiment within these parameters utilising the appropriate tools and techniques. The results of the EVOP will be recorded and analysed to identify areas where improvements to the process can be made. You will also need to produce a report of the findings along with an action plan to ensure the improvements identified are implemented.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that you cannot solve or are outside your responsibility to the relevant authority. You will need to ensure that all sampling is carried out correctly and the necessary job/task documentation is completed accurately and legibly. You will be expected to take full responsibility for your own actions within the activity and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of the application of evolutionary operations and provide an informed approach to the techniques and procedures used. You will need to understand the principles and application of EVOP in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying safe working practices will be a key issue throughout.

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### Performance criteria

#### You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. select an appropriate process on which to carry out the evolutionary operations and obtain all the necessary data
3. determine the scope/parameters of the experiment
4. utilise sample size selection to ensure the statistical validity of the experiment and calculate the correct sample size for an experiment
5. estimate the resources and expected benefits for the evolutionary operations undertaken
6. identify a suitable sampling plan to reduce systematic errors
7. run an evolutionary operation experiment using appropriate tools and techniques, recording and analysing the data collected
8. contribute to the construction of an evolutionary operations board
9. identify suitable optimal conditions for the process and produce an evolutionary operations report, highlighting the findings
10. produce an action plan to ensure the improvements are implemented

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### Knowledge and understanding

#### You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. the advantages and disadvantages to using evolutionary operations (EVOP)
3. what is meant by a cycle and a phase
4. how to gather the data during an evolutionary operations activity
5. why we should use evolutionary operations in an improvement activity
6. evolutionary operation experimental design and how it is used in a six sigma improvement project
7. how and when an evolutionary operations should be rerun and why
8. what statistics should be calculated in applying evolutionary operations
9. the measurements of central tendency and variation and how they are calculated
10. sample size selection to ensure the statistical validity of an experiment
11. Delta/Sigma ratio, Alpha and Beta risk for experiments
12. how to create an evolutionary operations board
13. how to carry out cost and benefit analysis within evolutionary operations
14. how to conduct full factorial, 2k factorial and fractional factorial experiments
15. how to calculate and produce graphs for main effects and interactions
16. how to identify suitable optimal conditions, and how to create an action plan to ensure these conditions are implemented
17. the extent of your own authority within the activity and whom you should report to, in the event of problems that you cannot resolve

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### Scope/range related to performance criteria

1. Identify **all** of the following for the experiment undertaken:
  1. a suitable Alpha risk level
  2. a suitable Delta that needs to be observed
  3. a suitable Beta level
  
2. Determine the correct experimental design to use from **one** of the following:
  1. full factorial
  2.  $2^k$  factorial
  3. fractional factorial
  
3. Calculate and produce graphs for **both** the following:
  1. main effects
  2. interactions
  
4. Estimate and document the resources required to include:
  1. financial
  2. time scales
  3. manpower
  4. plant/equipment
  5. materials

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