Level 4 NVQ Diploma in Business-Improvement Techniques (7576-04)

Qualification handbook for centres 501/1736/1

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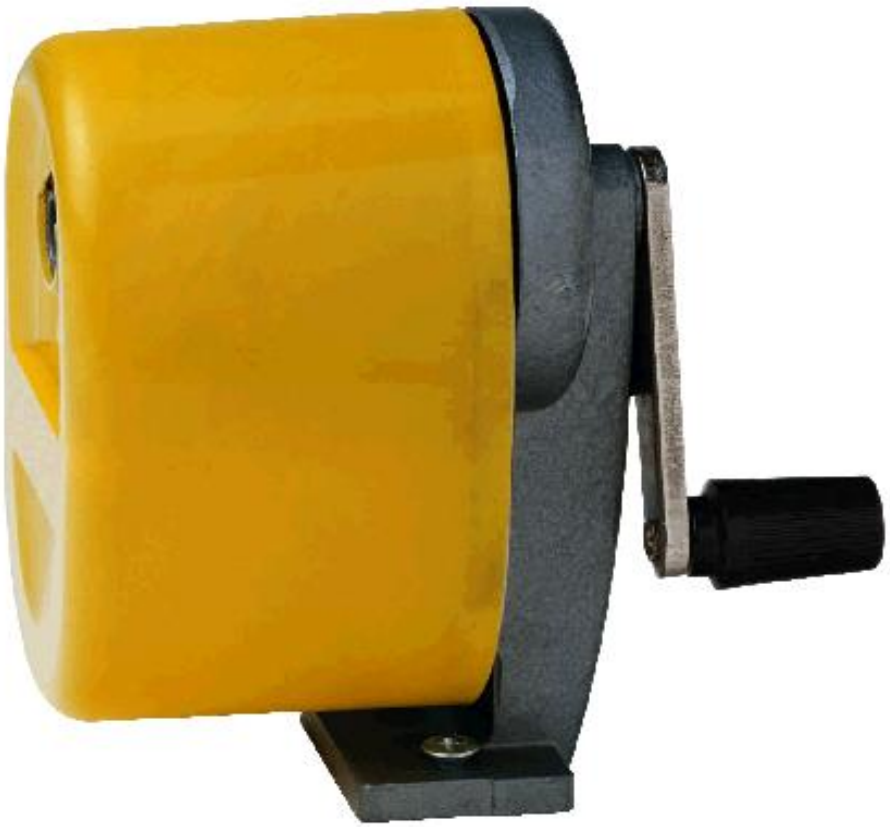
September 2018
Version 4.2



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Qualification title	Number	Ofqual ref.
Level 4 NVQ Diploma in Business-Improvement Techniques – Process Improvement.	7576-04	501/1736/1
Level 4 NVQ Diploma in Business-Improvement Techniques – Quality Improvement.	7576-04	501/1736/1

Version and date	Change detail	Section
4.1 August 2017	Added TQT details Deleted QCF	**Qualification at a glance, Structure** **Throughout**
2.0 August 2015	Amended assessor requirements	**Section 3.3 Resource requirements**
2-1 August 2015	Unit 404 Removed duplicate Assessment Criteria 2.4 and renumbered remaining AC in this Learning Outcome.	**Units**
3 January 2016	Amending Unit and Assessment Criteria titles	**Units**
V4.0 February 2017	Amendment to the structure of Level 4 NVQ Diploma in Business Improvement Techniques - Process Improvement (6 mandatory units, not 5)	**About the qualification**
4.2 September 2018	Changed from a seven to a nine	**Unit 201Assessment criteria 3**

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1 Introduction to the qualification

This document contains the information that centres need to offer the following qualifications:

Qualification title and level	Level 4 NVQ Diploma in [Business-Improvement Techniques]
GLH	320
TQT	1060
City & Guilds qualification number	(7576-[04])
Ofqual accreditation number	501/1736/1
Last registration date	30/04/2015
Last certification date	30/04/2018

Who is the qualification for?

- employees involved in business improvement within a team who wish to have their business improvement competencies assessed for certification purposes

- new employees who have undertaken business improvement training and are now acquiring experience within a team and wish to demonstrate their competencies for assessment purposes

What does the qualification cover?

- Mandatory units cover those areas which have a common approach such as safety and team working.
- Optional units offer a choice of techniques and systems that can be combined to meet the needs of businesses and organisations

2 About the qualification

2.1 Accreditation details

Accreditation details

This qualification is

- accredited by the Ofqual at Level 4.

2 About the qualification

2.2 Rules of combination

Rules of combination are used to define the structure of qualifications. The rules of combination specify the credits which must be achieved through a particular combination of units to gain a full qualification.

The following tables outline the unit title, unit number, credit value, mandatory/optional and accreditation unit reference.

2 About the qualification

2.3 Level 4 NVQ Diploma in Business-Improvement Techniques, Process Improvement.

To achieve the Level 4 NVQ Diploma in Business Improvement Techniques - Process Improvement, learners must achieve the 6 mandatory units (57 credits) from Mandatory Group 1, one unit (maximum of 8 credits) from Optional Group 1 and a minimum of 5 units (minimum of 41 credits) from Optional Group 2 - please note three of these five units may be selected from the Quality Improvement pathway (units 424-435). The total minimum credit value of this pathway is 106.

Mandatory Group 1

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
A/601/5013	201	Complying with statutory regulations and organisational safety requirements	Mandatory	5
L/600/5389	402	Leading effective teams	Mandatory	9
H/600/5396	403	Carrying out project management activities	Mandatory	10
F/600/5406	404	Leading workplace organisation activities	Mandatory	10
M/600/5420	405	Leading continuous improvement (Kaizen) activities	Mandatory	14
M/600/5434	406	Leading the development of visual management systems	Mandatory	9

Optional Group 1

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
K/600/5447	407	Leading the creation of flexible production and manpower systems	Optional	7
T/600/5466	408	Leading problem solving activities	Optional	8

Optional Group 2

If either unit 407 or 408 is selected from Optional Group 1 it cannot be reselected from Optional Group 2.

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
K/600/5447	407	Leading the creation of flexible production and manpower systems	Optional	7
T/600/5466	408	Leading problem solving activities	Optional	8
T/600/5483	409	Leading an analysis and selection of parts for improvements	Optional	14
K/600/5528	410	Leading lead time analysis activities	Optional	9
M/600/5563	411	Leading value stream mapping (VSM) activities	Optional	13
T/600/5614	412	Leading set-up reduction activities	Optional	14
H/600/5639	413	Leading total productive maintenance (TPM) activities	Optional	11
J/600/5665	414	Leading the carrying out of statistical process control procedures (SPC)	Optional	8
R/600/5684	415	Leading flow process analysis activities	Optional	14
R/600/5698	416	Leading policy deployment (HOSHIN KANRI) activities	Optional	9
A/600/5713	417	Leading value management (value engineering & value analysis) activities	Optional	11
L/600/5733	418	Leading potential failure modes and effects analysis (FMEA) activities	Optional	9
R/600/5748	419	Leading measurement systems analysis (MSA) activities	Optional	9
L/600/5862	420	Carrying out design of experiments (DOE)	Optional	9
K/600/5867	421	Leading mistake/error proofing (POKA YOKE) activities	Optional	9
J/600/5875	422	Applying quality function deployment (QFD)	Optional	9
F/600/5888	423	Leading the creation of standard operating procedures	Optional	8

2 About the qualification

2.4 Level 4 NVQ Diploma in Business-Improvement Techniques, Quality Improvement.

To achieve the Level 4 NVQ Diploma in Business-Improvement Techniques Quality Improvement, learners must achieve the 8 mandatory units (79 credits) from Mandatory Group 2. A minimum of 3 units from Optional Group 3 (minimum of 24 credits) – please note two of these three units may be selected from the Process Improvement pathway. Also a minimum of 2 units from Optional Group 4 (minimum of 17 credits) – please note one of these two units may be selected from the Process Improvement pathway. The total minimum credit value of this pathway is 120.

Mandatory Group 2

Accreditation unit reference	City & Guilds unit no.	Unit title	Mandatory/ optional for full qualification	Credit Value
A/601/5013	201	Complying with statutory regulations and organisational safety requirements	Mandatory	5
L/600/5389	402	Leading effective teams	Mandatory	9
H/600/5396	403	Carrying out project management activities	Mandatory	10
J/600/5665	414	Leading the carrying out of statistical process control procedures (SPC)	Mandatory	8
L/600/5733	418	Leading potential failure modes and effects analysis (FMEA) activities	Mandatory	9
D/600/5896	424	Leading the application of Six Sigma methodology to a project	Mandatory	14
T/600/5905	425	Leading Six Sigma process mapping activities	Mandatory	14
T/600/5919	426	Leading the carrying out of basic statistical analysis	Mandatory	10

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
Optional Group 3				
R/600/5748	419	Leading measurement systems analysis (MSA) activities	Optional	9
L/600/5862	420	Carrying out design of experiments (DOE)	Optional	9
K/600/5867	421	Leading mistake/error proofing (POKA YOKE) activities	Optional	9
Y/600/5931	427	Leading the application of Six Sigma metrics to a project	Optional	9
R/600/5944	428	Leading the production of a characteristic selection matrix	Optional	9
L/600/5957	429	Leading the carrying out of capability studies	Optional	14
A/600/5971	430	Leading the production of multi variance charts	Optional	9
K/600/5982	431	Leading hypothesis testing activities	Optional	9

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
Optional Group 4				
J/600/5875	422	Applying quality function deployment (QFD)	Optional	9
R/600/5989	432	Carrying out Evolutionary Operations (EVOP)	Optional	9
K/600/6002	433	Applying central limit theorem and confidence intervals	Optional	9
H/600/6029	434	Producing Taguchi linear graphs	Optional	9
A/600/6036	435	Applying response surface methodology	Optional	9

Total Qualification Time

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 4 NVQ Diploma in Business-Improvement Techniques	320	1060

Qualification support materials

City & Guilds also provides the following publications and resources specifically for this qualification:

Description	How to access
Centres Information Guide	Website
FAQ	Website

3 Centre requirements

3.1 Obtaining centre and qualification approval

Only approved organisations can offer City & Guilds qualifications. Organisations approved by City & Guilds are referred to as **centres.**

Centres must meet a set of quality criteria including:

- provision of adequate resources, both physical and human
- clear management information systems
- effective assessment and quality assurance procedures including candidate support and reliable recording systems.

An organisation that has not previously offered City & Guilds qualifications must apply for approval to become a centre. This is known as the **centre approval process (CAP).** Centres also need approval to offer a specific qualification. This is known as the **qualification approval process (QAP)**. In order to offer these qualifications, organisations which are not already City & Guilds centres must apply for centre and qualification approval at the same time. Existing City & Guilds centres will only need to apply for qualification approval for these particular qualifications.

Full details of the procedures and forms for applying for centre and qualification approval are given

City and Guilds branch offices will support new centres through the approval process. They will appoint an external quality assurer. They will also provide details of fees applicable for approvals. The local office will be the point of contact for all enquiries for these qualifications and will be responsible for monitoring the delivery and assessments through reports submitted by External Verifiers. They will be the first point of contact for any enquiries regarding the multiple choice examination.

Assessments must not be undertaken until qualification approval has been obtained and candidates have been registered.

City & Guilds reserves the right to withdraw qualification or centre approval for reasons of debt, malpractice or non-compliance with City & Guilds' policies, regulations, requirements, procedures and guidelines, or for any reason that may be detrimental to the maintenance of authentic, reliable and valid qualifications or that may prejudice the name of City & Guilds.

3 Centre requirements

3.2 Automatic Approval

This section outlines the approval processes for Centres to offer this qualification and any resources that Centres will need in place to offer the qualifications including qualification-specific requirements for Centre staff.

Centres already offering City & Guilds qualifications in this subject area

Centres approved to offer the qualification Level 4 NVQ in Business-Improvement Techniques (2257-52) will receive automatic approval for the new Level 4 NVQ Diploma in Business-Improvement Techniques (7576-04).

3 Centre requirements

3.3 Resource requirements

Human resources

Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. This information is also contained in
SEMTAs Business-Improvement Techniques (B-IT) NVQ Level 2 & 3 Unit Assessment Strategy document

Assessor Requirements

Assessor requirements to demonstrate effective assessment practice

Assessment must be carried out by competent Assessors that as a minimum must hold the Level 3 Award in Assessing Competence in the Work Environment. Current and operational Assessors that hold units D32 and/or D33 or A1 and/or A2 as appropriate to the assessment being carried out, will not be required to achieve the Level 3 Award as they are still appropriate for the assessment requirements set out in this Unit Assessment Strategy. However, they will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace assessment to the most up to date National Occupational Standards (NOS).

Assessor technical requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the B-IT unit learning outcomes and associated assessment criteria. This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.

Assessors must also be fully conversant with the Awarding Body/Organisation assessment recording documentation used for the B-IT NVQ units against which the assessments and verification are to be carried out and other relevant Awarding Body's/Organisation's documentation and system and procedures to support the Quality Assurance process.

Internal and External verifiers

Internal quality assurers must hold, or be working towards, the nationally recognised Internal Verifier unit V1 and would be expected to be familiar with, and preferably hold, the nationally recognised Assessor units. Internal quality assurers that hold unit D34 must demonstrate that they are applying the verification principles and practices set down in V1.

External Verifiers must hold, or be working towards, the nationally recognised External Verifier unit V2 and would be expected to be familiar with, and preferably hold, the nationally recognised Assessor units, and Internal Verifier unit. External Verifiers that hold unit D35 must demonstrate that they are applying the verification principles and practices set down in V2.

Verifiers, both Internal and External, will also be expected to be fully conversant with the terminology used in the B-IT NVQ units against which the assessments and verification are to be carried out, the appropriate Regulatory Body's systems and procedures and the City & Guilds documentation and system and procedures within which the assessment and verification is taking place.

Specific technical requirements for Internal and External Verifiers

Internal and External Verifiers of this qualification and or units must be able to demonstrate that they have verifiable, sufficient and relevant business experience in the sector/occupational area, and must have a working knowledge of the processes, techniques and procedures that are being used where the business improvement is being implemented

Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and verification, and that it takes account of any national or legislative developments.

Candidate entry requirements

Candidates should not be entered for a qualification of the same type, content and level as that of a qualification they already hold.

There are no formal entry requirements for candidates undertaking this qualification. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully.

Age restrictions

This qualification is not approved for use by candidates under the age of 16, and City & Guilds cannot accept any registrations for candidates in this age group.

3.4 Quality Assurance

Internal quality assurance

Approved centres must have effective quality assurance systems to ensure optimum delivery and assessment of qualifications.

Quality assurance includes initial centre approval, qualification approval and the centre's own internal procedures for standardising and monitoring quality. Centres are responsible for internal quality assurance, ensuring that there are appropriate opportunities for open communication between the course team, scheme co-ordinator and external quality assurer. City & Guilds is responsible for external quality assurance.

Full details and guidance on the internal and external quality assurance requirements and procedures, are provided in *Providing City & Guilds Qualifications* and in the centre toolkit. This document also explains the tasks, activities and responsibilities of quality assurance staff.

All candidates' evidence must be available for external verification, Centres are also required to retain copies of candidates' assessment and internal verification records for three years after certification.

National standards and rigorous quality assurance are maintained by use of:

- City & Guilds assignment, marked by the centres according to externally set marking criteria
- Portfolio evidence assessed against set criteria
- Internal (centre) quality assurance
- City & Guilds external verification.

To meet the quality assurance criteria for this qualification, the centre must ensure that the following internal roles are undertaken:

- quality assurance co-ordinator
- primary assessor
- independent assessor
- internal quality assurer.

External quality assurance

External verifiers are appointed by City & Guilds to approve centres, and to monitor the assessment and internal quality assurance carried out by centres. External verification is carried out to ensure that assessment is valid and reliable, and that there is good assessment practice in centres.

To carry out their quality assurance role, external quality assurers must have appropriate occupational and verifying knowledge and expertise. City & Guilds external quality assurers attend training and development designed to keep them up-to-date, to facilitate standardisation between verifiers and to share good practice.

Further details of the role of external quality assurers are given in *Providing City & Guilds qualifications*.

4 Units

The units for this qualification follow.

Structure of units

The units in this qualification are written in a standard format and comprise the following:

- title
- unit aim
- relationship to NOS, other qualifications and frameworks
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria
- notes for guidance.

Summary of units

City & Guilds unit number	Title	Unit number	Credit Value	GLH	Level
201	Complying with statutory regulations and organisational safety requirements	A/601/5013	35	5	2
402	Leading effective teams	L/600/5389	25	9	4
403	Carrying out project management activities	H/600/5396	28	10	4
404	Leading workplace organisation activities	F/600/5406	25	10	4
405	Leading continuous improvement (Kaizen) activities	M/600/5420	32	14	4
406	Leading the development of visual management systems	M/600/5434	25	9	4
407	Leading the creation of flexible production and manpower systems	K/600/5447	25	7	4
408	Leading problem solving activities	T/600/5466	25	8	4
409	Leading an analysis and selection of parts for improvement	T/600/5483	32	14	4
410	Leading lead time analysis activities	K/600/5528	25	9	4
411	Leading value stream mapping (VSM) activities	M/600/5563	32	13	4
412	Leading set-up reduction activities	T/600/5614	32	14	4
413	Leading total productive maintenance (TPM) activities	H/600/5639	32	11	4
414	Leading statistical process control (SPC) activities	J/600/5665	25	8	4
415	Leading flow process analysis activities	R/600/5684	32	14	4
416	Leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)	R/600/5698	25	9	4

417	Leading value management (value engineering and value analysis) activities	A/600/5713	32	11	4
418	Leading failure modes and effects analysis (FMEA) activities	L/600/5733	25	9	4
419	Leading measurement systems analysis (MSA) activities	R/600/5748	25	9	4
420	Carrying out design of experiments (DOE)	L/600/5862	25	9	4
421	Leading mistake/error proofing (Poka Yoke) activities	K/600/5867	25	9	4
422	Applying quality function deployment (QFD)	J/600/5875	25	9	4
423	Leading the creation of standard operating procedures (SOP)	F/600/5888	25	8	4
424	Leading the application of Six Sigma methodology to a project	D/600/5896	32	14	4
425	Leading the carrying out of Six Sigma process mapping	T/600/5905	32	14	4
426	Leading the application of basic statistical analysis	T/600/5919	25	10	4
427	Leading the application of Six Sigma metrics to a project	Y/600/5931	25	9	4
428	Leading the production of a characteristic selection matrix	R/600/5944	25	9	4
429	Leading the carrying out of capability studies	L/600/5957	32	14	4
430	Leading the production of multi variance charts	A/600/5971	25	9	4
431	Leading the process of hypothesis testing	K/600/5982	25	9	4
432	Carrying out evolutionary operations (EVOP)	R/600/5989	25	9	4
433	Applying central limit theorem and confidence intervals	K/600/6002	25	9	4
434	Producing Taguchi linear graphs	H/600/6029	25	9	4
435	Applying response surface methodology	A/600/6036	25	9	4

Unit Endorsement

These units are endorsed by the Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTA).

Unit 201 Complying with statutory regulations and organisational safety requirements

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to deal with statutory regulations and organisational safety requirements. It does not deal with specific safety regulations or detailed requirements, it does, however, cover the more general health and safety requirements that apply to working in an industrial environment.

The learner will be expected to comply with all relevant regulations that apply to their area of work, as well as their general responsibilities as defined in the Health and Safety at Work Act. The learner will need to be able to identify the relevant qualified first aiders and know the location of the first aid facilities. The learner will have a knowledge and understanding of the procedures to be adopted in the case of accidents involving injury and in situations where there are dangerous occurrences or hazardous malfunctions of equipment, processes or machinery. The learner will also need to be fully conversant with their organisation's procedures for fire alerts and the evacuation of premises.

The learner will also be required to identify the hazards and risks that are associated with their job. Typically, these will focus on their working environment, the tools and equipment that they use, the materials and substances that they use, any working practices that do not follow laid-down procedures, and manual lifting and carrying techniques.

The learner's responsibilities will require them to comply with all relevant statutory and organisational policy and procedures for health and safety in the workplace. The learner must act in a responsible and safe manner at all times, and present themselves in the workplace suitably prepared for the activities to be undertaken. The learner will be expected to report any problems with health and safety issues, to the relevant authority.

The learner's knowledge will provide a good understanding of the relevant statutory regulations and organisational requirements associated with their work, and will provide an informed approach to the procedures used. The learner will need to understand their organisation's health and safety requirements and their application, in adequate depth to provide a sound basis for carrying out their activities in a safe and competent manner.

Learning outcomes

1. Comply with statutory regulations and organisational safety requirements
2. Know how to comply with statutory regulations and organisational safety requirements

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard: Complying with statutory regulations and organisational safety requirements (Suite 2)

Unit 201 Complying with statutory regulations and organisational safety requirements

Outcome 1 Comply with statutory regulations and organisational safety requirements

Assessment Criteria

The learner can:

1. comply with their duties and obligations as defined in the health and safety at work act
2. demonstrate their understanding of their duties and obligations to health and safety by:
   - applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act
   - identifying, within their organisation, appropriate sources of information and guidance on health and safety issues, such as:
   - eye protection and personal protective equipment (PPE)
   - COSHH regulations
   - Risk assessments
   - identifying the warning signs and labels of the main groups of hazardous or dangerous substances
   - complying with the appropriate statutory regulations at all times
3. present themselves in the workplace suitably prepared for the activities to be undertaken
4. follow organisational accident and emergency procedures
5. comply with emergency requirements, to include:
   - identifying the appropriate qualified first aiders and the location of first aid facilities
   - identifying the procedures to be followed in the event of injury to themselves or others
   - following organisational procedures in the event of fire and the evacuation of premises
   - identifying the procedures to be followed in the event of dangerous occurrences or hazardous malfunctions of equipment
6. recognise and control hazards in the workplace
7. identify the hazards and risks that are associated with the following:
   - their working environment
   - the equipment that they use
   - materials and substances (where appropriate) that they use
   - working practices that do not follow laid-down procedures
8. use correct manual lifting and carrying techniques
9. demonstrate one of the following methods of manual lifting and carrying:
   - lifting alone
   - with assistance of others
   - with mechanical assistance
10. apply safe working practices and procedures to include:
    - maintaining a tidy workplace, with exits and gangways free from obstruction
    - using equipment safely and only for the purpose intended
    - observing organisational safety rules, signs and hazard warnings
    - taking measures to protect others from any harm resulting from the work that they are carrying out

Unit 201 Complying with statutory regulations and organisational safety requirements

Outcome 2 Know how to comply with statutory regulations and organisational safety requirements

Assessment Criteria

The learner can:

1. describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act, and other current legislation (such as The Management of Health and Safety at Work Regulations, Workplace Health and Safety and Welfare Regulations, Personal Protective Equipment at Work Regulations, Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Display Screen at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations)
2. describe the specific regulations and safe working practices and procedures that apply to their work activities
3. describe the warning signs for the nine main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations
4. explain how to locate relevant health and safety information for their tasks, and the sources of expert assistance when help is needed
5. explain what constitutes a hazard in the workplace (such as moving parts of machinery, electricity, slippery and uneven surfaces, poorly placed equipment, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile, flammable or toxic materials, unshielded processes, working in confined spaces)
6. describe their responsibilities for identifying and dealing with hazards and reducing risks in the workplace
7. describe the risks associated with their working environment (such as the tools, materials and equipment that they use, spillages of oil, chemicals and other substances, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures)
8. describe the processes and procedures that are used to identify and rate the level of risk (such as safety inspections, the use of hazard checklists, carrying out risk assessments, COSHH assessments)
9. describe the first aid facilities that exist within their work area and within the organisation in general; the procedures to be followed in the case of accidents involving injury
10. explain what constitute dangerous occurrences and hazardous malfunctions, and why these must be reported even if no-one is injured
11. describe the procedures for sounding the emergency alarms, evacuation procedures and escape routes to be used, and the need to report their presence at the appropriate assembly point
12. describe the organisational policy with regard to fire fighting procedures; the common causes of fire and what they can do to help prevent them
13. describe the protective clothing and equipment that is available for their areas of activity
14. explain how to safely lift and carry loads, and the manual and mechanical aids available
15. explain how to prepare and maintain safe working areas; the standards and procedures to ensure good housekeeping
16. describe the importance of safe storage of tools, equipment, materials and products
17. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 402 Leading effective teams

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading effective teams, which are involved in carrying out continuous improvement projects. It involves obtaining the appropriate authority and support for the release of resources to carry out team activities, which will include people, work space/work area, documentation and information. The learner will be required to determine and agree individual roles and responsibilities, and to set realistic and achievable goals for both the individuals within the team and the team as a whole. Coaching/mentoring and monitoring the performance of the team will also feature in this unit. They will also be expected to prioritise the work activities to achieve the overall objectives, cost-effectively and efficiently.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner must ensure that the team performs the tasks to the required standard and that all necessary job/task documentation is completed accurately and legibly. The learner will be expected to take full responsibility for the decisions that they make, and for the overall performance of the team.

The learner's knowledge will be sufficient to provide a good understanding of effective team leading and working, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the various techniques of team leading, coaching, performance monitoring and communication methods available to them, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead effective teams
2. Know how to lead effective teams

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 02: Leading effective teams (Suite 4)¶

Unit 402 Leading effective teams

Outcome 1 Lead effective teams

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. work in accordance with the roles and responsibilities identified for the team leader role
4. obtain the authority and support for the release of the necessary resources to carry out the team activities
5. approve and, where appropriate, consult with colleagues in order to secure the release of the following resources:
   - people involved
   - work space/work area required
   - documentation and information required
6. set realistic and achievable goals and objectives for their team, in accordance with the targets set for themselves or for the work area/activity
7. evaluate and prioritise the work activities to achieve the objectives, cost-effectively and efficiently
8. develop, review and update action plans which clearly identify activities and responsibilities required to meet the team targets:
   - for themselves
   - for the team
9. determine and agree individual roles and responsibilities, and coach/mentor their team, focusing on the objectives that have been set
10. monitor and review the performance of their team against the goals and objectives which have been set, and communicate this to the relevant people
11. communicate effectively with:
    - management
    - peers
    - subordinates

12. communication must include:
    - verbal
    - written
    - electronic methods

13. consult with subject specialists when required, to gain the necessary information to support the team goals and objectives
14. deal promptly and effectively with any problems within their control, and report those that cannot be resolved

Unit 402 Leading effective teams

Outcome 2 Know how to lead effective teams

Assessment Criteria

The learner can:

1. describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the business targets set for the learner's area of responsibility, and how to set personal, individual and team targets to achieve them (action planning)
4. explain how to prioritise the learner's own and their team's workload to ensure that targets are met
5. explain how to communicate effectively, listen, question, support and coach others to work towards the business targets
6. explain how to present information effectively to management, peers or team members, using different methods
7. explain how to conduct a team performance review and how to involve the team in brainstorming activities to identify opportunities, threats and solutions
8. describe the types of conflict and problem that might emerge between work activities
9. describe the organisational processes and procedures required to run the learner's area of responsibility effectively (such as quality procedures, code of conduct, standard operations, problem resolution procedures)
10. describe the improvement tools and techniques being used in the learner's area of responsibility (such as hourly count monitor, TAKT time, continuous flow process, flexible manpower systems, quality level, defects per million opportunities, workplace organisation)
11. describe the specialist help that the learner may require in their area of responsibility, and how this can be obtained
12. explain how to structure and lead a team event, and the presentation materials and work documentation required
13. explain how to train others in the processes and procedures relevant to them, and the learner's area of responsibility
14. explain how to monitor and check that the learner's team is working to identified quality and safety standards
15. describe the extent of the learner's own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 403 Carrying out project management activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to carry out project management involved with continuous improvement activities. It involves identifying the need for a project and determining its scope and then developing this into a fully detailed project plan. The learner will be required to form a suitable project team taking into account the technicalities within the project and the individual skills and abilities of the team members. The learner will also be expected to determine and agree the individual roles and responsibilities of the team members and to set realistic and achievable goals for both the individuals within the team and the team as a whole. Obtaining appropriate authority and support for the release of resources to carry out the project is also included and this will include people, work space/work area, documentation and information. Monitoring the performance of the project to ensure that it meets the identified objectives also features in this unit.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems that they cannot solve, or are outside your responsibility, to the relevant authority. The learner must ensure that the project is delivered on time; to cost and to the required quality/outcomes and that all necessary project documentation is completed accurately and legibly. The learner will be expected to take full responsibility for the decisions that they make and the overall performance of the project.

The learner's knowledge will be sufficient to provide a good understanding of project management, and provide an informed approach to the techniques and procedures used. The learner will need to understand the various techniques of project management and of team building, coaching, monitoring performance and communication methods available to them in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Carry out project management activities
2. Know how to carry out project management activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 03: Carrying out project management activities (Suite 4)¶

Unit 403 Carrying out project management activities

Outcome 1 Carry out project management activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. identify the need for the project and determine the project scope
3. develop a full project plan which accurately identifies the project aims and objectives
4. develop project plans, which clearly identify the following:
   - full cost of the project
   - time scale required for the project
   - resources required
   - individual tasks within the project
   - milestones and deliverables to be met
5. form the project team comprising of the right mix of personnel to deliver the project objectives
6. determine and agree individual roles and responsibilities within the project team
7. develop and manage a monitoring process to review the progress of the project, adjusting the project plan as required
8. consult with appropriate people in order to secure the release of the following resources:
   - people involved
   - work space/work area required
   - documentation and information required
9. obtain authority and support for the release of the necessary resources to carry out the project
10. conduct and manage the project in accordance with the plan consulting with subject experts and specialists according to the needs of the project
11. monitor the progress of the project to ensure:
    - the project objectives will be met
    - delivered on time
    - project keeps within budget
    - agreed quality standards are met and maintained
12. report project progress to relevant parties at the agreed stages
13. communicate effectively with:
    - management
    - peers
    - project team
    - customers
14. communicate by the following methods:
    - verbal
    - written
    - electronic
15. deal promptly and effectively with any problems within their control and report those that cannot be resolved
16. report project completion and closure to relevant personnel

Unit 403 Carrying out project management activities

Outcome 2 Know how to carry out project management activities

Assessment Criteria

The learner can:

1. describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act 1974
2. explain how to identify the project scope to determine the need for a full project plan and management approval
3. explain how to develop specific, measurable, realistic project objectives and deliverables, allowing progress to be monitored and measured
4. describe the tools and techniques available for project planning and monitoring
5. explain how to communicate effectively, listen and question, provide feedback, support and coach others
6. explain how to break the project down into individual deliverable tasks
7. explain how to form and develop the project team required to meet the identified objectives
8. explain how to allocate specific tasks and responsibilities to the project team members according to individual skills and abilities
9. explain how to determine the specialist help the learner may require in the project, and how this can be obtained
10. explain how to conduct a project meeting
11. explain how to present information effectively to management, peers, team members and customers
12. explain how to solve problems and overcome barriers/difficulties encountered during the life of the project
13. explain who to liaise with and who to obtain relevant and specific information from to support and assist the learner in running the project
14. explain how to monitor progress of the project in terms of delivery on time, to budget, with agreed levels of quality
15. explain how to report project closure, completion and final status to management, teams and customers
16. explain how to agree limits of the learner's own authority within the scope of the project and how to identify, outside of their authority area, whom they should report to in the event of encountering problems that they cannot resolve

Unit 404 Leading workplace organisation activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to lead the application of a systemic approach to continuously making improvements to the workplace organisation. It involves leading the activities that apply the principles and processes of workplace organisation (such as 5S or 5C). The learner will need to set standards and guidelines for the work area and its activity to determine where information, materials, tools and/or equipment are missing or require a new location and what improvements to the area or activity could be made. The learner will be expected to lead the production and/or updating of standard operating procedures and visual controls for the work area, which could cover such things as producing shadow boards to standardise the storage and location of area equipment, colour coding of equipment, cleaning and maintenance of equipment, production operations, and health and safety. The overall objective of the activity will be to make measurable improvements to the workplace organisation.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions, and the actions of others under their responsibility within the activity, and for the quality and accuracy of the work they carry out.

The learner's knowledge will provide a good understanding of the workplace organisation activity and the area in which they are working, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles of workplace organisation and their application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead workplace organisation activities
2. Know how to lead workplace organisation activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 04: Leading workplace organisation activities (Suite 4)¶

Unit 404 Leading workplace organisation activities

Outcome 1 Lead workplace organisation activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within the learner's area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead the activities that apply the principles and process of workplace organisation within the work areas, and establish the area scores
4. set standards and guidelines for situations where information, resources or equipment is missing or is in surplus and where improvements can be made
5. lead the team activities that make improvements to workplace organisation
6. lead the production and/or updating of standard operation procedures and visual controls that everyone works to within the area
7. lead the production and/or updating of standard operation procedures which cover three of the following:
   - cleaning of equipment/work area
   - maintenance of equipment
   - health and safety
   - process procedures
   - manufacturing operations/working processes
   - quality systems
   - regulatory compliance system
8. lead the production and/or updating of changes to visual controls, which cover three of the following:
   - producing shadow boards or an alternative (such a labelled racking and storage systems to standardise the storage and location of area resources and/or equipment
   - colour coding
   - line status systems (such as line, process system)
   - skills matrix
   - performance measures
   - process control boards
   - improvement systems
   - planning systems
9. make measurable improvements to the workplace organisation

Unit 404 Leading workplace organisation activities

Outcome 2 Know how to lead workplace organisation activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the workplace organisation activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the factors to be considered when selecting a work area for an activity (to include: cleanliness, health and safety, product quality, equipment and organisation)
4. describe the procedure used to identify and address surplus or missing equipment or resources (such as carrying out a 'red tagging' exercise)
5. explain how to arrange and label the necessary resources or equipment for rapid identification and access
6. explain how to correlate information to create or update standard operating procedures or other approved documentation
7. explain how to evaluate and prioritise the improvements required for the workplace
8. explain how to score and audit the workplace organisation
9. describe the techniques required to communicate information using visual control systems (such as shadow boards, performance charts, KPI's)
10. describe the extent of the learner's own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 405 Leading continuous improvement (Kaizen) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading continuous improvement (Kaizen) activities in the workplace. It involves approving the plan for the Kaizen process for the agreed work area/activity, to include plan, do, check, act, and to agree quantifiable objectives and targets for the improvement activity. The activities undertaken will include the identification of all forms of waste, and problems or conditions within the work area or activity where improvements can be made. The learner will need to focus on leading the improvement activities which would give business benefits such as reduced product cost, increased capacity and/or flexibility, improved safety, improved regulatory compliance, improved quality, improved customer service, improvements to working practices and procedures, reduction in lead time and reduction/elimination of waste.

The learner will also be required to lead the production of changes to standard operating procedures (SOPs), which could include cleaning of equipment, maintenance of equipment, health and safety practices and procedures, process procedures, manufacturing operations and quality improvements.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of the Kaizen activity and the area in which they are working, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the Kaizen principles and their application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead continuous improvement (Kaizen) activities
2. Know how to lead continuous improvement (Kaizen) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 05: Leading continuous improvement (Kaizen) activities (Suite 4)¶

Unit 405 Leading continuous improvement (Kaizen) activities

Outcome 1 Lead continuous improvement (Kaizen) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within the learner's area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. approve the plan for the Kaizen process to the agreed work area/activity to include plan, do, check, act
4. agree objectives and targets for the Kaizen activity
5. lead the carrying out of the Kaizen activity within the chosen work area/activity
6. confirm waste, problems or conditions within the work area or activity and discuss and evaluate what improvements can be made
7. confirm and lead improvements within the working area/activity which cover three of the following:
   - reduction in cost
   - improved health, safety and/or working environment
   - improved quality
   - improved regulatory compliance
   - improvements to working practices
   - reduction in lead time
   - reduction in waste and/or energy usage
   - improved customer service
   - improved resource utilisation
8. lead a structured waste elimination activity, based on the identified wastes, problems or conditions
9. lead the production of and approve changes to standard operating procedures (SOPs), or other approved documentation that will sustain the improvements resulting from the Kaizen activity

10. confirm and lead improvements, which cover three of the following:
    - cleaning of equipment or work area
    - maintenance of equipment
    - health and safety
    - process procedures
    - manufacturing operations or work area operations
    - quality system
    - regulatory compliance systems

11. agree calculated measures of performance for quality, cost and delivery
12. agree calculations for one of the following quality measures:
    - not right first time (as a percentage or as parts per million (PPM))
    - company-specific quality measure

13. agree calculations for one of the following measures:
    - delivery schedule achievement
    - company-specific delivery or service measure

14. agree calculations for one of the following cost measures:
    - parts per operator hour (PPOH)
    - production volume
    - value added per person (VAPP)
    - overall equipment effectiveness (OEE)
    - stock turns
    - floor space utilization (FSU)
    - cost breakdown (such as labour, material, energy and overhead)
    - company-specific cost measure

15. approve the calculations and lead the development of a visual representation of the optimum resources required for a process based on customer demand
16. evaluate comparisons of the agreed work area/activity before and after the kaizen activity to confirm improvements using key performance indicators
17. show business improvements, using one of the following key performance indicators:
    - not right first time (as a percentage or as parts per million (PPM))
    - company-specific quality measure
    - delivery schedule achievement
    - company-specific delivery measure
    - parts per operator hour (PPOH)
    - production volume
    - value added per person (VAPP)
    - overall equipment effectiveness (OEE)
    - stock turns
    - floor space utilization (FSU)
    - cost breakdown (such as labour, material, energy and overhead)
    - company-specific cost measure

Unit 405 Leading continuous improvement (Kaizen) activities

Outcome 2 Know how to lead continuous improvement (Kaizen) activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the Kaizen activity
2. explain how a work area/activity is selected for the Kaizen activity
3. explain how to plan the resources and time needed to carry out the agreed activity
4. describe the principles for the deployment of Kaizen (such as where a culture focuses on sustained continuous improvement, aiming at eliminating waste in all systems and processes in the organisation and supply chain)
5. describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them
6. explain problem solving and root cause analysis
7. describe the importance of understanding the process/activity under review, and how this will affect the quality of the problem solving
8. describe the application of the Deming cycle (plan, do, check, act)
9. explain how to carry out a Kaizen activity and establish measurable improvements
10. explain how to distinguish facts from opinions in order to identify improvement actions
11. explain how improvements to the process are achieved by engaging the knowledge and experience of the people involved in the process
12. explain how to encourage people to identify potential improvements
13. explain how to evaluate improvement ideas in order to select those that are to be pursued
14. explain how to set quantifiable targets and objectives
15. explain how to produce/propose the creation of or changes to standard operating procedures(SOPs) or other approved documentation
16. describe the techniques used to visually communicate the work of the Kaizen activity to participants and others
17. describe the application of the business' key measures of competitiveness (such as the former DTI's seven measures: delivered right first time, delivery schedule achievement, people productivity, stock turns, overall equipment effectiveness, value added per person, floor space utilisation)
18. explain how the cycle time of a process can be defined.
19. how to calculate the required production rate for a process by using a calculation (such as Takt Time)
20. explain how to calculate the optimal resources (such as people, equipment, facilities and materials) required for a process based on customer demand
21. describe the techniques used to distribute work content to balance cycle times to the rate of customer demand, and how to visually represent it (e.g. line balance and process displays)
22. describe the extent of the learner's own authority, and to whom they should report to in the event of problems that they cannot resolve

Unit 406 Leading the development of visual management systems

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the development of visual management systems. It involves discussing and justifying the appropriate parts of the process or work area that will have visual controls and agree the key performance indicators which are to be displayed in the work area. The learner will also be required to monitor the effectiveness of the visual management system and to check the quality of the information that is being displayed.

The information to be displayed will include such things as safety, zero defects, process concerns or corrective actions, performance measures, standard operating procedures (SOPs), workplace organisation, skills matrices, autonomous maintenance worksheets, parts control systems, problem resolution (e.g. Kaizen boards), shadow boards and standard work-in-progress (WIP) locations and quantities.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of visual management, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead the development of visual management systems
2. Know how to lead the development of visual management systems

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 06: Leading the development of visual management systems (Suite 4)¶)

Unit 406 Leading the development of visual management systems

Outcome 1 Lead the development of visual management systems

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. consider and justify the appropriate parts of the process or work area that will have visual controls
4. approve and lead the making of changes to visual management systems
5. agree the key performance indicators that will be displayed in the work area
6. lead the production of and approve changes to standard operating procedures (SOPs), and visual controls that everyone works to within the area
7. lead the creation and updating of visual management systems that promote six of the following:
    - health and safety
    - quality/zero defects
    - process concerns or corrective actions
    - performance measures
    - standard operating procedures
    - workplace organisation
    - skills matrices
    - autonomous maintenance worksheets
    - parts/material control systems
    - problem resolution (eg, Kaizen boards)
    - shadow boards
    - standard work-in-progress (WIP) locations and quantities
    - planning systems
    - the delivery of effective meetings
8. monitor the effectiveness of the visual management system and check the quality of information being displayed

Unit 406 Leading the development of visual management systems

Outcome 2 Know how to lead the development of visual management systems

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which they are leading the visual management activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the factors to be considered when selecting a visual management
4. explain where to find the information required to develop a local visual management system
5. describe the visual management systems available to create 'the visual factory' (such as using Kanban systems, card systems, colour coding, floor footprints, graphs, team boards)
6. explain how to differentiate between business performance measures and local performance measures
7. describe the measures of performance in a lean business environment (such as health, safety and the environment, right first time, cost, delivery, responsiveness, process concerns and corrective actions, performance measures, workplace organisation)
8. describe the application of measurement techniques required for communicating the visual management within an area and to others who may use the information (such as target versus actual, % right first time, Pareto analysis, bar charting, action plans, Paynter charts)
9. describe the extent of the learner's own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 407 Leading the creation of flexible production and manpower systems

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the creation of flexible business systems. It involves leading the application of the principles and processes of creating flexible production and manpower systems to the chosen activity. This will include obtaining and approving the schedule and batch size for the parts in the work area, and leading the creation of level schedules for those parts. The activities will require the learner to identify and evaluate improvement opportunities, and waste which needs to be removed, in order to achieve Takt time and flow processing. The learner will also be required to direct the production of a visual representation for identifying which resources do not meet the Takt time requirements. This would typically cover areas such as standard work in progress, consignment stocks, part routers, physical control signals, number of people required and their flexibility, and the rules and disciplines of the pull system.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions, and the actions of others under their responsibility within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of creating flexible production and manpower systems, and their application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead the creation of flexible production and manpower systems
2. Know how to lead the creation of flexible production and manpower systems

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 07: Leading the creation of flexible production and manpower systems (Suite 4)¶

Unit 407 Leading the creation of flexible production and manpower systems

Outcome 1 Lead the creation of flexible production and manpower systems

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead the application of the principles and processes of creating flexible production and manpower systems to the chosen activity
4. lead the selection of three different parts or materials in the work area, and approve the calculations for the following:
   - workload
   - capacity of resource (equipment, people)
   - Takt time
5. obtain and approve the schedule and batch size for the parts or materials in the work area
6. lead the creation of level schedules for the parts in the work area
7. direct the production of a visual communication of the schedule, which includes:
   - workload
   - resource capacity
   - Takt time for the work area
8. identify and evaluate improvement opportunities, and waste which needs to be removed, in order to achieve Takt time and flow processing
9. lead the production of a local workforce flexibility matrix (skills matrix)
10. direct the production of a visual representation, identifying resources that do not meet the Takt time requirements
11. implement the creation of a visually controlled system, based on the demand of subsequent processes for the chosen parts or materials, which includes four of the following:
    - standard work in progress
    - safety stocks
    - part or material routers
    - physical control signals
    - rules and disciplines of the implemented control system
12. implement a visually controlled system, based on the demand of subsequent processes for the chosen parts, and which improves the overall process effectiveness

Unit 407 Leading the creation of flexible production and manpower systems

Outcome 2 Know how to lead the creation of flexible production and manpower systems

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which they are leading the activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the information required to create level schedules, load and capacity, Takt time and batch sizes
4. describe the meaning of 'level schedules', and how to create them
5. explain how to create a load and capacity diagram
6. explain Takt time, and how this is calculated
7. describe the application of standard work in progress
8. describe the application of visually controlled systems and signals, based on the demand of subsequent processes
9. describe the application of skills matrices
10. describe the application of consignment stocking
11. explain how to simplify working practices and reduce the human error risk
12. describe the consequences of introducing a new improved part/process/material router
13. explain problem solving and route cause analysis
14. describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential), and how to eliminate them
15. explain how to stabilise and then optimise equipment effectiveness
16. explain how to conduct a review of asset care/best practice effectiveness, and establish a robust routine of asset care and correct operation
17. describe the appropriate techniques that provides value to the customer (such as push-pull systems, single piece flow, just in time (JIT), Kanban, autonomation)
18. describe the techniques used to visually communicate the work done (such as level schedules, load and capacity diagrams, revised batch sizes, and Takt time)
19. explain how to lay out an effective workplace, utilising recognised techniques (such as cellular manufacturing incorporating parallel lines or U-shaped cells)
20. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 408 Leading problem solving activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to lead problem solving activities, in accordance with approved procedures. Problems could occur in any aspect of the business, such as manufacturing, engineering, processing, service and support functions. The learner will be expected to lead prompt and appropriate action to identify, analyse, approve and implement corrective actions to solve the problem.

The learner will be required to lead investigations into problems by obtaining and evaluating all the necessary data and information, to enable them to identify and justify the possible corrective actions and their effects on both the process and the people involved.

The learner's responsibilities will require them to comply with organisational policy and procedures for the successful implementation of the corrective actions to problems, and to report any difficulties that they cannot personally resolve to the relevant authority.

The learner's knowledge will provide a good understanding of a structured approach to problem solving. The learner will be conversant with organisational procedures and systems, including methods of evaluating the outcomes of the problem-solving activity. The learner's knowledge will enable them to take an informed approach to applying problem-solving techniques and procedures to a range of problems, and will provide a sound basis for carrying out the activities to the required standard.

The learner will be fully aware of any health, safety and environmental requirements, and the appropriate legislative and regulatory frameworks applicable to their area of work. The learner will be required to ensure that safe working practices are maintained throughout, and will understand the responsibility they owe to themselves and others in the work area.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead problem solving activities
2. Know how to lead problem solving activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 08: Leading problem solving activities (Suite 4)¶

Unit 408 Leading problem solving activities

Outcome 1 Lead problem solving activities

Assessment Criteria

The learner can:

1. lead prompt action to identify the nature and extent of the problems that arise
2. lead all of the following as part of the problem-solving activity:
    - ensure that performance monitoring/measurement and review processes are in place (such as the former DTI's seven measures of QCD, the seven quality tools, SPC)
    - utilise a team-based approach for the problem-solving activity
    - discuss/consult with the relevant people on the nature and extent of the problem
    - follow a structured problem solving process, and use appropriate techniques to identify the root cause(s)
    - communicate the proposed corrective action to the relevant people, obtaining feedback where appropriate
    - prepare a plan of action for implementation of the appropriate corrective action
    - monitor the implementation of corrective actions, and make necessary revisions to the plan of action (Plan, Do, Check, Act)
    - monitor the effectiveness of corrective actions following their implementation
    - review the effectiveness of corrective actions against the costs of implementation
    - review the problem-solving process to understand the lessons learned, in order to achieve further improvements within the business

3. obtain and evaluate all relevant data and information relating to the problem
4. obtain and evaluate data on the problem from four of the following sources:
    - statistical data
    - historical records (e.g. maintenance or shift logs)
    - quality audits
    - external sources
    - feedback from customers
    - mapping the process
    - operating procedures / manufacturing manuals
    - company procedures
    - health and safety information
    - environmental documents
    - observation
    - designed and controlled trials/experiments

5. evaluate possible root causes to problems by two of the following methods/techniques:
    - cause and effect diagram
    - five 'why' analysis
    - flowcharting
    - fault tree analysis

6. lead an evaluation of all realistic root causes of the problem
7. identify and justify the most effective corrective action

8. justify possible corrective actions to problems, by considering all of the following:
   - operational effectiveness
   - ease of implementation
   - timescale for implementation
   - financial impact
   - functionality of the system
   - environmental impact
   - staffing implications
   - quality implications
   - conformity with company policies
   - health and safety implications
   - customer delivery implications

9. ensure that corrective actions are implemented correctly and promptly
10. lead the implementation of corrective actions to problems, which comply with one of the following:
    - company standards and procedures
    - BS and/or ISO standards and procedures
    - customer standards and requirements

11. confirm the effectiveness of corrective actions, by using one of the following:
    - one or more of the former DTI's seven measures of QCD
    - one or more of the seven quality tools
    - statistical process control (SPC)

12. ensure all relevant people are kept informed of progress throughout the problem-solving activity
13. communicate with the relevant people throughout the problem solving activity, by using both of the following:
    - verbal communication
    - completion of company-specific documentation (paper or IT based)

14. confirm that corrective actions to problems comply with all relevant regulations and guidelines

Unit 408 Leading problem solving activities

Outcome 2 Know how to lead problem solving activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the problem solving activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the importance of wearing protective clothing and other appropriate safety equipment during the investigation of the problem, and where it may be obtained
4. explain methods used to detect that a problem has occurred
5. explain methods of containment of a non-conforming product or process
6. explain a structured process for problem solving (such as DMAIC methodology - Define, Measure, Analyse, Improve, Control)
7. describe the processes and procedures used within the scope of the problem-solving activity
8. explain how to obtain any necessary resources to support the problem-solving activity
9. describe the extent of their own responsibility, and to whom they should report if they have problems that you cannot resolve
10. describe the use of performance measurement and analysis to direct and focus improvement effort
11. describe the techniques used to obtain data and information on problems (such as the former DTI's seven measures of QCD), and the sources of information
12. describe the methods and techniques involved in evaluating information (such as the seven quality tools, Is / Is Not sheets, capability studies, measurement system analysis)
13. describe the importance of getting to the root cause
14. describe the methods and techniques involved in root cause analysis (such as 5 'Why' analysis, cause and effect diagrams, fault tree analysis, flowcharting, FMEA, process flow analysis)
15. describe the criticality of different types of problem, and how to prioritise the problems to be solved
16. explain how to obtain and interpret company policy and procedures
17. describe the factors that have to be taken into account when selecting the corrective action to a problem
18. explain methods used to choose and implement corrective actions (such as decision matrix, design of experiments, Gantt chart, Deming cycle (Plan-Do-Check-Act), error proofing)
19. explain whom to inform of actions taken, and by what means
20. describe the reporting procedures and documentation, and their application
21. explain methods used to monitor the effectiveness of corrective actions (such as statistical process control (SPC), the former DTI's seven measures of QCD, seven quality tools)
22. explain how to review the problem-solving process to understand the lessons learned, in order to achieve further improvements within the business

Unit 409 Leading an analysis and selection of parts for improvement

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading an analysis and selection of parts for improvement. It involves co-ordinating the principles and processes of analysing and selecting parts for improvements within the chosen area/product range. The learner will be expected to co-ordinate and analyse information to identify and produce part families, using criteria such as part shape, part size, materials used to manufacture the part, and the manufacturing process used.

The learner will also be required to lead an analysis within the chosen area/product range, typically focusing on customer schedules (volume), cost of producing the part, profit for each part as a percentage, manufacturing lead time, quality (scrap and non-conformance percentage) and the process/manufacturing route.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of analysing and selecting parts for improvement, and their application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead an analysis and selection of parts for improvement
2. Know how to lead an analysis and selection of parts for improvement

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 09: Leading an analysis and selection of parts for improvement (Suite 4)¶

Unit 409 Leading an analysis and selection of parts for improvement

Outcome 1. Lead an analysis and selection of parts for improvement

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. co-ordinate the collecting of all the information, documentation and equipment required to carry out the activity
4. co-ordinate and lead an analysis of information to identify and confirm the representative parts for improvement within the chosen area/product range
5. lead an analysis against three of the following criteria:
   - customer schedules (volume)
   - cost of producing the part
   - profit for each part, as a percentage
   - manufacturing lead time
   - quality (scrap and non-conformance percentage)
   - process/manufacturing route
6. approve an evaluation and grouping of the identified parts into appropriate part families
7. lead the production of part families, using all the following criteria:
   - part shape
   - part size
   - materials used to manufacture the part
   - manufacturing process
8. lead the production of and confirm a finalised list of the representative parts for the chosen area/product range

Unit 409 Leading an analysis and selection of parts for improvement

Outcome 2 Know how to lead an analysis and selection of parts for improvement

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which you are leading the activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the information required to conduct the activity, and where and from whom authority can be found
4. describe the principles and process of analysis (such as, pie charts, bar charts (Pareto analysis))
5. describe the techniques used to communicate the information and results gained by this process
6. explain how to create and present bar graphs/histograms
7. explain how to differentiate between lead time and cycle time
8. explain how the bill of materials (BOM) structure is configured for each of the representative parts
9. explain how to identify the origin/source of the parts within the chosen area
10. explain how to evaluate the information, in order to select the representative parts for the chosen area
11. the application of problem solving and root cause analysis
12. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 410 Leading lead time analysis activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading time analysis activities. It involves leading the principles and processes of lead time analysis to selected parts or processes. The learner will be expected to lead the identification of suitable parts or processes for which lead time profiles are to be produced, and then to review and confirm suitable and quantifiable objectives and targets for the reduction in lead time and the creation of lead time profiles for all of the representative parts or processes chosen.

The learner will also be expected to evaluate and confirm any problems or conditions within the work area/process where improvements can be made. This will require leading the production of a frequency diagram, listing the major bottlenecks or constraints as identified by each lead time profile. Typically, improvements would focus on supply or delivery of parts, improved workflow, improved quality, flexibility of people, launch of material and inventory balancing.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of lead time analysis, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1. Lead time analysis activities
2. Know how to lead time analysis activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 10: Leading lead time analysis activities (Suite 4)¶

Unit 410 Leading lead time analysis activities

Outcome 1 Lead time analysis activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within the learner's area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. lead the collection and co-ordination of information/data to produce a frequency diagram, listing the major bottlenecks or constraints as identified by each lead time profile
4. review and confirm quantifiable objectives and targets for the reduction in lead time of the chosen parts or processes
5. lead the lead time analysis activity, and the production of lead time profiles for all of the representative parts or processes chosen
6. evaluate and confirm any problems or conditions within the work area where improvements can be made
7. lead improvement opportunities for three of the following:
    - supply or delivery of parts
    - improved workflow
    - improved quality
    - flexibility of people
    - launch of material
    - inventory balancing
8. lead the production of revised lead time profiles, identifying the improved process
9. lead the production of a plan of the improvement activities and resources required, with timescales to achieve the targeted lead time

Unit 410 Leading lead time analysis activities

Outcome 2 Know how to lead time analysis activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which they are leading the activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the information required to create lead time profiles
4. describe the information required to construct the lead time profiles, and where this information can be obtained
5. explain how to co-ordinate and create lead time profiles
6. explain how to co-ordinate and create frequency charts
7. describe the techniques used to communicate the information and results obtained by this process
8. explain how to differentiate between lead time and cycle time
9. explain applying problem solving and root cause analysis (such as: Ishikawa diagrams, brainstorming)
10. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 411 Leading Value Stream Mapping (VSM) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading value stream mapping (VSM) activities. It involves leading the application of the principles and processes of value stream mapping to the approved parts, using appropriate improvement tools and techniques. The learner will be expected to lead the creation of a current state map for the parts or materials chosen, and to confirm problems or conditions within the current state map where improvements can be made. Typically, the improvements will include improved workflow, improved lead time, improved quality, reduced waste and improved safety.

The learner will also need to lead the production of future state maps, which include part or material flow through the process, information flow, inventory, set-up and cycle times for each operation, lead time for the part or material, value-adding percentage of lead time, delays which occur between each operation, Takt time and schedules for the chosen part or material, and customer and supplier ordering and delivery.

The learner's responsibilities will require them to comply with organisational policy and procedures for the value stream mapping activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of value stream mapping, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout

Learning outcomes

1. Lead Value Stream Mapping (VSM) activities
2. Know how to lead Value Stream Mapping (VSM) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 11: Leading value stream mapping (VSM) activities (Suite 4)¶

Unit 411 Leading Value Stream Mapping (VSM) activities

Outcome1. Lead Value Stream Mapping (VSM) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within the learner's area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. approve the selection of appropriate parts or materials on which the activity is to be carried out
4. lead the value stream mapping process on the chosen parts, using appropriate improvement tools and techniques
5. lead the creation of and approve a current state map for the parts or materials chosen to include all of the following:
    - part or material flow through the process
    - information flow
    - inventory
    - set-up and cycle times for each operation
    - lead time for the part or material
    - value-adding percentage of lead time
    - delays which occur between each operation
    - Takt time and schedules for the chosen part
    - customer and supplier ordering and delivery
6. confirm problems or conditions within the current state map where improvements can be made
7. confirm opportunities for improvements and waste that needs to be removed, in order to create a future state map covering three of the following:
    - improved workflow
    - improved lead time
    - improved quality
    - improved safety
    - less inventory
    - improved flexibility
    - less waste/cost

8. lead the production of and approve a future state map to include all of the following:
    - part or material flow through the process
    - information flow
    - inventory
    - set-up and cycle times for each operation
    - lead time for the part or material
    - value-adding percentage of lead time
    - delays which occur between each operation
    - Takt time and schedules for the chosen part
    - customer and supplier ordering and delivery

9. lead the implementation of the changes identified

Unit 411 Leading Value Stream Mapping (VSM) activities

Outcome 2 Know how to lead Value Stream Mapping (VSM) activities

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are leading the value stream mapping activity
2 explain how to plan the resources and time needed to carry out the agreed activity
3 explain how a part is selected for a value stream mapping activity
4 explain from whom authority is gained for release of people and resources for the value stream mapping activity
5 explain how to structure and run a value stream mapping event
6 describe the principles and processes for the deployment of value stream mapping
7 explain how improvements to the process can be achieved
8 explain how to evaluate improvement ideas and select those that will give the greatest benefit for the least spend
9 explain how to set quantifiable objectives and targets for the future state maps
10 explain how to create standard operating procedures (SOPs)
11 describe the techniques used to visually communicate the information and results of the process
12 describe the techniques of problem solving and root cause analysis
13 explain systems lead time, how they differ from actual lead time, and how both are constructed
14 explain how to calculate Takt time
15 describe the principles of increasing process capacity
16 explain what constitutes value adding and non-value adding activities
17 describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 412 Leading set-up reduction activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading set-up reduction activities. It involves co-ordinating the principles and processes of set-up reduction to a machine or process set-up, changeover, clean-down or turnaround activity that is a bottleneck or constraint which affects the process, such as capacity, flexibility, lead time, inventory or other business performance measure.

The learner will be expected to confirm where the problems occur within the set-up process, and to confirm where improvements can be made. The learner will need to agree suitable quantifiable objectives and targets against which the improvements are to be made. The activities will require them to co-ordinate the set-up reduction activities on different machines or processes, and to co-ordinate improvements to the current set-up, which will include such things as reduced set-up time, improved safety, improved quality and improved work practice.

The learner will also be required to approve changes to standard operating procedures for the new set-up, which include all of the new steps to be carried out, the time required for each step, differentiation between internal and external steps, standard equipment and its location (e.g. cutting tools, clamps, hand tools, inspection equipment) and information required for a quick set-up, and its location (e.g. CNC programs, drawings and manufacturing instructions).

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of set-up reduction, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead set-up reduction activities

2 Know how to lead set-up reduction activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 12: Leading set-up reduction activities (Suite 4)¶

Unit 412 Leading set-up reduction activities

Outcome 1 Lead set-up reduction activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. approve the identification of a machine or process set-up activity that is a bottleneck or constraint which affects productivity
4. co-ordinate the set-up reduction activity on the chosen machine or process, using the appropriate techniques
5. confirm problems or conditions within the current set-up, where improvements can be made
6. agree quantifiable objectives/targets for improvements to the chosen set-up
7. co-ordinate improvements to the current set-up which cover three of the following:
   - reduced set-up time
   - improved safety
   - improved quality
   - improved work practice
   - improved regulatory compliance
   - reduced cost
8. co-ordinate improvements to the current set-up, to meet the identified objectives and targets
9. approve the production of changes to standard operating procedures (SOPs) or other approved documentation that will sustain the improvements made to the set-up requirements
10. co-ordinate improvements to the new set-up, which covers three of the following:
    - all of the new steps, and the time required for each step
    - differentiation between internal and external steps
    - standard equipment and its location (e.g. cutting tools, clamps, hand tools, inspection equipment)
    - information required for a quick set-up, and its location (such as CNC programs, drawings and manufacturing instructions)
    - methods and standards
    - documentation for co-ordination control

Unit 412 Leading set-up reduction activities

Outcome 2 Know how to lead set-up reduction activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the set-up reduction activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain how a machine or process is selected for a set-up reduction activity
4. explain from whom authority is gained for the release of people and resources for the set-up reduction activity
5. describe the application of the Deming cycle (plan, do, check, act)
6. explain how to structure and run a set-up reduction activity
7. explain how improvements to the set-up can be achieved
8. explain how to evaluate improvement ideas and select those that will give most benefit for the least spend
9. explain how to set quantifiable targets and objectives for the improved set-up
10. explain how to correlate information to create or update standard operating procedures (SOPs) or other approved documentation for the revised set-up
11. explain how to distinguish between internal and external activities with reference to set-up
12. explain problem solving and the application of root cause analysis
13. describe the difference between 'motion' and 'work'
14. explain what constitutes a value adding and non-value adding activity
15. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 413 Leading Total Productive Maintenance (TPM) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to lead total productive maintenance (TPM) activities on equipment and processes, and aims to prevent equipment problems by identifying potential causes rather than waiting for a problem to occur. It involves the measurement of the six classic hidden losses, assessment of potential and priorities for loss reduction. It covers the application of the TPM principles and processes to resources, such as plant and equipment, machines, office equipment, service equipment and utilities. It also concerns assessment of the equipment/process condition, the steps required to restore the equipment/process to good working order, and then to set a robust asset care regime to maintain this condition.

The learner will be required to lead the application of the appropriate TPM techniques, and to use the data gathered on the resource to refine the working practices through the application of autonomous, condition based and planned maintenance. Working practice improvement will include cleaning and checking, early problem detection and process monitoring, and routine servicing. This will involve close working with both production and maintenance staff, and will include cross-shift implementation (if applicable to the learner's organisation).

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will also be responsible for ensuring that all tools and equipment used during the maintenance activities are correctly accounted for, and that all necessary job/task documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the TPM techniques and procedures used. The learner will need to understand the principles and procedures of TPM, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead Total Productive Maintenance (TPM) activities

2 Know how to lead Total Productive Maintenance (TPM) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 13: Leading total productive maintenance (TPM) activities (Suite 4)¶

Unit 413 Leading Total Productive Maintenance (TPM) activities

Outcome 1 Lead Total Productive Maintenance (TPM) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. approve the selection of the appropriate asset on which to carry out the total productive maintenance activity
4. lead the total productive maintenance process on at least two assets from the following:
   - plant and equipment
   - machines
   - office equipment
   - service equipment
   - utilities
5. obtain and approve the necessary information to carry out the activity
6. lead the carrying out of the total productive maintenance activity using the appropriate techniques
7. lead the total productive maintenance process, and show how one of the following is undertaken:
   - assess criticality of equipment/process condition and identify refurbishment needs
   - identify an integrated asset care plan for both operator and maintenance staff
8. use the overall equipment effectiveness (OEE) measure and information to confirm which elements of the OEE and their associated losses need improvement
9. lead the collection of information relating to all of the following:
   - load or demand
   - capacity
   - Takt time or bottleneck analysis

10. approve and use an action plan which will reduce/eliminate the losses, and hence improve the overall equipment effectiveness
11. lead the implementation of improvements to working practices through the total productive maintenance activities
12. confirm improvements to working practices through three of the following:
    - initial cleaning
    - countermeasures for cause and effect of dust and dirt
    - cleaning and lubrication standards
    - general inspection
    - autonomous inspection
    - workplace organisation
    - full circle implementation of autonomous maintenance

13. carry out all of the following total productive maintenance activities:
    - autonomous maintenance (front line asset care)
    - condition based maintenance (predictive)
    - planned maintenance steps (fixed interval)

Unit 413 Leading Total Productive Maintenance (TPM) activities

Outcome 2 Know how to lead Total Productive Maintenance (TPM) activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the total productive maintenance (TPM) activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the principles of TPM, and how they can be applied in administration procedures, safety improvement and quality maintenance
4. explain how to select an asset on which to carry out the TPM activity (assets could be plant and equipment, machines, office equipment, service equipment, utilities)
5. explain how to implement a systematic and structured approach to carrying out autonomous, condition based and planned maintenance
6. describe the difference between a chronic and sporadic loss, and the countermeasures to both
7. explain how to calculate overall equipment effectiveness (OEE)
8. explain where to find the information required to calculate the OEE for the chosen asset
9. describe the benefits of having a TPM system
10. describe the importance of taking ownership of the TPM system, and the issues that can be expected to be resolved
11. describe the six major losses and how loss-reduction actions need to be prioritised
12. describe the use of standard operating procedures, single point lessons and machine/process start up and shutdown procedures
13. explain an awareness of the improvement activities that will drive the implementation of the TPM activities (Kaizen and team working)
14. explain critical processes and early problem detection steps
15. explain loss areas and opportunities for improvement
16. explain standards of wear, and the ability to stabilise the component life
17. describe the techniques of visual management used to communicate the information and results obtained by this process (including TPM activity boards and checklists)
18. describe the integration with workplace organisation and improving OEE
19. explain contaminants and sources of contaminants
20. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 414 Leading the carrying out of Statistical Process Control (SPC) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading statistical process control (SPC) activities. It involves leading the application of the principles and processes of SPC to an approved process, and the gathering of all the necessary data for analysis, in consultation with relevant people. The learner will be expected to lead the application of statistical process control, utilising statistical and graphical methods to represent the process conditions. Typically, these would focus on simple run charts, tally charts, bar charts, histograms, run charts, box plots time series charts, Pareto diagrams and stem and leaf plots.

The learner will need to lead the basic statistical process control, identifying special cause versus common cause. The learner will also be expected to agree activities which will improve the process performance, and to approve an action plan to implement the improvements. Calculation of the capability of the process will focus on identifying and approving Cp and Cpk.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of statistical process control, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead Statistical Process Control (SPC) activities

2 Know how to lead Statistical Process Control (SPC) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 14: Leading statistical process control (SPC) activities (Suite 4)

Unit 414 Leading the carrying out of Statistical Process Control (SPC) activities

Outcome 1 Lead Statistical Process Control (SPC) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. work to, and ensure compliance with all the required process monitoring documentation and work instruction sheets
4. approve the process on which the process analysis is to be carried out
5. consult with relevant people and lead the gathering of the necessary data for analysis
6. lead the application of the principles and processes of statistical process control to the chosen process
7. lead the performing of basic statistical process control, using appropriate tools and techniques
8. lead the use of statistical and graphical methods to represent the process conditions
9. approve the capability of the process, identifying:
    - Cp
    - Cpk
10. lead the production of charts for process and control information, to include three from:
    - simple run charts
    - tally charts
    - bar charts
    - histograms
    - box plots
    - time series charts
    - Pareto diagrams
    - stem and leaf plots
    - run charts
11. agree activities which will improve the process performance
12. approve the production of an action plan to implement the improvements

Unit 414 Leading the carrying out of Statistical Process Control (SPC) activities

Outcome 2 Know how to lead Statistical Process Control (SPC) activities

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are leading the process control activities
2 explain how to plan the resources and time needed to carry out the agreed activity
3 explain where process control fits within a continuous improvement environment
4 explain how process performance affects customer satisfaction and process costs
5 explain where and why statistical process control is used, the benefits, and how it is applied
6 describe the importance of standardisation within a process operation, and why process performance can only be determined when it is controlled
7 explain how process control can improve process performance
8 describe the benefits of prevention and detection
9 describe the two types of variation within a process (common cause, special cause), and the impact they have within the process
10 explain how to gather data and effectively analyse it; how the data can be used to communicate abnormalities within a process
11 describe the main types of control charts used for SPC, their features and benefits, and how to construct and implement them
12 describe the meaning of a 'population' and a 'sample'
13 describe the measurements of central tendency and variability, and how they are calculated
14 describe the properties of a normal curve of distribution
15 explain how to create charts or diagrams (such as run charts, histograms, box plots, time series charts, Pareto diagrams, and stem and leaf plots)
16 explain how to explain the terms and calculate mean, median, mode, standard deviation, range and variance
17 explain how to explain and calculate process capability (Cp and Cpk)
18 describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 415 Leading flow process analysis activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to lead flow process analysis activities. It involves co-ordinating the application of the principles and procedures of flow process analysis, within a given work area, to lead to the production of a process analysis sheet. The learner will be required to discuss and agree elements of waste and problems or conditions within the process where improvements can be made. The learner will need to lead an evaluation and prioritisation of the opportunities for improvement, and to assist in this activity they will be required to approve the content of a payback matrix.

The learner will also be expected to use the information gathered to agree quantifiable objectives and targets for all the identified improvement activities, with an appropriate measure and timescale for their implementation. The flow process analysis will focus on establishing value added and non-value added activity.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of flow process analysis, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout

Learning outcomes

1 Lead flow process analysis activities

2 Know how to lead flow process analysis activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 15: Leading flow process analysis activities (Suite 4)¶

Unit 415 Leading flow process analysis activities

Outcome 1 Lead flow process analysis activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. co-ordinate the flow process analysis mapping activity within a given work area
4. lead the production of and approve a flow process analysis sheet
5. discuss and agree opportunities for improvement within the process
6. lead an evaluation of the opportunities for improvement, and approve the prioritisation of these using suitable criteria
7. lead an analysis of the data obtained into both:
    - non-value added activity
    - value added activity
8. agree quantifiable objectives and targets for all the defined improvement activities
9. lead the creation of and agree on an action plan which:
    - eliminates non-value added activity
    - simplifies value added activity

Unit 415 Leading flow process analysis activities

Outcome 2 Know how to lead flow process analysis activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the flow process analysis activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain how to describe a process in its elements/activities of work
4. describe the eight forms of waste within a lean working environment
5. describe the symbols and abbreviations used for flow process analysis (such as those defined by the American Standard for Methods Engineering (ASME) - to include operation, inspection, transport, waiting, storage)
6. explain how to map out a process or deployment flowchart, using the recognised symbols
7. explain what are classed as value-added and non-value added activities
8. explain how to establish which of the elements/activities in the process are value added or non value added
9. explain how to identify opportunities for improvements to the process
10. explain how to use data to eliminate activities that do not add value to the process
11. explain how to construct an action plan that will simplify the value added activities and eliminate the non-value added activities
12. explain how to construct an action plan (such as payback matrix)
13. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 416 Leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment). It involves leading the application of the principles and processes of business plan deployment in the learner's local area, and agreeing the area goals for the customer and the business they work in, to enable improvement opportunities and conditions to be approved which, when implemented, will deliver the local area policy deployment plan.

Typically, improvement opportunities will focus on such things as whether there is a local commitment to deliver the improvement plan, whether the policy deployment plan is communicated to everyone in the business, whether there are procedures for making all employees aware of and engaged in the local policy plan, whether there are local measures reflecting policy deployment plans, whether policy review dates are adhered to, whether there are procedures for eliminating cross-functional boundaries, and whether improvement actions are being linked to the policy deployment plan.

The learner will be required to lead the production of and approve a visual communication of the plans, which must include the resources required, measures of performance, timescales for completion, review dates of each activity, assigned ownership and responsibility for each action, and the order of importance of each improvement activity.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures of policy deployment, and is application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

2 Know how to lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 16: Leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment) (Suite 4)

Unit 416 Leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Outcome 1 Lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. evaluate the current policy deployment plan
4. lead the policy deployment process in your local area and agree the area goals
5. confirm the area goals for:
   - customers
   - the business in which they work
6. approve improvement opportunities and conditions which, when implemented, deliver the local area policy deployment plan
7. use at least four of the following criteria when approving improvement opportunities:
   - is there local commitment to deliver the improvement plan?
   - is the plan communicated to everyone in the business?
   - are all employees aware of and engaged in the local policy plan?
   - do local measures reflect policy deployment plans?
   - are policy review dates adhered to?
   - are cross-functional boundaries eliminated?
   - are improvement actions linked to the policy deployment plan?
8. confirm quantifiable objectives and targets for all the defined improvement activities, and agree an appropriate measure and timescale for completion
9. lead the production of and approve the policy deployment plan and communicate the plan in an appropriate visual format

10. lead the production of a visual communication of the plans, which must include all of the following:
    - the resources required
    - measures of performance
    - timescales for completion
    - review dates of each activity
    - assigned ownership and responsibility for each action
    - the order of importance of each improvement activity

Unit 416 Leading policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Outcome 2 Know how to lead policy deployment activities (Hoshin Kanri, quality operating systems, business plan deployment)

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which they are leading the improvement activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain where to find the information required to develop a local policy deployment plan
4. explain how to create policy deployment plans
5. describe the techniques used to communicate the information and results obtained by this process
6. explain how to differentiate between your business vision, mission and main business drivers
7. explain measures of performance in a lean business environment
8. describe the limits of your responsibility and involvement in the policy deployment planning process
9. describe the types of improvement activity that will drive the implementation of the business plan (eg, management tools and techniques which contribute to quality, cost, delivery and responsiveness)
10. describe the meaning and application of the Deming cycle (Plan, Do, Check, Act)
11. describe the application of gap analysis (current situation versus desired situation)
12. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 417 Leading value management (value engineering and value analysis) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading value management (value engineering and value analysis) activities. It involves leading the application of the principles and processes of value management (VM) to the chosen product or process. The learner will be expected to confirm what the customer requires from the product or the process, and to approve quantifiable objectives and targets to achieve this. The learner will need to lead the analysis of the functions of the process, agree costs of each of these functions, and confirm the added and non-value added activities within the process. The learner will also be expected to approve the most appropriate alternatives, lead a risk assessment of the alternatives, prioritise and rank the alternatives, and confirm the expected benefits. The learner will need to lead the development of these alternatives into detailed proposals that will improve the value of the product or process, and to provide costing recommendations for management approval.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and processes of value management, and its application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead value management (value engineering and value analysis) activities

2 Know how to lead value management (value engineering and value analysis) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 17: Leading value management (value engineering and value analysis) activities (Suite 4)¶

Unit 417 Leading value management (value engineering and value analysis) activities

Outcome 1 Lead value management (value engineering and value analysis) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead the application of the principles and processes of value management (VM) to the chosen product or process
4. confirm what the customer requires from the product or the process, and approve quantifiable objectives and targets for the value management activity
5. lead the analysis of the functions of the product or process being studied, and agree allocated costs to those functions
6. lead the production of a total cost model and supply chain map for the product or process, which shows how cost are related to function
7. confirm the non-value added activity within the product or process, and approve alternatives
8. lead the development of these alternatives into detailed proposals that will improve the value of the product or process
9. lead the production of detailed proposals of the findings of the value management activities which:
   - identify the non-value added activities and indicate alternatives
   - prioritise and rank the alternatives
   - include a risk assessment of the alternatives
   - identify the most appropriate alternatives
   - provide costing recommendations for management approval
   - identify expected benefits
10. approve the new value added process, and manage the plan within agreed timescales

Unit 417 Leading value management (value engineering and value analysis) activities

Outcome 2 Know how to lead value management (value engineering and value analysis) activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the work area in which they are leading the value management activities
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain how to select a product or process on which to carry out the value management activity
4. explain how to structure and run a value management activity
5. explain how to set quantifiable objectives and targets for the value management activity
6. explain how to carry out a function analysis
7. describe the performance related tools used to qualify customer wants and needs
8. describe the 'cost of function' equation, and how to calculate the cost of function
9. explain FAST diagramming and value trees
10. explain decision making and creativity techniques (brainstorming)
11. explain how value management relates to the overall business strategy and competitive positioning
12. explain how to produce a total cost model and supply chain map for the product or process
13. explain what constitutes value adding and non-value adding activities
14. explain how to identify what a customer requires from a product or process
15. explain how to prioritise and rank the alternatives
16. explain how to complete a risk assessment of the alternatives
17. explain how to prepare the findings into proposals
18. explain how to monitor and track proposals to implementation
19. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 418 Leading Failure Modes and Effects Analysis (FMEA) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading failure modes and effects analysis (FMEA) activities. It involves leading the principles and processes of FMEA and agreeing the key features of FMEA required for the activity under investigation. The activities will include concepts, designs, systems, products, processes and machines.

The learner will be required to agree the key features of FMEA, check the recording of the information gathered in an appropriate format, and consider and approve valid judgements about the activity, using FMEA principles. This will include approving risk priority numbers (RPNs), agreeing high RPNs and agreeing actions to improve them. Once actions have been completed, the learner will need to lead the reassessment of the activity and review the re-score of severity, occurrence and detection.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they can not solve, or that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of FMEA, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of FMEA, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead Failure Modes and Effects Analysis (FMEA) activities

2 Know how to lead Failure Modes and Effects Analysis (FMEA) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 18: Leading failure modes and effects analysis (FMEA) activities (Suite 4)

Unit 418 Leading Failure Modes and Effects Analysis (FMEA) activities

Outcome 1 Lead Failure Modes and Effects Analysis (FMEA) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. agree the key features of failure modes and effects analysis required for the activity under investigation
4. lead the carrying out of a failure modes and effects analysis on two of the following:
   - concept
   - product
   - design
   - process
   - system
   - machine
5. agree, for the activities analysed:
   - the potential failure modes
   - the potential effects from failure modes
   - the potential causes of failure modes
6. co-ordinate the production of a failure modes and effects analysis
7. check the recording of the information gathered in an appropriate format
8. approve the score for all of the following:
   - the likely occurrence of a potential failure modes
   - the severity of the potential failure modes
   - the likelihood of detection of the potential failure modes
9. consider and approve valid judgements about the activity using failure modes and effects analysis principles
10. approve the risk priority numbers (RPNs) calculations, agree high RPNs, and agree actions to improve them

11. check rating tables for all of the following:
    - occurrence
    - severity
    - detection

12. lead the reassessment of a failure modes and effects analysis once actions have been completed, and review the re-score of severity, occurrence and detection

Unit 418 Leading Failure Modes and Effects Analysis (FMEA) activities

Outcome 2 Know how to lead Failure Modes and Effects Analysis (FMEA) activities

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are leading the failure modes and effects analysis
2 explain how to plan the resources and time needed to carry out the agreed activity
3 describe the main features and benefits of carrying out a failure modes and effects analysis
4 explain who should be part of a team that constructs and updates a failure modes and effects analysis
5 explain system FMEA, concept FMEA, design FMEA and process FMEA - what they are, and where they should use them
6 describe the meaning of failure mode, failure effect and failure cause
7 describe the rating scale used in failure modes and effects analysis projects, to include the severity rating scale, the occurrence rating scale and the detection rating scale
8 explain how to calculate a risk priority number (RPN)
9 explain how to use the risk priority numbers
10 explain how to apply a structured approach to risk reduction
11 explain when to start a failure modes and effects analysis
12 explain when to update a failure modes and effects analysis
13 describe the roles and responsibilities of individuals within a failure modes and effects analysis team
14 describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve

Unit 419 Leading Measurement Systems Analysis (MSA) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading measurement systems analysis (MSA) activities. It involves approving an appropriate measurement system on which to carry out the analysis, and obtaining and approving all the necessary data in order to carry out the measurement systems analysis. The learner will be expected to lead the application of the principles and processes of measurement system analysis, which will include such things as directing the completion of a calibration study on a gauge, leading a gauge linearity study, leading either an attribute or a variable gauge repeatability and reproducibility study, directing a metrology study on a measurement system which includes either a variable or attribute gauge repeatability and reproducibility study.

The learner will be required to lead the carrying out of the analysis using the appropriate techniques, and to confirm the recording of the results of the analysis in the appropriate format. From this information, they will need to confirm the percentage gauge repeatability and reproducibility of the measurement system under study, and to lead the production of a detail report suggesting ways in which the measurement system might be improved.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of measurement systems analysis, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of MSA, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead Measurement Systems Analysis (MSA) activities

2 Know how to lead Measurement Systems Analysis (MSA) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 19: Leading measurement systems analysis (MSA) activities (Suite 4)

Unit 419 Leading Measurement Systems Analysis (MSA) activities

Outcome 1 Lead Measurement Systems Analysis (MSA) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. approve the selection of an appropriate measurement system on which to carry out the analysis
4. lead the carrying out of a measurement system analysis, which includes three from the following:
   - completing a calibration study on a gauge
   - conducting a gauge linearity study
   - completing either an attribute or a variable gauge repeatability and reproducibility study
   - conducting a metrology study on a measurement system which includes either a variable or attribute gauge repeatability and reproducibility study
5. obtain and approve all the necessary data in order to carry out the measurement systems analysis
6. lead the carrying out of the analysis, using the appropriate techniques
7. agree the type of measurement system variation, to include two of the following:
   - bias
   - linearity
   - stability
   - accuracy
   - repeatability
   - reproducibility
8. confirm the recording of the results of the analysis in the appropriate format

9. agree the percentage gauge repeatability and reproducibility of the measurement system under study, and approve ways of improving the measurement system
10. lead the production of a measurement systems analysis report, detailing ways of improving the measurement system under study

Unit 419 Leading Measurement Systems Analysis (MSA) activities

Outcome 2 Know how to lead Measurement Systems Analysis (MSA) activities

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the measurement
2. systems analysis
3. explain how to plan the resources and time needed to carry out the agreed activity
4. explain why we should study our measurement systems
5. explain how to select a measurement system for analysis
6. describe the possible sources of measurement systems variation
7. describe the use of measurement systems analysis, and how it can be used in a six sigma
8. improvement project
9. explain how to conduct a variable and a attribute repeatability and reproducibility study
10. describe the terminology used in measurement system analysis (such as bias, linearity, stability,
11. accuracy, repeatability, discrimination, resolution, reproducibility)
12. explain how to conduct a measurement systems analysis study
13. explain how to calculate gauge repeatability and reproducibility
14. explain how to calculate gauge precision and tolerance
15. explain industry rules for repeatability and reproducibility results
16. describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve

Unit 420 Carrying out Design of Experiments (DoE)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for carrying out design of experiments (DOE). It involves applying the principles and process of design of experiments to the selected plant or process, which will require the plant or process being taken out of production to run the methodology.

The learner will need to calculate the correct sample size required and identify a suitable sampling plan to reduce any systematic errors. The learner 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 design of experiment will be recorded and analysed to identify areas where improvements to the process can be made. The learner will also need to produce a report of the findings along with an action plan to ensure the improvements identified are implemented.

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

The learner's knowledge will provide a good understanding of design of experiments and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of design of experiments 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.

Learning outcomes

1 Carry out Design of Experiments (DOE)

2 Know how to carry out Design of Experiments (DOE)

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 20: Carrying out design of experiments (DOE) (Suite 4)¶

Unit 420 Carrying out Design of Experiments (DoE)

Outcome 1 Carry out Design of Experiments (DOE)

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. select an appropriate process on which to carry out the design of experiment 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 required for the experiment
5. estimate the resources and expected benefits for the design of experiment undertaken
6. document the resources required to include:
   - financial
   - time scales
   - manpower
   - plant/equipment
   - materials
7. identify a suitable sampling plan to reduce systematic errors
8. carry out a design of experiment within an improvement project utilising the appropriate tools and techniques
9. for the experiment undertaken identify:
   - a suitable Alpha risk level
   - a suitable Delta that needs to be observed
   - a suitable Beta level
10. determine the correct experimental design to use from one of the following:
    - full factorial
    - 2^k factorial
    - fractional factorial
11. record the results of the design of experiment in the appropriate format
12. analyse the data gathered and identify areas where improvements to the process can be made
13. calculate and produce graphs for the following:
    - main effects
    - interactions
14. produce a design of experiment report which includes an action plan to ensure the improvements

Unit 420 Carrying out Design of Experiments (DoE)

Outcome 2 Know how to carry out Design of Experiments (DOE)

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are carrying out an experiment
2. explain why we need to use design of experiments and how this benefits an improvement project
3. explain how to determine the scope of an experiment
4. explain how to carry out a design of experiment project and the tools and techniques used
5. explain where to obtain the data required to carry out the design of experiment
6. explain how to calculate the sample size to be used in the design of experiment
7. explain what is meant by alpha risk and beta risk
8. explain how to use the data obtained to calculate: mean, median, mode, standard deviation, range and variance
9. explain how to calculate and graphically display main effects and interactions
10. explain what is the meaning of a population and a sample in terms of the design of experiment
11. explain how to design a suitable array for the designs to include full factorial, 2k factorial and fractional
12. explain how to design an array to assess the selected interactions from the designs to include full factorial, 2k factorial and fractional
13. describe the extent of their own authority and whom they should report to, in the event of problems that they cannot resolve

Unit 421 Leading mistake/error proofing (Poka Yoke) activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading of mistake/error proofing (Poka Yoke) activities, which is a method of making an activity 'foolproof'. It involves leading the application of the principles and procedures of mistake/error proofing to the chosen activity, to enable worksheets to be produced for the activity that identify the problem, evaluate any actions to be taken, and indicate the benefits to be gained. Typically, worksheets would focus on the description of the mistake/error identified, the containment action taken, the root cause of the mistake/error and the permanent corrective action to be taken. The learner will be required to lead trials on the suggested improvements, which will include confirming their effectiveness, cost and complexity.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner need's to ensure that all necessary job/task documentation and analysed data is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of mistake/error proofing, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of mistake/error proofing, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead mistake/error proofing (Poka Yoke) activities
2 Know how to lead mistake/error proofing (Poka Yoke) activities

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 21: Leading mistake/error proofing (Poka Yoke) activities (Suite 4)

Unit 421 Leading mistake/error proofing (Poka Yoke) activities

Outcome 1 Lead mistake/error proofing (Poka Yoke) activities

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
    - set out an communicate the purpose of the improvement activities
    - involve the team in planning how the improvement activity will be achieved
    - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
    - provide advice and support the team to achieve both team and individual improvement objectives
    - motivate the team to present their own improvement ideas
    - encourage the team and/or individuals to take the lead where appropriate
    - agree the implementation of the improvement ideas
    - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
    - monitor the progress of improvement activities
    - deal with any organisational problems identified during the improvement activity
3. use information and data to approve the selection of a suitable process on which the mistake/error proofing activity is to be carried out
4. lead the application of the mistake/error proofing process to the chosen activity
5. use appropriate techniques to analyse the data received, and confirm valid conclusions
6. evaluate recommendations and lead the production of worksheets for the activity that identify the problem and actions to be taken
7. lead the creation of a worksheet of the mistake/error proofing activity, identifying:
    - the description of the mistake/error identified
    - the containment action taken
    - the root cause of the mistake/error
    - the permanent corrective action to be taken
8. agree suitable solutions, and manage the carrying out of agreed trials to measure the effectiveness of the solution
9. approve suitable solutions and determine their:
    - effectiveness
    - cost
    - complexity
10. confirm and co-ordinate the implementation of the optimum solution
11. lead the measurement and documentation of the results
12. identify the benefits of mistake/error proofing in terms of:
    - improved quality/compliance (such as ISO9001)
    - reduced costs
    - delivery or service

Unit 421 Leading mistake/error proofing (Poka Yoke) activities

Outcome 2 Know how to lead mistake/error proofing (Poka Yoke) activities

Assessment Criteria

The learner can:

1 explain how to define a mistake/error proofing activity, and the benefits of carrying this out
2 describe the difference and benefits between mistake/error proofing and prevention and detection
3 explain how to plan the resources and time needed to carry out the agreed activity
4 describe the selection criteria used to determine a suitable product or process on which to carry out the mistake/error proofing activity
5 explain how mistake/error proofing can lead to zero defects
6 describe the relationship between errors and defects
7 describe the different types and range of mistakes
8 explain how defects originate in products or processes
9 explain how the role of source inspection contributes to the reduction of defects
10 describe the application of mistake/error proofing (Poka Yoke) tools (such as 'cause and effect', and the 5 'why's)
11 describe the type of mistake/error proofing documentation, and the information it should contain
12 describe the analysis and charting methodology used for mistake/error proofing
13 describe the financial implications of mistake/error proofing projects
14 describe the relationship between mistake/error proofing and other continuous improvement processes (such as workplace organisation 5S/5C, quick changeovers, cellular manufacturing, total productive maintenance, structured problem solving and visual management)
15 explain how to undertake trials and measure the effectiveness of mistake/error proofing projects
16 describe the different types and range of mistake proofing devices used
17 describe the roles and responsibilities of individuals within a mistake/error proofing team (including facilitator, timekeeper, scribe)
18 describe the extent of their own authority within the activity, and to whom they should report in the event of problems that they cannot resolve

Unit 422 Applying Quality Function Deployment (QFD)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying quality function deployment (QFD). It involves identifying the customer requirement of a product or process and obtaining all the required information necessary to perform the QFD project study. These, typically, would cover the needs and expectations of the customer and the functions and features required by the customer.

The learner will be required to produce a matrix for the quality function deployment activity, which identifies the four phases (e.g. pre- planning, design deployment, process and production planning and managing deployment). The learner will need to analyse the information gathered (such as score matrices for relationships, technical requirements, correlations, planning and specifications) and draw conclusions as to the appropriate course of action. The learner will be expected to record the results of the analysis in the appropriate format to enable a report to be compiled, outlining the findings of the activity and the recommended solutions.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve, or are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of quality function deployment and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of QFD, 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.

Learning outcomes

1 Apply Quality Function Deployment (QFD)

2 Know how to apply Quality Function Deployment (QFD)

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 22: Applying quality function deployment (QFD) (Suite 4)¶

Unit 422 Applying Quality Function Deployment (QFD)

Outcome 1 Apply Quality Function Deployment (QFD)

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. identify the customer requirement of a product or process using quality function deployment
3. obtain all the required information necessary to perform the quality function deployment study
4. produce a matrix for a quality function deployment project which identifies the four phases as follows:
   - pre-planning
   - design deployment
   - process and production planning
   - managing deployment

5. determine the customer requirements within the project in terms of:
   - needs and expectations
   - functions
   - features

6. carry out the quality function deployment project
7. identify within the quality function deployment project the:
   - necessary inputs and how to acquire them
   - the outputs from each of the four phases and their execution
   - customer rankings
   - substitute quality characteristics

8. analyse the information gathered and draw conclusions as to the appropriate course of action
9. record the results of the analysis in the appropriate format
10. produce and score matrices for three of the following:
    - relationships
    - technical requirements
    - correlations
    - planning
    - specifications

11. produce a report outlining the findings and the recommended solutions

Unit 422 Applying Quality Function Deployment (QFD)

Outcome 2 Know how to apply Quality Function Deployment (QFD)

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the quality function deployment activity

2 describe the advantages of using quality function deployment

3 describe the 'quality lever' and how quality function deployment fits this model

4 describe the terms 'house of quality' and 'voice of the customer'

5 explain how quality function deployment relates to potential failure modes and effects analysis, design of experiments, value analysis, control plans, pugh concept diagrams

6 explain how to carry out a quality function deployment activity, and the tools and techniques used

7 describe the four phases of quality function deployment (pre-planning, design deployment, process and production planning, managing deployment)

8 explain how to identify the necessary inputs and outputs for each of the phases

9 explain what are the customer's requirements within the project, in terms of needs and expectations, features and functions

10 explain how to produce matrices for relationships, specifications, technical requirements and planning

11 explain how to score the matrices within the quality function deployment

12 describe the extent of their own authority within the project and whom they should report to, in the event of problems they cannot resolve, and to whom they should report in the event of problems that they cannot resolve

Unit 423 Leading the creation of Standard Operating Procedures (SOP)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to lead the creation of standard operating procedures (SOP) for work activities.

This will involve leading the documenting of the information gathered from the method used when performing the operation/process. The learner will lead the preparations required from start to finish, advise on the quality and safety standards to be maintained, and agree on the drawings, tooling, fixtures, gauges, and other items that are used during the operation or process. The learner will need to agree the 'key points' in the document, and advise on the use of drawings, photographs and/or sketches, as appropriate.

The learner will be required to ensure that those involved in performing the operation or process have the opportunity to contribute, and agree the method identified.

The learner will also be required to lead the production of standard operating procedures for a range of activities, such as cleaning of equipment, maintenance of equipment, health and safety practices and procedures, process procedures, manufacturing operations and quality improvements.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and procedures for creating standard operating procedures, and their application, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the creation of Standard Operating Procedures (SOP)

2 Know how to lead the creation of Standard Operating Procedures (SOP)

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 23: Leading the creation of standard operating procedures (SOP) (Suite 4)

Unit 423 Leading the creation of Standard Operating Procedures (SOP)

Outcome 1 Lead the creation of Standard Operating Procedures (SOP)

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity

3. lead the production of a standard operating procedure for two of the following:
   - cleaning of equipment
   - maintenance of equipment
   - health, safety and environmental practices and procedures
   - process procedures
   - manufacturing operations
   - quality improvements
   - improvements to customer satisfaction

4. lead the production of standard operating procedures that include all of the following:
   - operation/process to be performed
   - part/product number and part/product description/operation reference
   - operation/process number
   - preparation activities prior to starting the operation/process
   - description of the full operation/process, broken down into appropriate tasks/activities
   - quality standards, health and safety requirements, environmental issues/requirements
   - tooling/fixtures/gauges/equipment required
   - sketches/photographs/drawings that assist completion of the operation/process
   - date of first issue
   - originator of the document
   - latest revision date

5. lead the gathering of information of the current operation or process to identify the optimum and safest method
6. agree what tools, equipment, fixtures, documentation and standards are required
7. ensure that all team members performing the operation or process have the opportunity to contribute, and agree the method identified
8. lead the production of standard operating procedures in an agreed format and monitor their accuracy against the operation or process requirements
9. lead the production of standard operating procedures that minimise all of the following:
    - time
    - effort
    - waste
10. arrange for the supply of standard operating procedures at their point of use, and the storage of copies and master copies in accordance with company requirements
11. lead the revision of standard operating procedures, as appropriate, to ensure their effectiveness in the workplace
12. establish confirmation that the method defined will meet quality, productivity, health, safety and environmental requirements

Unit 423 Leading the creation of Standard Operating Procedures (SOP)

Outcome 2 Know how to lead the creation of Standard Operating Procedures (SOP)

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area for which they are leading the creation of standard operating procedures (SOP)
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the various formats used in creating SOP
4. explain where to find the SOP document format to be used in their business
5. describe the information that will be required to create a SOP
6. explain how SOP are structured, and the importance of their use
7. explain methods of communicating/facilitating to ensure that all the required information for the SOP is captured
8. describe the operation/process to be captured in the SOP
9. explain why SOP are the basis for quality and continuous Improvement
10. describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them
11. explain how to simplify work done, eliminating waste and potential for human error
12. explain Takt time, and the relationship with achieving flow in a process
13. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 424 Leading the application of Six Sigma methodology to a project

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the application of a structured Six Sigma methodology to a project. It involves leading the identification of the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that will apply. These will include financial, quality and process aspects of the project. The learner will be expected to agree areas where the Six Sigma tools, techniques and activities can be applied, in order to demonstrate those factors that are critical to the customer, business and process.

Contribution to the identification of the cost of poor quality by agreeing the defects per million opportunities (DPMO) is a major part of this unit.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they cannot solve, or that are outside your responsibility, to the relevant authority. The learner will need to ensure that all the five phases of Six Sigma are utilised within the project (such as define, measure, analyse, improve and control), and to ensure all necessary project documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of the application Six Sigma methodology, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of Six Sigma methodology, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the application of Six Sigma methodology to a project

2 Know how to lead the application of Six Sigma methodology to a project

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 24: Leading the application of Six Sigma methodology to a project (Suite 4)

Unit 424 Leading the application of Six Sigma methodology to a project

Outcome 1 Lead the application of Six Sigma methodology to a project

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead the application of the structured Six Sigma methodology and approach to the selected project
4. lead and participate in Six Sigma projects which cover two the following:
   - manufacturing
   - quality level
   - administration
5. lead the utilisation of the five phases of Six Sigma within the project:
   - define
   - measure
   - analyse
   - improve
   - control
6. approve the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that would apply
7. lead the production of a diagram (family tree) of the Six Sigma organisational infrastructure and the roles of:
   - Champion
   - Mentor
   - Yellow Belt
   - Green Belt
   - Black Belt
   - Master Black Belt

8. lead the production of a metric chart for the Six Sigma projects undertaken:
    - financial
    - quality
    - process
9. agree areas where the Six Sigma tools, techniques and activities can be applied, and direct the need to measure those factors that are critical to quality characteristic (CTQC) for the customer, business and process
10. identify the critical to quality characteristic (CTQC) of the projects, to include:
    - cost
    - quality
    - delivery

11. contribute to the identification of the cost of poor quality, by agreeing the defects per million opportunities (DPMO)
12. establish defects per million opportunities to the sigma score, and determine the gap to Six Sigma performance

Unit 424 Leading the application of Six Sigma methodology to a project

Outcome 2 Know how to lead the application of Six Sigma methodology to a project

Assessment Criteria

The learner can:

1. describe the Six Sigma methodology, and how it is applied to a project
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the Six Sigma infrastructure and philosophy
4. describe the benefits that will arise from a Six Sigma project
5. describe the 'parts per million opportunities' goal of Six Sigma
6. describe the calculation of defects per million opportunities (DPMO)
7. describe the five phases of Six Sigma that are applied to a project
8. explain how to define a critical to quality characteristic (CTQC)
9. explain how non-value added activity can serve as a roadblock for achieving Zero Defect
10. explain how to define an 'opportunity for defect'
11. describe the roles and responsibilities of the key players in the Six Sigma process (Champion, Mentor, Master Black Belt, Black Belt, Green Belt and Yellow Belt)
12. describe the relationship between key process input variables (KPIV) and key process output variables (KPOV) (using the equation Y=(f)x)
13. describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

Unit 425 Leading the carrying out of Six Sigma process mapping activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the carrying out of a Six Sigma process mapping activity. It requires the learner to approve the selection of a suitable process on which to carry out the process mapping activity, and to agree the key stages that form the overall process under investigation. These would be the process input variables and the process output variables, and would include things which are controllable, critical, noise, and standard operating procedures.

The learner will be required to lead the construction of the process map for the Six Sigma project and to confirm the value added and non-value added steps in the process. The learner will also need to consider the information gathered in the Six Sigma mapping activity, and to agree areas where improvements can be made to the process as a result of the information gathered.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they cannot solve, or that are outside their responsibility, to the appropriate authority. The learner must ensure that all the necessary documentation/visual representation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of Six Sigma process mapping, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and the application of Six Sigma process mapping, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the carrying out of Six Sigma process mapping

2 Know how to lead the carrying out of Six Sigma process mapping

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 25: Leading the carrying out of Six Sigma process mapping (Suite 4)¶

Unit 425 Leading the carrying out of Six Sigma process mapping activities

Outcome 1 Lead the carrying out of Six Sigma process mapping

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. approve the selection of a suitable process on which to carry out the process mapping activity
4. agree the key stages that form the overall process under investigation
5. lead the collection of the data necessary to construct the Six Sigma process map
6. lead the construction of the process map for the Six Sigma project
7. lead the production of a process map, which identifies:
   - the key process input variables
   - the key process output variables
8. confirm both the key process input variables and the key process output variables as one or more of the following:
   - controllable
   - critical
   - noise
   - standard operating procedure
9. confirm the value added and non-value added steps in a process
10. identify and agree improvements to the process as a result of the information gathered in the Six Sigma mapping activity
11. agree and have included on the process map the specifications of both the:
    - key process input variables
    - key process output variables

Unit 425 Leading the carrying out of Six Sigma process mapping activities

Outcome 2 Know how to lead the carrying out of Six Sigma process mapping

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the process mapping activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the benefits of carrying out Six Sigma process mapping
4. explain what a Six Sigma process map is and how it is constructed
5. explain how the Six Sigma process map integrates within a Six Sigma project
6. describe what is meant by key process input variables (KPIVs) and key process output variables (KPOVs)
7. describe the data collection point for the key process input variables and key process output variables (such as gauges, forms and samples)
8. explain what the main types of key process input variables and key process output variables are in terms of being controllable, critical, noise, or standard operating procedures
9. explain who should create a Six Sigma process map
10. describe the difference between a value added activity and a non-value added activity
11. describe the roles and responsibilities of individuals within a process mapping team
12. describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve

Unit 426 Leading the application of basic statistical analysis

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the application of basic statistical analysis, by consulting with the appropriate people and leading the gathering the relevant data for statistical analysis on a Six Sigma project.

The learner will need to lead the use the data gathered to produce descriptive statistics, which cover mean, median, mode, standard deviation, range and variance for the selected representative sample. The learner will be expected to lead the recording of the statistics gathered, using a variety of techniques that could include bar charts, histograms, Pareto diagrams, stem and leaf diagrams, box plots and time series charts. The learner will also be required to approve the production of an action plan as a result of the statistical and graphical analysis undertaken.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they can not solve, or that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation and/or visual representations are completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of basic statistics, and will provide an informed approach to the analytical techniques and procedures used. The learner will need to understand the principles and application of basic statistical analysis, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the application of basic statistical analysis

2 Know how to lead the application of basic statistical analysis

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 26: Leading the application of basic statistical analysis (Suite 4)¶

Unit 426 Leading the application of basic statistical analysis

Outcome 1 Lead the application of basic statistical analysis

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. consult with appropriate people and lead the gathering of the relevant data for statistical analysis
4. direct the production of data gathering forms or charts to gather information to enable statistical and graphical analysis to take place
5. lead the recording of the collected data, utilising three of the following methods:
   - bar charts
   - histograms
   - Pareto diagrams
   - stem and leaf diagrams
   - box plots
   - time series charts
6. lead the use of statistical and graphical analysis on a Six Sigma project
7. lead the production of descriptive statistics of data, to include all of the following:
   - mean
   - median
   - mode
   - standard deviation
   - range and variance
8. lead the production of a normal distribution to assess a population from the representative sample
9. interpret the statistical data collected, in order to validate and approve the pre-determined courses of action
10. approve the production of an action plan as a result of the statistical and graphical analysis undertaken

Unit 426 Leading the application of basic statistical analysis

Outcome 2 Know how to lead the application of basic statistical analysis

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the collecting of data
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the meaning of 'variation', how this can be detected with statistics, and how this variation can affect a process
4. describe the number of data points needed to draw a statistically valid conclusion
5. explain why we need to use basic statistics
6. describe the meaning of the terms 'population' and 'sample' when applied to basic statistics
7. explain distribution curves and the properties of a normal curve
8. explain how to create and use charts and diagrams (such as histograms, box plots, time series charts, Pareto diagrams, stem and leaf diagrams)
9. explain how to calculate mean, median, mode, standard deviation, range and variance
10. describe the difference between descriptive and inferential statistics
11. describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve

Unit 427 Leading the application of Six Sigma metrics to a project

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the application of Six Sigma metrics to products and processes. It involves consulting with appropriate personnel and leading the gathering all the necessary data to produce a metric graph.

The learner will need to lead the application of Six Sigma metrics to monitor the process and justify improvements, approving both primary and secondary metrics for the Six Sigma project. The learner will be expected to direct the use of the data collected and the graph produced to identify and approve where improvements can be made, and to approve an action plan that will bring about the improvements.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that they cannot solve, or that are outside their responsibility, to the relevant authority. The learner must ensure that all the necessary documentation/visual representation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity, and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of the production of Six Sigma metrics, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of Six Sigma metrics, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the application of Six Sigma metrics to a project

2 Know how to lead the application of Six Sigma metrics to a project

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 27: Leading the application of Six Sigma metrics to a project (Suite 4)¶

Unit 427 Leading the application of Six Sigma metrics to a project

Outcome 1 Lead the application of Six Sigma metrics to a project

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead Six Sigma metrics activities on both:
   - products
   - processes
4. consult with appropriate personnel and lead the gathering of the necessary data to produce a metric graph
5. for the selected activity, lead the application of Six Sigma metrics to monitor the process and justify improvements
6. confirm, for each of the activities covered:
   - defects per million opportunities
   - defects per unit
   - rolled through put yield (Yrt)
   - the sigma score
7. confirm and approve metrics, which are:
   - long-term
   - short-term
   - variable or attribute
8. approve both primary and secondary metrics for the Six Sigma project
9. agree where appropriate to transform variable data to attribute data
10. direct the use of the data collected to complete a primary metric graph
11. use the graph produced to identify and approve where improvements to metrics can be made
12. approve an action plan that will bring about the improvements

Unit 427 Leading the application of Six Sigma metrics to a project

Outcome 2 Know how to lead the application of Six Sigma metrics to a project

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the Six Sigma metrics activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. describe the main features and benefits of carrying out a Six Sigma metrics activity
4. describe the importance of using metrics to drive a Six Sigma project
5. explain how to calculate defects per million opportunities, defects per unit and rolled throughput yield
6. explain how to utilise Z tables to calculate the sigma score
7. describe the time period necessary to calculate a meaningful baseline
8. explain how to set realistic objectives and targets for the Six Sigma metrics activity
9. explain how to gather the data required for inclusion in a metric chart
10. explain how to construct a Six Sigma metric chart
11. describe the relationship between 'parts per million', 'defects per million opportunities', Yrt and the sigma score
12. describe the difference between variable and attribute data
13. explain why it is advantageous to transform attribute data into variable data
14. explain how to transform attribute data into variable data
15. describe the significance of the 1.5S shift, and how it can be utilised to infer long-term metric values
16. describe the extent of their own authority within the project, and to whom they should report in the event of problems that you cannot resolve

Unit 428 Leading the production of a characteristic selection matrix

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the production of a characteristic selection matrix. It involves working with the customer to agree the customer requirements and manage the application of a characteristic selection matrix to the Six Sigma project to create greater customer satisfaction. The learner will need to lead the collection of the necessary data and lead the production of a characteristic selection matrix for the chosen activity by managing the five-step process for generating the matrix. This will require listing the customer key process output variables, scoring the key process output variables, listing the key process input variables that impact the customer key process output variables, numerically rating the interaction between key process input variables and customer key process output variables and using ranking to prioritise future team focus. The learner will then be expected to use this information to identify and approve activities in the process where improvements can be made.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation/visual representation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of producing a characteristic selection matrix and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application for managing the production of a characteristic selection matrix in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the production of a characteristic selection matrix

2 Know how to lead the production of a characteristic selection matrix

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 28: Leading the production of a characteristic selection matrix (Suite 4)¶

Unit 428 Leading the production of a characteristic selection matrix

Outcome 1 Lead the production of a characteristic selection matrix

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. work with the customer to agree the customer requirements and manage the application of a characteristic selection matrix to the Six Sigma project
4. lead the production of a characteristic selection matrix for two of the following:
   - concept
   - product
   - design
   - process
   - system
   - machine
5. lead the five-step process for generating a characteristic selection matrix:
   - list the customer key process output variable
   - score the key process output variables
   - list the key process input variables that impact the customer key process output variables
   - numerically rate the interaction between key process input variables and customer key process output variables
   - use ranking to prioritise future team focus
6. lead the collection of all the required data necessary to create the matrix
7. lead the production of a characteristic selection matrix for the chosen activity
8. use the characteristic selection matrix produced to agree scoring parameters for:
   - customers
   - team members
9. use the matrix produced to identify and approve activities in the process where improvements can be made
10. lead the preparation of and approve an action plan that will bring about the improvements

Unit 428 Leading the production of a characteristic selection matrix

Outcome 2 Know how to lead the production of a characteristic selection matrix

Assessment Criteria

The learner can:

1 explain the need and use of hypothesis testing, and how this benefits a Six Sigma improvement project
2 explain the need to identify a suitable sample size
3 explain how to calculate a suitable sample size
4 describe the meaning of Alpha risk, Beta risk and Delta/Sigma ratio
5 describe the meaning of 'practical difference' and 'statistical difference'
6 explain how to conduct a hypothesis test
7 explain how to calculate test statistics such as mean, median, mode, standard deviation, range and variance
8 describe the meaning of a 'population' and a 'sample'
9 describe the meaning of 'null hypothesis'
10 describe the meaning of 'alternate hypothesis'
11 explain how to determine the correct statistic from the following: F-test, Chi-Square test, normality tests, T-test, Levene's test, Bartlett's test, contingency tables, one way ANOVA
12 describe the extent of their own authority within the project, and to whom they should report in the event of problems that they cannot resolve

Unit 429 Leading the carrying out of capability studies

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the carrying out of capability studies. It involves obtaining and approving all the necessary data needed to carry out the study analysis, and agreeing the appropriate sample size using statistical based techniques. From the study the learner will be required to lead the production of statistical information, this will include calculations for mean, mode, median, standard deviation, range, variance, and the capability indices Cp and Cpk for the process. The learner will also need to approve calculations for the sigma score (Z) from the Cpk and the parts per million outside upper and lower specification limits for the processes studied for both the long and short term.

The learner will be expected to lead an analysis of the information gained and identify activities, which will improve the process capability. The learner will also need to lead the production of and approve a process capability report, highlighting the improvements to be made and the actions to be taken.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of capability studies, and will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application for carrying out the capability studies, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the carrying out of capability studies

2 Know how to lead the carrying out of capability studies

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 29: Leading the carrying out of capability studies (Suite 4)¶

Unit 429 Leading the carrying out of capability studies

Outcome 1 Lead the carrying out of capability studies

Assessment Criteria

The learner can:

1. Work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. Lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead a capability study, which covers both:
   - the short term
   - the long term
4. obtain and approve all the necessary data needed to carry out the capability study analysis
5. agree the appropriate sample size using statistical based techniques
6. determine whether rational sub-grouping is appropriate
7. lead the process capability study and confirm relevant statistics
8. confirm the calculation of the following statistics:
   - mean
   - median
   - mode
   - standard deviation
   - range
   - variance
9. confirm the calculation of the following from the above statistics:
   - the capability indices Cp and Cpk for the process
   - the sigma score (Z) from the Cpk
   - the parts per million outside upper and lower specification limits for the processes studied
10. lead the production of a histogram to represent the Cp and Cpk graphically
11. obtain and approve the information gained and agree activities to improve the process capability
12. lead the production of and approve a process capability report highlighting the improvements to be made and the actions to be taken

Unit 429 Leading the carrying out of capability studies

Outcome 2 Know how to lead the carrying out of capability studies

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are leading the capability studies
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain why we need to assess process capability and how this affects a Six Sigma project
4. explain what is meant by the term Sigma Score (Z)
5. explain how to calculate the Sigma Score (Z) and use this to estimate the percentage outside of specification
6. explain what are Cp and Cpk and how are they calculated
7. explain how to calculate long-term capability from short term data
8. explain how many samples are needed for a statistically valid short term capability study
9. explain what is a population and what is a sample
10. explain how to select appropriate sample sizes
11. explain how to calculate parts per million
12. explain how to calculate mean, median, mode, standard deviation, range, and variance
13. explain how to perform rational sub-grouping
14. describe the extent of their own authority within the project and whom they should report to, in the event of problems that they cannot resolve

Unit 430 Leading the production of multi variance charts

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the production of multi variance charts. It involves approving the selection of a suitable activity on which to carry out the multi variance charting process, consulting with the appropriate people and directing the gathering of the relevant data necessary for the analysis. The learner will be required to use the data collected to lead the production of a data demographics form for the process and subsequently approve a multi variance chart showing within part variation, piece-to-piece variation and time-to-time variation. The learner will need to lead on the recording and displaying of the information on such as bar charts, histograms, Pareto diagrams, stem and leaf diagrams, box plots and time series charts. The learner will also be expected to approve a report of the activity highlighting the opportunities for improvement and manage an action plan, which makes recommendations of how they can be implemented.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation/visual representation is completed accurately and legibly. The learner will also be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of multi variance charts and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of multi variance charting in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the production of multi variance charts

2 Know how to lead the production of multi variance charts

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 30: Leading the production of multi variance charts (Suite 4)¶

Unit 430 Leading the production of multi variance charts

Outcome 1 Lead the production of multi variance charts

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. lead the production of multi variance charts for two of the following:
   - concept
   - product
   - design
   - process
   - system
   - machine
4. approve the selection of a suitable activity on which to carry out the multi variance charting process
5. consult with the appropriate people and direct the gathering of the relevant data necessary for the multi variance charting analysis
6. lead the recording of the collected data utilising at least three of the following techniques:
   - bar charts
   - histograms
   - Pareto diagrams
   - stem and leaf diagrams
   - box plots
   - time series charts
7. lead the production of a data demographics form for the selected activity
8. use the data demographics form to approve a multi variance chart showing:
   - within-part variation
   - piece-to-piece variation
   - time-to-time variation
9. obtain and approve a multi variance chart on the activity selected

10. discuss and approve opportunities for improvement from the multi variance chart
11. lead the creation of an action plan that minimises variation and approve recommendations of how the improvements can be implemented

Unit 430 Leading the production of multi variance charts

Outcome 2 Know how to lead the production of multi variance charts

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are directing the gathering of the data for a multi variance chart activity
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain why we need to carry out multi variance charting and the benefits to be gained from this activity
4. explain how to construct a data demographics form and a multi variance chart
5. explain how to assess the chart for within-piece variation, piece-to-piece variation and time-to-time variation
6. explain how much data needs to be gathered to draw statistically valid conclusions from the chart
7. explain how to draw further conclusion by utilising such tools as bar charts, box plots, histograms, stem and leaf diagrams, Pareto diagrams and time series charts
8. describe the benefits of multi variance analysis with respect to design of experiment
9. describe the extent of their own authority within the project and whom they should report to, in the event of problems that they cannot resolve

Unit 431 Leading hypothesis testing activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for leading the process of hypothesis testing. It involves directing the calculation of the correct sample size to ensure the statistical validity of the hypothesis test and leading the production of a suitable sampling plan to reduce systematic errors. The tests should be conducted on a variable/process in a Six Sigma project where the actual statistics from data collected is compared with the calculated statistics so that a decision can be reached as to which hypothesis is true. Typically tests that can be carried out could be F-Test, Chi-Square test, normality tests, T-test, Levene's test, Bartlett's test, contingency table, one-way ANOVA. The learner will be required to lead the production and approval of a hypothesis test report on the variable/process studied.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation/visual representation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of hypothesis testing and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of hypothesis testing in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying and advising on safe working practices will be a key issue throughout.

Learning outcomes

1 Lead the process of hypothesis testing

2 Know how to lead the process of hypothesis testing

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit No. 31: Leading the process of hypothesis testing (Suite 4)¶

Unit 431 Leading hypothesis testing activities

Outcome 1 Lead the process of hypothesis testing

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. lead the activities within their area of responsibility to include all of the following:
   - set out an communicate the purpose of the improvement activities
   - involve the team in planning how the improvement activity will be achieved
   - ensure each team member has individual objectives and understands how these objectives contribute to the overall improvement objective
   - provide advice and support the team to achieve both team and individual improvement objectives
   - motivate the team to present their own improvement ideas
   - encourage the team and/or individuals to take the lead where appropriate
   - agree the implementation of the improvement ideas
   - negotiate any physical and/or financial resources required to implement the improvement activity (where appropriate)
   - monitor the progress of improvement activities
   - deal with any organisational problems identified during the improvement activity
3. direct the utilization of sample size selection to ensure the statistical validity of an hypothesis test and check the calculation for the correct sample size required for the test
4. lead the production of a suitable sampling plan to reduce systematic errors
5. lead the conducting of a hypothesis test on a variable/process in a Six Sigma project
6. obtain and confirm the actual statistic from data collected
7. confirm the correct statistic from one of the following:
   - F-test
   - Chi-Square test
   - normality tests
   - T-test
   - Levene's test
   - Bartlett's test
   - contingency table
   - one way ANOVA
8. confirm for a hypothesis test:
   - the Delta/Sigma ratio
   - the Alpha risk
   - the Beta risk
9. use the appropriate test to compare the calculated statistic against actual statistic and confirm which hypothesis is true
10. confirm the following:
    - null hypothesis
    - alternative hypothesis
    - test statistic
11. lead the production of and approve a hypothesis test report on the variable/process studied

Unit 431 Leading hypothesis testing activities

Outcome 2 Know how to lead the process of hypothesis testing

Assessment Criteria

The learner can:

1. explain what is hypothesis testing, why we need to use hypothesis testing and how this benefits a Six Sigma improvement project
2. explain how to plan the resources and time needed to carry out the agreed activity
3. explain why we need to identify a suitable sample size
4. explain how to calculate a suitable sample size
5. explain what is meant by Alpha risk, Beta risk and Delta/Sigma ratio
6. explain what is meant by practical difference and statistical difference
7. explain how to conduct a hypothesis test
8. explain how to calculate test statistics such as mean, median, mode, standard deviation, range and variance
9. explain what are a population and a sample
10. explain what is meant by the null hypothesis
11. explain what is meant by the alternate hypothesis
12. explain how to determine the correct statistic from the following F-test, Chi-Square test, Normality tests, T-test, Levene's test, Bartlett's test, Contingency tables, one way ANOVA
13. describe the extent of their own authority within the project and whom they should report to, in the event of problems that they cannot resolve

Unit 432 Carrying out Evolutionary Operations (EVOP)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences 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.

The learner will need to calculate the correct sample size required and identify a suitable sampling plan to reduce systematic errors. The learner 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. The learner will also need to produce a report of the findings along with an action plan to ensure the improvements identified are implemented.

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

The learner's knowledge will provide a good understanding of the application of evolutionary operations and provide an informed approach to the techniques and procedures used. The learner 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.

Learning outcomes

1 Carry out Evolutionary Operations (EVOP)

2 Know how to carry out Evolutionary Operations (EVOP)

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit 32: Carrying out evolutionary operations (EVOP) (Suite 4)

Unit 432 Carrying out Evolutionary Operations (EVOP)

Outcome 1 Carry out Evolutionary Operations (EVOP)

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations 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. document the resources required to include:
   - financial
   - time scales
   - manpower
   - plant/equipment
   - materials
7. identify a suitable sampling plan to reduce systematic errors
8. run an evolutionary operation experiment using appropriate tools and techniques, recording and analysing the data collected
9. identify for the experiment undertaken:
   - a suitable Alpha risk level
   - a suitable Delta that needs to be observed
   - a suitable Beta level
10. determine the correct experimental design to use from one of the following:
    - full factorial
    - 2k factorial
    - fractional factorial
11. contribute to the construction of an evolutionary operations board
12. calculate and produce graphs for the following:
    - main effects
    - interactions
13. identify suitable optimal conditions and produce an evolutionary operations report, highlighting the findings and including an action plan to ensure the improvements are implemented

Unit 432 Carrying out Evolutionary Operations (EVOP)

Outcome 2 Know how to carry out Evolutionary Operations (EVOP)

Assessment Criteria

The learner can:

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

Unit 433 Applying central limit theorem and confidence intervals

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying central limit theorem and confidence intervals to a project. It involves demonstrating how central limit theorem can be utilised to estimate the mean of a population when it is not normally distributed. The learner will be required to calculate confidence intervals from the standard confidence interval equations, which will include mean, standard deviation, Cp, and Cpk. The learner will be expected to demonstrate how sample size affects the accuracy of the mean. The learner will also be expected to produce a report highlighting the findings and an action plan identifying how the improvements can be implemented.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary calculations and documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of central limit theorem and confidence intervals and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of central limit theorem and confidence intervals 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.

Learning outcomes

1 Apply central limit theorem and confidence intervals
2 Know how to apply central limit theorem and confidence intervals

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit 33: Applying central limit theorem and confidence intervals (Suite 4)

Unit 433 Applying central limit theorem and confidence intervals

Outcome 1 Apply central limit theorem and confidence intervals

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. demonstrate how central limit theorem can be utilised to estimate the mean of a population when it is not normally distributed
3. utilise the central limit theorem to:
   - transform non-normal data into normal data
   - increase the accuracy of measurement system
   - calculate the standard error of the mean for a set of data
   - utilise central limit theorem to give an appropriate sample size for a test or inspection
4. calculate confidence intervals from the standard confidence interval equations
5. calculate confidence intervals for the following:
   - mean
   - standard deviation
   - Cp
   - Cpk
6. demonstrate how sample size affects the accuracy of the mean
7. produce a report highlighting the findings and includes an action plan to ensure the improvements are implemented

Unit 433 Applying central limit theorem and confidence intervals

Outcome 2 Know how to apply central limit theorem and confidence intervals

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are carrying out an experiment
2. explain what the central limit theorem is
3. explain what is meant by the standard error of the mean
4. explain how the central limit theorem can be used to reduce measurement error
5. describe the number of observations that must be made in order to estimate a population mean when the data is not normally distributed
6. explain how to calculate the standard error of the mean
7. describe the relationship between the standard error of the means and sample size
8. explain how to utilise central limit theorem to reduce measurement system error
9. explain how to calculate mean, median, mode, standard deviation, range, variance, Cp and Cpk
10. explain how to calculate confidence intervals from the standard confidence interval equations
11. describe the 'mean of means' principle
12. describe the extent of their own authority within the activity and whom they should report to, in the event of problems that they cannot resolve

Unit 434 Producing Taguchi linear graphs

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for producing Taguchi linear graphs. It involves utilising sample size selection to ensure the statistical validity of the experiment and calculating the correct sample size for the experiment. The learner will need to produce and use suitable sampling plans to reduce systematic errors and estimate the resources and expected benefits from carrying out the Taguchi linear graph activity. The learner will need to choose the appropriate Taguchi linear graph to use and calculate the factor settings for the Taguchi linear graph experiment. Having gathered all the necessary information and completed the appropriate calculations they will need to run an experiment and analyse the data collected for main effects and interactions. The learner will be required to identify suitable optimum conditions and produce a report of the activities, which includes and action plan of how the improvements can be implemented.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation and calculations are completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of Taguchi linear graphs and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of Taguchi linear graphs 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.

Learning outcomes

1 Produce Taguchi linear graphs

2 Know how to produce Taguchi linear graphs

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit 34: Producing Taguchi linear graphs (Suite 4)¶

Unit 434 Producing Taguchi linear graphs

Outcome 1 Produce Taguchi linear graphs

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. utilise sample size selection to ensure the statistical validity of the experiment and calculate the correct sample size for the experiment
3. identify suitable sampling plans to reduce systematic errors
4. estimate the resources and expected benefits from the Taguchi linear graph activity and gain approval
5. document the resources required to include:
   - financial
   - time scales
   - manpower
   - plant/equipment
   - materials
6. determine the correct Taguchi linear graph to use
7. calculate factor settings for the Taguchi linear graph experiment
8. determine factors and levels for the design of experiment
9. determine for the Taguchi linear graph experiment:
   - a suitable Alpha risk level
   - a suitable Beta level
   - a suitable Delta that needs to be observed
10. run an experiment recording and analyse the data collected
11. identify suitable optimum conditions and create an action plan to ensure these conditions are implemented
12. complete a written Taguchi linear graph report
13. calculate and produce graphs for the following:
    - main effects
    - interactions

Unit 434 Producing Taguchi linear graphs

Outcome 2 Know how to produce Taguchi linear graphs

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they carry out a Taguchi linear graph experiment
2. explain what is meant by the following terms: fold over, confounded, alias
3. explain how to produce Taguchi linear graph designs for a range of arrays (such as L4, L8 and L16)
4. explain what is meant by Alpha risk and Beta risk
5. explain what are a population and a sample
6. explain how to calculate a suitable sample size
7. explain why we need to use Taguchi linear graph experimental design and how it is used in a Six Sigma improvement project
8. explain how to conduct a Taguchi linear graph experiment
9. explain how to calculate mean, median, mode, standard deviation, range and variance
10. explain how to calculate and graphically display main effects and interactions
11. explain how to identify suitable optimal conditions
12. explain how to create an action plan to ensure that improvements are implemented
13. explain how to create a Taguchi linear graph report, and the information is should contain
14. describe the extent of their own authority and whom they should report to, in the event of problems that they cannot resolve

Unit 435 Applying response surface methodology

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying response surface methodology. It involves selecting an appropriate process on which to carry out the activity and applying the principles and processes of response surface methodology utilising orthogonal array, level and factor. The learner will be expected to determine the scope/parameters of the activity, estimate the resources required (which will include costs, time scales, manpower, plant/equipment and materials) and identify the expected benefits to be gained by carrying out the activity. The learner will be required to utilise sample size selection to ensure the statistical validity of the experiment and calculate the correct sample size methodology within an improvement project.

The learner will also be expected to record the results of the activity in the appropriate format, analyse the data gathered and identify areas where improvements can be made. The learner will need to produce a report of the response surface methodology activity undertaken which identifies the areas where improvements can be made and the optimum operating conditions along with an action plan to ensure the identified improvements are implemented.

The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that they cannot solve or are outside their responsibility to the relevant authority. The learner will need to ensure that all the necessary documentation is completed accurately and legibly. The learner will be expected to take full responsibility for their own actions within the activity and for the quality and accuracy of the work that they produce.

The learner's knowledge will provide a good understanding of response surface methodology and provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application of response surface methodology 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

Learning outcomes

1 Apply response surface methodology

2 Know how to apply response surface methodology

Details of the relationship between the unit and relevant national occupational standards

This unit has been derived from national occupational standard Business-Improvement Techniques Unit 35: Applying response surface methodology (Suite 4)¶

Unit 435 Applying response surface methodology

Outcome 1 Apply response surface methodology

Assessment Criteria

The learner can:

1. work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. select an appropriate process on which to carry out the response surface methodology and obtain all the required information
3. estimate the resources and expected benefits for the response surface methodology and gain approval
4. utilise sample size selection to ensure the statistical validity of the experiment and calculate the correct sample size required
5. determine the scope/parameters of the response surface methodology activity
6. carry out the response surface methodology within an improvement project utilising the appropriate tools and techniques
7. carry out response surface methodology utilising:
   - orthogonal array
   - level
   - documentation and information required
8. record the results of the project in the appropriate format
9. document the resources required to include:
   - financial
   - time scales
   - manpower
   - plant/equipment
   - materials
10. analyse the data gathered and identify areas where improvements could be made
11. identify for the response surface methodology undertaken:
    - a suitable Alpha risk level
    - a suitable Delta that needs to be observed
    - a suitable Beta level
    - steepest ascent for the surface design
12. identify suitable optimum conditions and produce a response surface methodology report which includes an action plan to ensure the improvements are implemented

Unit 435 Applying response surface methodology

Outcome 2 Know how to apply response surface methodology

Assessment Criteria

The learner can:

1. describe the health and safety requirements of the area in which they are carrying out the response surface methodology
2. describe the use of response surface methodology and how it can be used in a Six Sigma improvement project
3. explain how to carry out a response surface methodology project and the tools and techniques used
4. explain where to obtain the required data necessary to carry out the project
5. explain how to calculate a statistically valid sample size to be used in the response surface methodology activity
6. explain what is the meaning of population and a sample in terms of the response surface methodology activity
7. explain what is meant by a method of steepest ascent
8. explain what is meant by the terms: coded variables and uncoded variables
9. explain what is meant by Alpha risk and Beta risk
10. explain how to use the data collected to calculate: mean, median, mode, standard deviation, range and variance
11. explain how to calculate cost benefits when considering response surface methodology
12. describe the extent of their own authority within the project and whom they should report to, in the event of problems that they cannot resolve

6 Course design and delivery

6.1 Initial assessment and induction

Centres will need to make an initial assessment of each candidate prior to the start of their programme to ensure they are entered for an appropriate type and level of qualification.

The initial assessment should identify:

- any specific training needs the candidate has, and the support and guidance they may require when working towards their qualification. This is sometimes referred to as diagnostic testing.
- any units the candidate has already completed, or credit they have accumulated which is relevant to the qualification they are about to begin.

City & Guilds recommends that centres provide an induction programme to ensure the candidate fully understands the requirements of the qualification they will work towards, their responsibilities as a candidate, and the responsibilities of the centre. It may be helpful to record the information on a learning contract.

Further guidance about initial assessment and induction, as well as a learning contract that centres may use, are available on the City & Guilds website.

Recording forms

Candidates and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds has developed a set of *Recording forms* including examples of completed forms, for new and existing centres to use as appropriate.

Although it is expected that new centres will use these forms, centres may devise or customise alternative forms, which must be approved for use by the external quality assurer, before they are used by candidates and assessors at the centre.

Amendable (MS Word) versions of the forms are available on the City & Guilds website.

6 Course design and delivery

6.2 Recommended delivery strategies

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Centres may design course programmes of study in any way which:

- best meets the needs and capabilities of their candidates
- satisfies the requirements of the qualification.

In particular, staff should consider the skills and knowledge related to the national occupational standards.

City & Guilds recommends that centres address the wider curriculum, where appropriate, when designing and delivering the course. Centres should also consider links to the National Occupational Standards, Key/Core Skills and other related qualifications. Relationship tables are provided in **Error! Reference source not found. Error! Reference source not found.** to assist centres with the design and delivery of the qualification.

Centres may wish to include topics as part of the course programme which will not be assessed through the qualification.

Appendix 1 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Providing City & Guilds qualifications – a guide to centre and qualification approval contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Ensuring quality contains updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document contains information on:

- Management systems
- Maintaining records
- Assessment
- Internal verification and quality assurance
- External verification.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- ***Walled Garden***
  Find out how to register and certificate candidates on line

- ***Events***
  Contains dates and information on the latest Centre events
- ***Online assessment***
  Contains information on how to register for GOLA assessments.

Useful contacts

Type	Contact	Query
UK learners	T: +44 (0)20 7294 2800 E: learnersupport@cityandguilds.com	• General qualification information
International learners	T: +44 (0)20 7294 2885 F: +44 (0)20 7294 2413 E: intcg@cityandguilds.com	• General qualification information
Centres	T: +44 (0)20 7294 2787 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com	• Exam entries • Registrations/enrolment • Certificates • Invoices • Missing or late exam materials • Nominal roll reports • Results
Single subject qualifications	T: +44 (0)20 7294 8080 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: singlesubjects@cityandguilds.com	• Exam entries • Results • Certification • Missing or late exam materials • Incorrect exam papers • Forms request (BB, results entry) • Exam date and time change
International awards	T: +44 (0)20 7294 2885 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com	• Results • Entries • Enrolments • Invoices • Missing or late exam materials • Nominal roll reports
Walled Garden	T: +44 (0)20 7294 2840 F: +44 (0)20 7294 2405 E: walledgarden@cityandguilds.com	• Re-issue of password or username • Technical problems • Entries • Results • GOLA • Navigation • User/menu option problems
Employer	T: +44 (0)121 503 8993 E: business_unit@cityandguilds.com	• Employer solutions • Mapping • Accreditation • Development Skills • Consultancy
Publications	T: +44 (0)20 7294 2850 F: +44 (0)20 7294 3387	• Logbooks • Centre documents • Forms • Free literature

If you have a complaint, or any suggestions for improvement about any of the services that City & Guilds provides, email: **feedbackandcomplaints@cityandguilds.com**