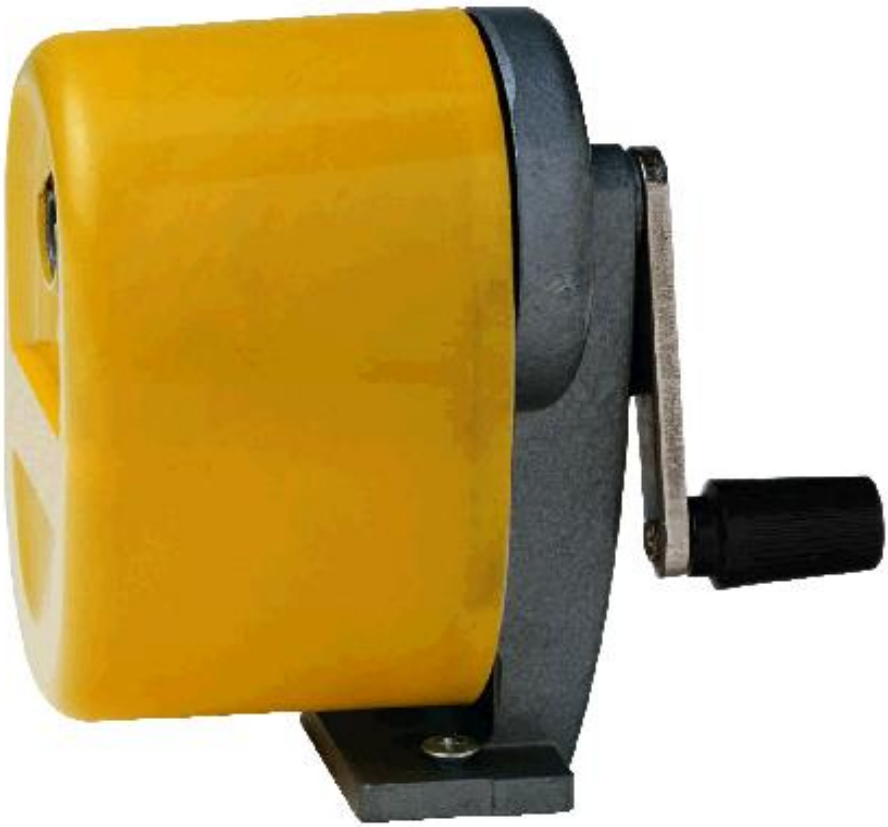
Level 3 NVQ Diploma in Business-Improvement Techniques (7576-03)

Qualification handbook for centres 501/0600/4

www.cityandguilds.com
October 2018
Version 2.2



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Qualification title	Number	Ofqual ref.
Level 3 NVQ Diploma in Business-Improvement Techniques – Process Improvement.	7576-03	501/0600/4
Level 3 NVQ Diploma in Business-Improvement Techniques – Quality Improvement.	7576-03	501/0600/4

Version and date	Change detail	Section
2.2 October 2018	Unit title corrected on page 29	**5**
2.1 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**

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Unit 328	**Applying hypothesis testing**	**109**

1 Introduction to the qualification

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

Qualification title and level	Level 3 NVQ Diploma in [Business-Improvement Techniques]
City & Guilds qualification number	(7576-[03])
GLH	320
TQT	940
Ofqual accreditation number	501/0600/4
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 3.

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 3 NVQ Diploma in Business-Improvement Techniques, Process Improvement.

To achieve the Level 3 NVQ Diploma in Business-Improvement Techniques Process Improvement, learners must achieve the 5 mandatory units (59 credits) from Mandatory Group 1, one unit (maximum of 12 credits) from Optional Group 1 and a minimum of two units (minimum of 23 credits) from Optional Group 2. The total minimum credit value of this pathway is 94.

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
T/600/5306	302	Leading Effective Teams	Mandatory	9
J/600/5309	303	Applying Workplace Organisation Techniques	Mandatory	14
D/600/5316	304	Applying Continuous Improvement Techniques (Kaizen)	Mandatory	18
K/600/5318	305	Developing Visual Management Systems	Mandatory	13

Optional Group 1

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
K/600/5321	306	Creating Flexible Production and Manpower Systems	Optional	11
Y/600/5315	307	Carrying Out Problem Solving Activities	Optional	12

Optional Group 2

If either unit 306 or 307 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/600/5321	306	Creating Flexible Production and Manpower Systems	Optional	11
Y/600/5315	307	Carrying Out Problem Solving Activities	Optional	12
M/600/5319	308	Analysing and Selecting Parts for Improvement	Optional	18
F/600/5325	309	Applying Lead Time Analysis	Optional	13
L/600/5330	310	Carrying Out Value Stream Mapping (VSM)	Optional	17
D/600/5333	311	Applying Set-up Reduction Techniques	Optional	18
T/600/5323	312	Applying Total Productive Maintenance (TPM)	Optional	15
R/600/5314	313	Applying Flow Process Analysis	Optional	18
H/600/5334	314	Applying Policy Deployment (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	Optional	13
K/600/5335	315	Applying Value Management (Value Engineering and Value Analysis)	Optional	15
M/600/5336	316	Creating Standard Operating Procedures	Optional	12
M/600/5305	317	Applying Six Sigma Methodology to a Project	Optional	18
F/600/5308	318	Carrying Out Six Sigma Process Mapping	Optional	18
F/600/5311	319	Applying Basic Statistical Analysis	Optional	14
J/600/5312	320	Applying Failure Modes and Effects Analysis (FMEA)	Optional	13

H/600/5317	321	Applying Mistake/Error Proofing (Poka Yoke)	Optional	13
A/600/5307	322	Carrying Out Statistical Process Control (SPC) Procedures	Optional	12
L/600/5313	323	Applying Six Sigma Metrics to a Project	Optional	13
H/600/5320	324	Producing a Characteristic Selection Matrix	Optional	13
J/600/5326	325	Carrying Out Measurement Systems Analysis (MSA)	Optional	13
R/600/5331	326	Carrying Out Capability Studies	Optional	18
Y/600/5332	327	Producing Multi-Variance Charts	Optional	13
Y/600/5301	328	Applying Hypothesis Testing	Optional	13

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 2 NVQ Diploma in Fabrication and Welding Engineering	214	470

2 About the qualification

2.4 Level 3 NVQ Diploma in Business-Improvement Techniques, Quality Improvement.

To achieve the Level 3 NVQ Diploma in Business-Improvement Techniques Quality Improvement, learners must achieve the 6 mandatory units (77 credits) from Mandatory Group 2 and a minimum of three units (minimum of 35 credits) from Optional Group 3. The total minimum credit value of this pathway is 112.

Mandatory Group 2

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
T/600/5306	302	Leading Effective Teams	Mandatory	9
M/600/5305	317	Applying Six Sigma Methodology to a Project	Mandatory	18
F/600/5308	318	Carrying Out Six Sigma Process Mapping	Mandatory	18
F/600/5311	319	Applying Basic Statistical Analysis	Mandatory	14
J/600/5312	320	Applying Failure Modes and Effects Analysis (FMEA)	Mandatory	13

Optional Group 3

Note: Of the three units to be selected from this Group a maximum of two may be selected from units 303-316 only.

Accreditation unit reference	City & Guilds unit number	Unit title	Mandatory/ optional for full qualification	Credit Value
J/600/5309	303	Applying Workplace Organisation Techniques	Optional	14
D/600/5316	304	Applying Continuous Improvement Techniques (Kaizen)	Optional	18
K/600/5318	305	Developing Visual Management Systems	Optional	13
K/600/5321	306	Creating Flexible Production and Manpower Systems	Optional	11
Y/600/5315	307	Carrying Out Problem Solving Activities	Optional	12
M/600/5319	308	Analysing and Selecting Parts for Improvement	Optional	18
F/600/5325	309	Applying Lead Time Analysis	Optional	13
L/600/5330	310	Carrying Out Value Stream Mapping (VSM)	Optional	17
D/600/5333	311	Applying Set-up Reduction Techniques	Optional	18
T/600/5323	312	Applying Total Productive Maintenance (TPM)	Optional	15
R/600/5314	313	Applying Flow Process Analysis	Optional	18
H/600/5334	314	Applying Policy Deployment (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	Optional	13

K/600/5335	315	Applying Value Management (Value Engineering and Value Analysis)	Optional	15
M/600/5336	316	Creating Standard Operating Procedures	Optional	12
H/600/5317	321	Applying Mistake/Error Proofing (Poka Yoke)	Optional	13
A/600/5307	322	Carrying Out Statistical Process Control (SPC) Procedures	Optional	12
L/600/5313	323	Applying Six Sigma Metrics to a Project	Optional	13
H/600/5320	324	Producing a Characteristic Selection Matrix	Optional	13
J/600/5326	325	Carrying Out Measurement Systems Analysis (MSA)	Optional	13
R/600/5331	326	Carrying Out Capability Studies	Optional	18
Y/600/5332	327	Producing Multi-Variance Charts	Optional	13
Y/600/5301	328	Applying Hypothesis Testing	Optional	13

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 3 NVQ Diploma in Business-Improvement Techniques	320	940

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 Quality Assurers. 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 3 NVQ in Business-Improvement Techniques (2257-51) will receive automatic approval for the new Level 3 NVQ Diploma in Business-Improvement Techniques (7576-03).

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 Quality Assurers

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 Quality Assurers 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 Quality Assurers 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 Quality Assurers

Internal and External Quality Assurers 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 Quality Assurers 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 Course design and delivery

4.1 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.

4 Course design and delivery

4.2 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.

5 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	5	35	2
302	Leading Effective Teams	T/600/5306	9	26	3
303	Applying Workplace Organisation Techniques	J/600/5309	14	51	3
304	Applying Continuous Improvement Techniques (Kaizen)	D/600/5316	18	55	3
305	Developing Visual Management Systems	K/600/5318	13	41	3
306	Creating Flexible Production and Manpower Systems	K/600/5321	11	42	3
307	Carrying Out Problem Solving Activities	Y/600/5315	12	41	3
308	Analysing and Selecting Parts for Improvement	M/600/5319	18	58	3
309	Applying Lead Time Analysis	F/600/5325	13	42	3
310	Carrying Out Value Stream Mapping (VSM)	L/600/5330	17	58	3
311	Applying Set-up Reduction Techniques	D/600/5333	18	58	3
312	Applying Total Productive Maintenance (TPM)	T/600/5323	15	54	3
313	Applying Flow Process Analysis	R/600/5314	18	58	3
314	Applying Policy Deployment (Hoshin Kanri, Quality Operating Systems, Business Plan Deployment)	H/600/5334	13	42	3
315	Applying Value Management (Value Engineering and Value Analysis)	K/600/5335	15	50	3
316	Creating Standard Operating Procedures	M/600/5336	12	42	3
317	Applying Six Sigma Methodology to a Project	M/600/5305	18	62	3

318	Carrying Out Six Sigma Process Mapping	F/600/5308	18	58	3
319	Applying Basic Statistical Analysis	F/600/5311	14	36	3
320	Applying Failure Modes and Effects Analysis (FMEA)	J/600/5312	13	42	3
321	Applying Mistake/Error Proofing (Poka Yoke)	H/600/5317	13	42	3
322	Carrying Out Statistical Process Control (SPC) Procedures	A/600/5307	12	35	3
323	Applying Six Sigma Metrics to a Project	L/600/5313	13	42	3
324	Producing a Characteristic Selection Matrix	H/600/5320	13	42	3
325	Carrying Out Measurement Systems Analysis (MSA)	J/600/5326	13	42	3
326	Carrying Out Capability Studies	R/600/5331	18	58	3
327	Producing Multi-Variance Charts	Y/600/5332	13	42	3
328	Applying Hypothesis Testing	Y/600/5301	13	42	3

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 Business-Improvement Techniques Unit No. 01: Complying with statutory regulations and organisational safety requirements (Suite 3)

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 seven 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 302 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 activities. It involves obtaining 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 their team will also feature in this unit. The learner 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 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 3)

Unit 302 Leading effective teamsLeading 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 work in accordance with the roles and responsibilities identified for the team leader role

3 obtain the authority and support for the release of the necessary resources to carry out the team activities

4 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

5 set realistic and achievable goals and objectives for their team, in accordance with the targets set for themselves or for the work area/activity

6 prioritise the work activities to achieve the objectives, cost-effectively and efficiently

7 develop action plans which clearly identify activities and responsibilities required to meet the team targets:
- for themselves
- for the team

8 determine and agree individual roles and responsibilities, and coach/mentor their team, focusing on the objectives that have been set

9 monitor the performance of their team against the goals and objectives which have been set, and communicate this to the relevant people

10 communicate effectively with:
- management
- peers
- subordinates

11 communication must include:
- verbal
- written
- electronic methods

12 consult with subject specialists when required, to gain the necessary information to support the team goals and objectives

13 deal promptly and effectively with any problems within their control, and report those that cannot be resolved

Unit 302 Leading effective teamsLeading 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 describe the business targets set for their area of responsibility, and how to set personal, individual and team targets to achieve them (action planning)

3 explain how to prioritise their own and their team's workload to ensure that targets are met

4 explain how to communicate effectively, listen, question, support and coach others to work towards the business targets

5 explain how to present information effectively to management, peers or team members, using different methods

6 explain how to conduct a team performance review and how to involve the team in brainstorming activities to identify opportunities, threats and solutions

7 describe the types of conflict and problem that might emerge between work activities

8 describe the organisational processes and procedures required to run their area of responsibility effectively (such as quality procedures, code of conduct, standard operations, problem resolution procedures)

9 describe the improvement tools and techniques being used in their area of responsibility (such as hourly count monitor, TAKT time, continuous flow process, flexible manpower systems, quality level, defects per million opportunities, workplace organisation)

10 describe the specialist help that they may require in their area of responsibility, and how this can be obtained

11 explain how to structure and lead a team event, and the presentation materials and work documentation required

12 explain how to train others in the processes and procedures relevant to them, and their area of responsibility

13 explain how to monitor and check that their team is working to identified quality and safety standards

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

Unit 303 Applying workplace organisation techniques

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to apply a systemic approach to continuously making improvements to the workplace organisation. It involves co-ordinating and applying the principles and techniques of workplace organisation (such as 5S or 5C). The learner will need to consider 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 produce 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 improve the condition of the working environment and in doing so establish a new improved area score.

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 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply workplace organisation techniques

2 Know how to apply workplace organisation techniques

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: Applying workplace organisation techniques (Suite 3)

Unit 303 Applying workplace organisation techniques

Outcome 1 Apply workplace organisation techniques

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 co-ordinate and apply the process of workplace organisation within the chosen work area, and establish the area score

3 identify and confirm where information, resources or equipment is missing or is in surplus, and what improvements can be made

4 produce changes to standard operation procedures (sops), and visual controls that everyone works to within the area

5 make changes to standard operating 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

6 make 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

7 make improvements to the workplace organisation and establish the new improved area score

Unit 303 Applying workplace organisation techniques

Outcome 2 Know how to apply workplace organisation techniques

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the workplace organisation activity

2 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)

3 describe the procedure used to identify and address surplus or missing equipment or resources (such as carrying out a 'red tagging' exercise)

4 explain how to arrange and label the necessary resources or equipment for rapid identification and access

5 explain how to correlate information to create or update standard operating procedures (SOPs) or other approved documentation

6 explain how to evaluate and prioritise the improvements required for the workplace

7 explain how to score and audit the workplace organisation

8 describe the techniques required to communicate information using visual control systems (such as shadow boards, performance charts, KPI's)

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

Unit 304 Applying continuous improvement techniques (Kaizen)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying continuous improvement techniques (Kaizen) to their work activities. It involves planning the Kaizen process for the agreed work area/activity, to include plan, do, check, act, and to establish 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 co-ordinating and carrying out 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 produce 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply continuous improvement techniques (Kaizen)

2 Know how to apply continuous improvement techniques (Kaizen)

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: Applying continuous improvement techniques (Kaizen) (Suite 3)

Unit 304 Applying continuous improvement techniques (Kaizen)

Outcome 1 Apply continuous improvement techniques (Kaizen)

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 plan the kaizen process to the agreed work area/activity to include plan, do, check, act

3 establish objectives and targets for the kaizen activity

4 carry out the kaizen activity within the chosen work area/activity

5 identify and confirm waste, problems or conditions within the work area or activity and what improvements can be made

6 identify and confirm 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

7 co-ordinate and carry out a structured waste elimination activity, based on the identified wastes, problems or conditions

8 produce changes to standard operating procedures (sops), or other approved documentation that will sustain the improvements resulting from the kaizen activity

9 identify and apply 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

10 determine and calculate measures of performance for quality, cost and delivery

11 determine and calculate one of the following quality measures:
- not right first time (as a percentage or as parts per million (PPM))
- company-specific quality measure

12 Determine and calculate one of the following measures:
- delivery schedule achievement
- company-specific delivery or service measure

13 determine and calculate 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 utilisation (FSU)
- cost breakdown (such as labour, material, energy and overhead)
- company-specific cost measure

14 calculate and visually represent the optimum resources required for a process based on customer demand

15 provide comparisons of the agreed work area/activity before and after the kaizen activity to confirm improvements using key performance indicators

16 record and 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 utilisation (FSU)
- cost breakdown (such as labour, material, energy and overhead)
- company-specific cost measure

Unit 304 Applying continuous improvement techniques (Kaizen)

Outcome 2 Know how to apply continuous improvement techniques (Kaizen)

Assessment Criteria

The learner can:

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

2 explain how a work area/activity is selected for the kaizen activity

3 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)

4 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

5 describe problem solving and root cause analysis

6 describe the importance of understanding the process/activity under review, and how this will affect the quality of the problem solving

7 describe the application of the Deming cycle (plan, do, check, act)

8 explain how to carry out a Kaizen activity and establish measurable improvements

9 explain how to distinguish facts from opinions in order to identify improvement actions

10 explain how improvements to the process are achieved by engaging the knowledge and experience of the people involved in the process

11 explain how to encourage people to identify potential improvements

12 explain how to evaluate improvement ideas in order to select those that are to be pursued

13 explain how to set quantifiable targets and objectives

14 explain how to produce/propose the creation of or changes to standard operating procedures (SOPs) or other approved documentation

15 describe the techniques used to visually communicate the work of the Kaizen activity to participants and others

16 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)

17 explain how the cycle time of a process can be defined.

18 explain how to calculate the required production rate for a process by using a calculation (such as Takt Time)

19 explain how to calculate the optimal resources (such as people, equipment, facilities and materials) required for a process based on customer demand

20 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)

21 Describe the extent of their own authority, and to whom they should report to in the event of problems that they cannot resolve

Unit 305 Developing visual management systems

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for developing and applying the principles and processes of visual management. It involves identifying the appropriate parts of the process or work area that will have visual controls and identifying the key performance indicators which are to be displayed in the work area. The learner will also be required to measure the effectiveness of the visual management system and to change and maintain 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Develop visual management systems

2 Know how to develop 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. 05: Developing visual management systems (Suite 3)

Unit 305 Developing visual management systems

Outcome 1 Develop 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 identify and confirm appropriate parts of the process or work area that will have visual controls

3 create, or make changes to, visual management systems

4 identify and confirm the key performance indicators that will be displayed in the work area

5 produce or make changes to standard operating procedures (SOPs), and visual controls that everyone works to within the area

6 create and update 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 (e.g. Kaizen boards)
- shadow boards
- standard work-in-progress (WIP) locations and quantities
- planning systems
- the delivery of effective meetings

7 measure the effectiveness of the visual management system and maintain the quality of information being displayed

Unit 305 Developing visual management systems

Outcome 2 Know how to develop visual management systems

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the work area in which they are conducting the visual management activities

2 describe the factors to be considered when selecting a visual management system

3 explain where to find the information required to develop a local visual management system

4 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)

5 explain how to differentiate between business performance measures and local performance measures

6 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)

7 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)

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

Unit 306 Creating flexible production and manpower systems

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for creating flexible business systems. It involves applying the principles and processes of creating flexible production and manpower systems to the chosen activity. This will include obtaining the schedule and batch size for the parts in the work area, and creating level schedules for those parts. The activities will require the learner to identify 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 produce 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 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 safe working practices will be a key issue throughout

Learning outcomes

1 Create flexible production and manpower systems
2 Know how to create 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. 06: Creating flexible production and manpower systems (Suite 3)

Unit 306 Creating flexible production and manpower systems

Outcome 1 Create 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 apply the principles and processes of creating flexible production and manpower systems to the chosen activity

3 choose three different parts or materials in the work area, and calculate the following:
- workload
- capacity of resource (equipment, people)
- Takt time

4 obtain the schedule and batch size for the parts or materials in the work area

5 create level schedules for the parts in the work area

6 produce a visual communication of the schedule, which includes:
- workload
- resource capacity
- Takt time for the work area

7 identify improvement opportunities, and waste which needs to be removed, in order to achieve takt time and flow processing

8 produce a local workforce flexibility matrix (skills matrix)

9 produce a visual representation, identifying resources that do not meet the takt time requirements

10 create 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

11 implement a visually controlled system, based on the demand of subsequent processes for the chosen parts, and which improves the overall process effectiveness

Unit 306 Creating flexible production and manpower systems

Outcome 2 Know how to create 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 conducting the activity

2 describe the information required to create level schedules, load and capacity, takt time and batch sizes

3 describe the meaning of 'level schedules', and how to create them

4 explain how to create a load and capacity diagram

5 describe takt time, and how this is calculated

6 describe the application of standard work in progress

7 describe the application of visually controlled systems and signals, based on the demand of subsequent processes

8 describe the application of skills matrices

9 describe the application of consignment stocking

10 explain how to simplify working practices and reduce the human error risk

11 describe the consequences of introducing a new improved part/process/material router

12 describe problem solving and route cause analysis

13 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

14 explain how to stabilise and then optimise equipment effectiveness

15 explain how to conduct a review of asset care/best practice effectiveness, and establish a robust routine of asset care and correct operation

16 describe the appropriate techniques that provides value to the customer (such as push-pull systems, single piece flow, just in time (JIT), Kanban, autonomation)

17 describe the techniques used to visually communicate the work done (such as level schedules, load and capacity diagrams, revised batch sizes, and takt time)

18 explain how to lay out an effective workplace, utilising recognised techniques (such as cellular manufacturing incorporating parallel lines or u-shaped cells)

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

Unit 307 Carrying out problem solving activities

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to solve problems, 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 take prompt and appropriate action to identify, analyse and implement corrective actions to solve the problem.

The learner will be required to investigate problems by obtaining all the necessary data and information, to enable them to identify and evaluate 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.

Learning outcomes

1 Carry out problem solving activities

2 Know how to carry out 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. 07: Carrying Out Problem Solving Activities (Suite 3)

Unit 307 Carrying out problem solving activities

Outcome 1 Carry out problem solving activities

Assessment Criteria

The learner can:

1 take prompt action to identify the nature and extent of the problems that arise

2 carry out 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 all relevant data and information relating to the problem

4 obtain and use 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 establish possible root causes to problems by two of the following methods/techniques:
- cause and effect diagram
- five 'why' analysis
- flowcharting
- fault tree analysis

6 evaluate all realistic root causes of the problem

7 identify the most effective corrective action

8 evaluate 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 implement 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 monitor 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 keep all relevant people 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 ensure that corrective actions to problems comply with all relevant regulations and guidelines

Unit 307 Carrying out problem solving activities

Outcome 2 Know how to carry out problem solving activities

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the problem solving activity

2 describe the importance of wearing protective clothing and other appropriate safety equipment during the investigation of the problem, and where it may be obtained

3 describe the methods used to detect that a problem has occurred

4 describe the methods of containment of a non-conforming product or process

5 describe the structured process for problem solving (such as DMAIC methodology - Define, Measure, Analyse, Improve, Control)

6 describe the processes and procedures used within the scope of the problem-solving activity

7 explain how to obtain any necessary resources to support the problem-solving activity

8 describe the extent of their own responsibility, and to whom they should report if they have problems that they cannot resolve

9 describe the use of performance measurement and analysis to direct and focus improvement effort

10 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

11 describe the methods and techniques involved in evaluating information (such as the seven quality tools, is / is not sheets, capability studies, measurement system analysis)

12 describe the importance of getting to the root cause

13 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)

14 describe the criticality of different types of problem, and how to prioritise the problems to be solved

15 explain how to obtain and interpret company policy and procedures

16 describe the factors that have to be taken into account when selecting the corrective action to a problem

17 describe the 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)

18 explain whom to inform of actions taken, and by what means

19 describe the reporting procedures and documentation, and their application

20 describe the 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)

21 explain how to review the problem-solving process to understand the lessons learned, in order to achieve further improvements within the business

Unit 308 Analysing and selecting parts for improvement

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for analysing and selecting parts for improvement. It involves applying 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 carry out 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Analyse and select parts for improvement
2 Know how to analyse and select 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. 08: Analysing and selecting parts for improvement (Suite 3)

Unit 308 Analysing and selecting parts for improvement

Outcome 1 Analyse and select 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 obtain all the information, documentation and equipment required to carry out the activity

3 co-ordinate and analyse information to identify and confirm the representative parts for improvement within the chosen area/product range

4 carry out 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

5 evaluate and group the identified parts into appropriate part families

6 produce part families, using all the following criteria:
- part shape
- part size
- materials used to manufacture the part
- manufacturing process

7 produce and confirm a finalised list of the representative parts for the chosen area/product range

Unit 308 Analysing and selecting parts for improvement

Outcome 2 Know how to analyse and select parts for improvement

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the work area in which they are conducting the activity

2 describe the information required to conduct the activity, and where and from whom authority can be found

3 describe the principles and process of analysis (such as, pie charts, bar charts (Pareto analysis))

4 describe the techniques used to communicate the information and results gained by this process

5 explain how to create and present bar graphs/histograms

6 explain how to differentiate between lead time and cycle time

7 explain how the bill of materials (bom) structure is configured for each of the representative parts

8 explain how to identify the origin/source of the parts within the chosen area

9 explain how to evaluate the information, in order to select the representative parts for the chosen area

10 describe the application of problem solving and root cause analysis

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

Unit 309 Applying lead time analysis

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying lead time analysis. It involves applying the principles and processes of lead time analysis to selected parts or processes. The learner will be expected to identify suitable parts or processes for which lead time profiles are to be produced, and then to define 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 identify and confirm any problems or conditions within the work area/process where improvements can be made. This will require 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply lead time analysis

2 Know how to apply lead time 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. 09: Applying lead time analysis (Suite 3)

Unit 309 Applying lead time analysis

Outcome 1 Apply lead time analysis

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 collect and co-ordinate information/data to produce a frequency diagram, listing the major bottlenecks or constraints as identified by each lead time profile

3 define and confirm quantifiable objectives and targets for the reduction in lead time of the chosen parts or processes

4 co-ordinate the lead time analysis, and the production of lead time profiles for all of the representative parts or processes chosen

5 identify and confirm any problems or conditions within the work area where improvements can be made

6 identify improvement opportunities for three of the following:

- supply or delivery of parts
- improved workflow
- improved quality
- flexibility of people
- launch of material
- inventory balancing

7 produce revised lead time profiles, identifying the improved process

8 produce a plan of the improvement activities and resources required, with timescales to achieve the targeted lead time

Unit 309 Applying lead time analysis

Outcome

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the work area in which they are conducting the activity

2 describe the sort of information required to create lead time profiles

3 describe the sort of information required to construct the lead time profiles, and where this information can be obtained

4 explain how to co-ordinate and create lead time profiles

5 explain how to co-ordinate and create frequency charts

6 describe the techniques used to communicate the information and results obtained by this process

7 explain how to differentiate between lead time and cycle time

8 describe the application of problem solving and root cause analysis (such as: Ishikawa diagrams, brainstorming)

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

Unit 310 Carrying out Value Stream Mapping (VSM)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required carrying out Value Stream Mapping (VSM). It involves applying the principles and processes of value stream mapping to the chosen parts, using appropriate improvement tools and techniques. The learner will be expected to create a current state map for the parts or materials chosen, and to identify 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 produce 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Carry out Value Stream Mapping (VSM)
2 Know how to carry out Value Stream Mapping (VSM)

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: Carrying out Value Stream Mapping (VSM) (Suite 3)

Unit 310 Carrying out Value Stream Mapping (VSM)

Outcome 1 Apply lead time analysis

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 select appropriate parts or materials on which to carry out the activity

3 carry out the value stream mapping process on the chosen parts, using appropriate improvement tools and techniques

4 create a current state map for the parts or materials chosen which includes 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

5 identify problems or conditions within the current state map where improvements can be made

6 identify 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

7 produce a future state map which includes 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

8 implement the changes identified

Unit 310 Carrying out Value Stream Mapping (VSM)

Outcome 2 Know how to carry out Value Stream Mapping (VSM)

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the value stream mapping activity

2 explain how a part is selected for a value stream mapping activity

3 describe from whom authority is gained for release of people and resources for the value stream mapping activity

4 explain how to structure and run a value stream mapping event

5 describe the principles and processes for the deployment of value stream mapping

6 explain how improvements to the process can be achieved

7 explain how to evaluate improvement ideas and select those that will give the greatest benefit for the least spend

8 explain how to set quantifiable objectives and targets for the future state maps

9 explain how to create standard operating procedures (SOPs)

10 describe the techniques used to visually communicate the information and results of the process

11 describe the techniques of problem solving and root cause analysis

12 describe systems lead time, how they differ from actual lead time, and how both are constructed

13 explain how to calculate Takt time

14 describe the principles of increasing process capacity

15 explain what constitutes value adding and non-value adding activities

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

Unit 311 Applying set-up reduction techniques

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying set-up reduction techniques. It involves applying 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 identify and confirm where the problems occur within the set-up process, and to determine where improvements can be made. The learner will need to set suitable quantifiable objectives and targets against which the improvements are to be made. The activities will require them to co-ordinate and carry out set-up reduction activities on different machines or processes, and to make 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 produce 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply set-up reduction techniques
2 Know how to apply set-up reduction techniques

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: Applying set-up reduction techniques (Suite 3)

Unit 311 Applying set-up reduction techniques

Outcome 1 Apply lead time analysis

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 identify a machine or process set-up activity that is a bottleneck or constraint which affects productivity

3 co-ordinate and carry out the set-up reduction activity on the chosen machine or process, using the appropriate techniques

4 identify and confirm problems or conditions within the current set-up, where improvements can be made

5 define quantifiable objectives/targets for improvements to the chosen set-up

6 make 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

7 co-ordinate improvements to the current set-up, to meet the identified objectives and targets

8 produce changes to standard operating procedures (sops) or other approved documentation that will sustain the improvements made to the set-up requirements

9 identify and apply 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 311 Applying set-up reduction techniques

Outcome 2 Know how to apply set-up reduction techniques

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the set-up reduction activities

2 explain how a machine or process is selected for a set-up reduction activity

3 describe from whom authority is gained for the release of people and resources for the set-up reduction activity

4 describe the application of the Deming cycle (plan, do, check, act)

5 explain how to structure and run a set-up reduction activity

6 explain how improvements to the set-up can be achieved

7 explain how to evaluate improvement ideas and select those that will give most benefit for the least spend

8 explain how to set quantifiable targets and objectives for the improved set-up

9 explain how to correlate information to create or update standard operating procedures (SOPs) or other approved documentation for the revised set-up

10 explain how to distinguish between internal and external activities with reference to set-up

11 describe problem solving and the application of root cause analysis

12 describe the difference between 'motion' and 'work'

13 explain what constitutes a value adding and non-value adding activity

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

Unit 312 Applying Total Productive Maintenance (TPM)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to apply Total Productive Maintenance (TPM) principles to 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 apply 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 their 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 your 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply Total Productive Maintenance (TPM)
2 Know how to apply Total Productive Maintenance (TPM)

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 Applying Total Productive Maintenance (TPM) (Suite 3)

Unit 312 Applying Total Productive Maintenance (TPM)

Outcome 1 Apply lead time analysis

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 select the appropriate asset on which to carry out the total productive maintenance activity

3 carry out the total productive maintenance process on at least two assets from the following:
- plant and equipment
- machines
- office equipment
- service equipment
- utilities

4 obtain the necessary information to carry out the activity

5 carry out the total productive maintenance activity by applying the appropriate techniques

6 carry out 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

7 calculate and use the overall equipment effectiveness (oee) measure and information to determine which elements of the oee and their associated losses need improvement

8 collect information relating to all of the following:
- load or demand
- capacity
- Takt time or bottleneck analysis

9 develop and use an action plan which will reduce/eliminate the losses, and hence improve the overall equipment effectiveness

10 implement improvements to working practices through the total productive maintenance activities

11 show 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

12 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 312 Applying Total Productive Maintenance (TPM)

Outcome 2 Know how to apply Total Productive Maintenance (TPM)

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the Total Productive Maintenance (TPM) activities

2 describe the principles of TPM, and how they can be applied in administration procedures, safety improvement and quality maintenance

3 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)

4 explain how to implement a systematic and structured approach to carrying out autonomous, condition based and planned maintenance

5 describe the difference between a chronic and sporadic loss, and the countermeasures to both

6 explain how to calculate overall equipment effectiveness (OEE)

7 explain where to find the information required to calculate the OEE for the chosen asset

8 describe the benefits of having a total productive maintenance system

9 describe the importance of taking ownership of the TPM system, and the issues that can be expected to be resolved

10 describe the six major losses and how loss-reduction actions need to be prioritised

11 describe the use of standard operating procedures, single point lessons and machine/process start-up and shutdown procedures

12 explain how an awareness of the improvement activities will drive the implementation of the TPM activities (Kaizen and team working)

13 describe the critical processes and early problem detection steps

14 describe the loss areas and opportunities for improvement

15 describe the standards of wear, and the ability to stabilise the component life

16 describe the techniques of visual management used to communicate the information and results obtained by this process (including TPM activity boards and checklists)

17 describe the integration with workplace organisation and improving OEE

18 describe the contaminants and sources of contaminants

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

Unit 313 Applying flow process analysis

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to apply flow process analysis. It involves applying the principles and procedures of flow process analysis, within a given work area, to produce a flow process analysis sheet. The learner will be required to identify and establish elements of waste and problems or conditions within the process where improvements can be made. The learner will need to evaluate and prioritise the opportunities for improvement, and to assist in this activity they will be required to produce a payback matrix.

The learner will also be expected to use the information gathered to define 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 safe working practices will be a key issue throughout

Learning outcomes

1 Apply flow process analysis

2 Know how to apply flow process 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. 13 Applying flow process analysis (Suite 3)

Unit 313 Applying flow process analysis

Outcome 1 Apply flow process analysis

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 co-ordinate and carry out the process flow analysis mapping activity within a given work area

3 produce a flow process analysis sheet

4 identify and record the opportunities for improvement within the process

5 evaluate the opportunities for improvement, and prioritise these using suitable criteria

6 analyse the data obtained into both:

- non-value added activity
- value added activity

7 define quantifiable objectives and targets for all the defined improvement activities

8 create and agree an action plan which:

- eliminates non-value added activity
- simplifies value added activity

Unit 313 Applying flow process analysis

Outcome 2 Know how to apply flow process analysis

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the flow process analysis activities

2 explain how to describe a process in its elements/activities of work

3 describe the eight forms of waste within a lean working environment

4 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)

5 explain how to map out a process or deployment flowchart, using the recognised symbols

6 what are classed as value-added and non-value added activities

7 explain how to establish which of the elements/activities in the process are value added or non-value added

8 explain how to identify opportunities for improvements to the process

9 explain how to use data to eliminate activities that do not add value to the process

10 explain how to construct an action plan that will simplify the value added activities and eliminate the non-value added activities

11 explain how to construct an action plan (such as payback matrix)

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

Unit 314 Applying Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment). It involves applying the principles and processes of business plan deployment in the learner's local area, and defining the area goals for the customer and the business they work in, to enable improvement opportunities and conditions to be identified 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 create 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment)

2 Know how to apply Policy Deployment (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. 14 Applying Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment) (Suite 3)

Unit 314 Applying Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment)

Outcome 1 Apply Policy Deployment (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 obtain the current policy deployment plan

3 carry out the policy deployment process in their local area and define the area goals

4 define the area goals for:
- customers
- the business in which they work

5 identify improvement opportunities and conditions which, when implemented, deliver the local area policy deployment plan

6 use at least four of the following criteria when identifying 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?

7 produce quantifiable objectives and targets for all the defined improvement activities, with an appropriate measure and timescale for completion

8 produce and communicate the plan in an appropriate visual format

9 create 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 314 Applying Policy Deployment (Hoshin Kanri, quality operating systems, business plan deployment)

Outcome 2 Know how to apply Policy Deployment (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 carrying out the improvement activities

2 explain where to find the information required to develop a local policy deployment plan

3 explain how to create policy deployment plans

4 describe the techniques used to communicate the information and results obtained by this process

5 explain how to differentiate between their business vision, mission and main business drivers

6 describe the measures of performance in a lean business environment

7 describe the limits of their responsibility and involvement in the policy deployment planning process

8 describe the types of improvement activity that will drive the implementation of the business plan (e.g. management tools and techniques which contribute to quality, cost, delivery and responsiveness)

9 describe the meaning and application of the Deming cycle (plan, do, check, act)

10 describe the application of gap analysis (current situation versus desired situation)

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

Unit 315 Applying value management (value engineering and value analysis)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying value management (value engineering and value analysis). It involves applying the principles and processes of value management (VM) to the chosen product or process. The learner will be expected to identify what the customer requires from the product or the process, and to set quantifiable objectives and targets to achieve this. The learner will need to analyse the functions of the process, identify and allocate costs of each of these functions, and identify the added and non-value added activities within the process. The learner will also be expected to identify the most appropriate alternatives, carry out a risk assessment of the alternatives, prioritise and rank the alternatives, and identify the expected benefits. The learner will need to develop 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply value management (value engineering and value analysis)

2 Know how to apply value management (value engineering and value 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. 15: Applying value management (value engineering and value analysis) (Suite 3)

Unit 315 Applying value management (value engineering and value analysis)

Outcome 1 Apply value management (value engineering and value analysis)

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 apply the principles and processes of value management (vm) to the chosen product or process

3 identify what the customer requires from the product or the process, and set quantifiable objectives and targets for the value management activity

4 analyse the functions of the product or process being studied, and allocate costs to those functions

5 produce a total cost model and supply chain map for the product or process, which shows how cost are related to function

6 identify the non-value added activity within the product or process, and suggest alternatives

7 develop these alternatives into detailed proposals that will improve the value of the product or process

8 produce 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

9 identify the new value added process, and implement the plan within agreed timescales

Unit 315 Applying value management (value engineering and value analysis)

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

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the work area in which they are carrying out the value management activities

2 explain how to select a product or process on which to carry out the value management activity

3 explain how to structure and run a value management activity

4 explain how to set quantifiable objectives and targets for the value management activity

5 explain how to carry out a function analysis

6 describe the performance related tools used to qualify customer wants and needs

7 describe the 'cost of function' equation, and how to calculate the cost of function

8 describe FAST diagramming and value trees

9 describe the decision making process and the use of creativity techniques (brainstorming)

10 explain how value management relates to the overall business strategy and competitive positioning

11 explain how to produce a total cost model and supply chain map for the product or process

12 explain what constitutes value adding and non-value adding activities

13 explain how to identify what a customer requires from a product or process

14 explain how to prioritise and rank the alternatives

15 explain how to complete a risk assessment of the alternatives

16 explain how to prepare the findings into proposals

17 explain how to monitor and track proposals to implementation

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

Unit 316 Creating Standard Operating Procedures (SOP)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required to create Standard Operating Procedures (SOP) for work activities.

This will involve co-ordinating, analysing and documenting the information gathered from the method used when performing the operation/process. The learner will confirm what preparations are required from start to finish, the quality and safety standards to be maintained, and the drawings, tooling, fixtures, gauges, and other items that are used during the operation or process. The learner will need to highlight 'key points' in the document, using 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 produce 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Create Standard Operating Procedures (SOP)

2 Know how to create 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. 16: Creating Standard Operating Procedures (SOP) (Suite 3)

Unit 316 Creating Standard Operating Procedures (SOP)

Outcome 1 Create 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 produce a standard operating procedure for one 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

3 produce 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

4 co-ordinate and analyse the gathering of information of the current operation or process to identify the optimum and safest method

5 confirm what tools, equipment, fixtures, documentation and standards are required

6 ensure that all operators performing the operation or process have the opportunity to contribute, and agree the method identified

7 produce standard operating procedures in an agreed format and monitor their use against the operation or process requirements

8 produce standard operating procedures that minimise all of the following:
- time
- effort
- waste

9 supply standard operating procedures at their point of use, and store copies and master copies in accordance with company requirements

10 revise standard operating procedures, as appropriate, to ensure their effectiveness in the workplace

11 confirm that the method defined will meet quality, productivity, health, safety and environmental requirements

Unit 316 Creating Standard Operating Procedures (SOP)

Outcome 2 Know how to create Standard Operating Procedures (SOP)

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area for which they are creating Standard Operating Procedures (SOP)

2 describe the various formats used in creating SOP

3 explain where to find the SOP document format to be used in their business

4 describe the information that will be required to create a SOP

5 explain how SOP are structured, and the importance of their use

6 describe the methods of communicating/facilitating to ensure that all the required information for the SOP is captured

7 describe the operation/process to be captured in the SOP

8 explain why SOP are the basis for quality and continuous Improvement

9 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

10 explain how to simplify work done, eliminating waste and potential for human error

11 describe Takt time, and the relationship with achieving flow in a process

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

Unit 317 Applying Six Sigma methodology to a project

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying a structured Six Sigma methodology to a project. It involves identifying 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 identify 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 identifying 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 their 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 complete all necessary project documentation 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply Six Sigma methodology to a project

2 Know how to apply 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. 17 Applying Six Sigma methodology to a project (Suite 3)

Unit 317 Applying Six Sigma methodology to a project

Outcome 1 Apply 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 apply the structured Six Sigma methodology and approach to the selected project

3 identify and participate in Six Sigma projects which cover two the following:
- manufacturing
- quality level
- administration

4 utilise the five phases of Six Sigma within the project:
- define
- measure
- analyse
- improve
- control

5 identify the Six Sigma organisational infrastructure, roles and responsibilities and business-specific metrics that would apply

6 produce 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

7 contribute to producing a metric chart for the Six Sigma projects undertaken, to include
- financial
- quality
- process

8 identify areas where the Six Sigma tools, techniques and activities can be applied, and demonstrate the need to measure those factors that are critical to quality characteristic (CTQC) for the customer, business and process

9 identify the critical to quality characteristic (CTQC) of the projects, to include:
- cost
- quality
- delivery

10 contribute to the identification of the cost of poor quality, by identifying the defects per million opportunities (DPMO)

11 relate defects per million opportunities to the sigma score, and identify the gap to six sigma performance

Unit 317 Applying Six Sigma methodology to a project

Outcome 1 Apply 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 describe the Six Sigma infrastructure and philosophy

3 describe the benefits that will arise from a Six Sigma project

4 describe the 'parts per million opportunities' goal of Six Sigma

5 describe the calculation of defects per million opportunities (DPMO)

6 describe the five phases of Six Sigma that are applied to a project

7 explain how to define a critical to quality characteristic (CTQC)

8 explain how non-value added activity can serve as a roadblock for achieving zero defect

9 explain how to define an 'opportunity for defect'

10 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)

11 describe the relationship between key process input variables (KPIV) and key process output variables (KPOV) (using the equation Y=(f)x)

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

Unit 318 Carrying out Six Sigma process mapping

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for carrying out a Six Sigma process mapping activity. It requires the learner to select a suitable process on which to carry out the process mapping activity, and to identify 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 contribute to the construction of the process map for the Six Sigma project and to identify 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 suggest 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Carry out Six Sigma process mapping

2 Know how to carry out 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. 18: Carrying out Six Sigma process mapping (Suite 3)

Unit 318 Carrying out Six Sigma process mapping

Outcome 1 Carry out 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 select a suitable process on which to carry out the process mapping activity

3 identify the key stages that form the overall process under investigation

4 collect the data necessary to construct the six sigma process map

5 carry out the construction of the process map for the Six Sigma project

6 produce a process map, which identifies:
- the key process input variables
- the key process output variables

7 classify 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

8 identify value added and non-value added steps in a process

9 identify improvements to the process as a result of the information gathered in the six sigma mapping activity

10 identify and add to the process map the specifications of both the:
- key process input variables
- key process output variables

Unit 318 Carrying out Six Sigma process mapping

Outcome 1 Carry out Six Sigma process mapping

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the process mapping activity

2 describe the benefits of carrying out Six Sigma process mapping

3 explain what a Six Sigma process map is and how it is constructed

4 explain how the Six Sigma process map integrates within a Six Sigma project

5 explain what is meant by key process input variables (KPIVs) and key process output variables (KPOVs)

6 describe the data collection point for the key process input variables and key process output variables (such as gauges, forms and samples)

7 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

8 explain who should create a Six Sigma process map

9 describe the difference between a value added activity and a non-value added activity

10 describe the roles and responsibilities of individuals within a process mapping team

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 319 Applying basic statistical analysis

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying basic statistical analysis, by consulting with the appropriate people and gathering the relevant data for statistical analysis on a Six Sigma project. The learner will need to 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 record 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 produce 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 cannot 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply basic statistical analysis

2 Know how to apply 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. 19: Applying basic statistical analysis (Suite 3)

Unit 319 Applying basic statistical analysis

Outcome 1 Apply 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 consult with appropriate people and gather the relevant data for statistical analysis

3 produce data gathering forms or charts to gather information to enable statistical and graphical analysis to take place

4 record the collected data, utilising three of the following methods:

- bar charts
- histograms
- Pareto diagrams
- stem and leaf diagrams
- box plots
- time series charts

5 utilise statistical and graphical analysis on a Six Sigma project

6 produce descriptive statistics of data, to include all of the following:

- mean
- median
- mode
- standard deviation
- range and variance

7 produce a normal distribution to assess a population from the representative sample

8 interpret the statistical data collected, in order to validate the pre-determined courses of action

9 produce an action plan as a result of the statistical and graphical analysis undertaken

Unit 319 Applying basic statistical analysis

Outcome 1 Apply basic statistical analysis

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are collecting data

2 describe the meaning of 'variation', how this can be detected with statistics, and how this variation can affect a process

3 describe the number of data points needed to draw a statistically valid conclusion

4 explain why we need to use basic statistics

5 describe the meaning of the terms 'population' and 'sample' when applied to basic statistics

6 describe distribution curves and the properties of a normal curve

7 explain how to create and use charts and diagrams (such as histograms, box plots, time series charts, Pareto diagrams, stem and leaf diagrams)

8 explain how to calculate mean, median, mode, standard deviation, range and variance

9 describe the difference between descriptive and inferential statistics

10 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 320 Applying Failure Modes and Effects Analysis (FMEA)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying Failure Modes and Effects Analysis (FMEA). It involves applying the principles and processes of FMEA and determining 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 determine the key features of FMEA, co-ordinating and recording the information gathered in an appropriate format, and to make valid judgements about the activity, using FMEA principles. This will include calculating risk priority numbers (RPNs), identifying high RPNs and developing actions to improve them. Once actions have been completed, the learner will need to reassess the activity and re-score 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 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 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply Failure Modes and Effects Analysis (FMEA)
2 Know how to apply Failure Modes and Effects Analysis (FMEA)

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 Applying Failure Modes and Effects Analysis (FMEA) (Suite 3)

Unit 320 Applying Failure Modes and Effects Analysis (FMEA)

Outcome 1 Apply Failure Modes and Effects Analysis (FMEA)

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 determine the key features of failure modes and effects analysis required for the activity under investigation

3 carry out a failure modes and effects analysis on two of the following:
- concept
- product
- design
- process
- system
- machine

4 identify, for the activities analysed:
- the potential failure modes
- the potential effects from failure modes
- the potential causes of failure modes

5 co-ordinate and produce a failure modes and effects analysis

6 record the information gathered in an appropriate format

7 identify and score 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

8 make valid judgements about the activity using failure modes and effects analysis principles

9 calculate risk priority numbers (RPNs), identify high RPNs, and develop actions to improve them

10 establish rating tables for all of the following:
- occurrence
- severity
- detection

11 reassess a failure modes and effects analysis once actions have been completed, and re-score severity, occurrence and detection

Unit 320 Applying Failure Modes and Effects Analysis (FMEA)

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

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are conducting the failure modes and effects analysis

2 describe the main features and benefits of carrying out a failure modes and effects analysis

3 explain who should be part of a team that constructs and updates a failure modes and effects analysis

4 describe System FMEA, Concept FMEA, Design FMEA and Process FMEA - what they are, and where they should use them

5 describe the meaning of failure mode, failure effect and failure cause

6 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

7 explain how to calculate a risk priority number (RPN)

8 explain how to use the risk priority numbers

9 explain how to apply a structured approach to risk reduction

10 explain when to start a failure modes and effects analysis

11 explain when to update a failure modes and effects analysis

12 describe the roles and responsibilities of individuals within a failure modes and effects analysis team

13 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 321 Applying mistake/error proofing (Poka Yoke)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying mistake/error proofing (Poka Yoke), which is a method of making an activity 'foolproof'. It involves applying 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 conduct trials on the suggested improvements, which will include determining 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 will need 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply mistake/error proofing (Poka Yoke)

2 Know how to apply mistake/error proofing (Poka Yoke)

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: Applying mistake/error proofing (Poka Yoke) (Suite 3)

Unit 321 Applying mistake/error proofing (Poka Yoke)

Outcome 1 Apply mistake/error proofing (Poka Yoke)

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 use information and data to select and confirm a suitable process on which to carry out mistake/error proofing activity

3 apply the mistake/error proofing process to the chosen activity

4 use appropriate techniques to analyse the data received, and draw valid conclusions

5 evaluate recommendations and produce worksheets for the activity that identify the problem and actions to be taken

6 create 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

7 determine suitable solutions, and conduct agreed trials to measure the effectiveness of the solution

8 identify the merits of suitable solutions and determine their:
- effectiveness
- cost
- complexity

9 confirm and co-ordinate the implementation of the optimum solution

10 measure and document the results

11 identify the benefits of mistake/error proofing in terms of:
- improved quality/compliance (such as ISO9001)
- reduced costs
- delivery or service

Unit 321 Applying mistake/error proofing (Poka Yoke)

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

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 describe the selection criteria used to determine a suitable product or process on which to carry out the mistake/error proofing activity

4 explain how mistake/error proofing can lead to zero defects

5 describe the relationship between errors and defects

6 describe the different types and range of mistakes

7 explain how defects originate in products or processes

8 explain how the role of source inspection contributes to the reduction of defects

9 describe the application of mistake/error proofing (Poka Yoke) tools (such as 'cause and effect', and the 5 'why's)

10 describe the type of mistake/error proofing documentation, and the information it should contain

11 describe the analysis and charting methodology used for mistake/error proofing

12 describe the financial implications of mistake/error proofing projects

13 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)

14 explain how to undertake trials and measure the effectiveness of mistake/error proofing projects

15 describe the different types and range of mistake proofing devices used

16 describe the roles and responsibilities of individuals within a mistake/error proofing team (including facilitator, timekeeper, scribe)

17 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 322 Carrying out Statistical Process Control (SPC) procedures

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for carrying out Statistical Process Control (SPC) procedures. It involves applying the principles and processes of SPC to a selected process, and gathers all the necessary data for analysis, in consultation with relevant people. The learner will be expected to apply 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 perform basic statistical process control, identifying special cause versus common cause. The learner will also be expected to identify activities which will improve the process performance, and to produce an action plan to implement the improvements. Calculation of the capability of the process will focus on identifying 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Carry out Statistical Process Control (SPC) procedures

2 Know how to carry out Statistical Process Control (SPC) procedures

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: Carrying out Statistical Process Control (SPC) procedures (Suite 3)

Unit 322 Carrying out Statistical Process Control (SPC) procedures

Outcome 1 Carry out Statistical Process Control (SPC) procedures

Assessment Criteria

The learner can:

1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

2 work to, and comply with all the required process monitoring documentation and work instruction sheets

3 select and/or confirm the process on which the process analysis is to be carried out

4 consult with relevant people and gather all the necessary data for analysis

5 apply the principles and processes of statistical process control to the chosen process

6 perform basic statistical process control, using appropriate tools and techniques

7 utilise statistical and graphical methods to represent the process conditions

8 calculate the capability of the process, identifying:
- Cp
- Cpk

9 produce 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

10 identify activities which will improve the process performance

11 contribute to the production of an action plan to implement the improvements

Unit 322 Carrying out Statistical Process Control (SPC) procedures

Outcome 2 Know how to carry out Statistical Process Control (SPC) procedures

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the process control activities

2 explain where process control fits within a continuous improvement environment

3 explain how process performance affects customer satisfaction and process costs

4 explain where and why statistical process control is used, the benefits, and how it is applied

5 describe the importance of standardisation within a process operation, and why process performance can only be determined when it is controlled

6 explain how process control can improve process performance

7 describe the benefits of prevention and detection

8 describe the two types of variation within a process (common cause, special cause), and the impact they have within the process

9 explain how to gather data and effectively analyse it; how the data can be used to communicate abnormalities within a process

10 describe the main types of control charts used for SPC, their features and benefits, and how to construct and implement them

11 describe the meaning of a 'population' and a 'sample'

12 describe the measurements of central tendency and variability, and how they are calculated

13 describe the properties of a normal curve of distribution

14 explain how to create charts or diagrams (such as run charts, histograms, box plots, time series charts, pareto diagrams, and stem and leaf plots)

15 explain the terms and calculate mean, median, mode, standard deviation, range and variance

16 explain and calculate process capability (Cp and Cpk)

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

Unit 323 Applying Six Sigma metrics to a project

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying Six Sigma metrics to products and processes. It involves consulting with appropriate personnel and gathering all the necessary data to produce a metric graph. The learner will need to apply Six Sigma metrics to monitor the process and justify improvements, applying both primary and secondary metrics for the Six Sigma project. The learner will be expected to use the data collected and the graph produced to identify where improvements can be made, and to prepare 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 safe working practices will be a key issue throughout.

Learning outcomes

1 Apply Six Sigma metrics to a project

2 Know how to apply 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. 23: Applying Six Sigma metrics to a project (Suite 3)

Unit 323 Applying Six Sigma metrics to a project

Outcome 1 Apply 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 carry out Six Sigma metrics activities on both:
- products
- processes

3 consult with appropriate personnel and gather the necessary data to produce a metric graph

4 for the selected activity, apply Six Sigma metrics to monitor the process and justify improvements

5 calculate, for each of the activities covered:
- defects per million opportunities
- defects per unit
- rolled through put yield (y_{rt})
- the sigma score

6 calculate metrics, which are:
- long-term
- short-term
- variable or attribute

7 apply both primary and secondary metrics for the six sigma project

8 where appropriate, transform variable data to attribute data

9 use the data collected to complete a primary metric graph

10 use the graph produced to identify where improvements to metrics can be made

11 prepare an action plan that will bring about the improvements

Unit 323 Applying Six Sigma metrics to a project

Outcome 2 Know how to apply 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 conducting the Six Sigma metrics activity

2 describe the main features and benefits of carrying out a Six Sigma metrics activity

3 describe the importance of using metrics to drive a Six Sigma project

4 explain how to calculate defects per million opportunities, defects per unit and rolled throughput yield

5 explain how to utilise Z tables to calculate the sigma score

6 describe the time period necessary to calculate a meaningful baseline

7 explain how to set realistic objectives and targets for the Six Sigma metrics activity

8 explain how to gather the data required for inclusion in a metric chart

9 explain how to construct a Six Sigma metric chart

10 describe the relationship between 'parts per million', 'defects per million opportunities', Yrt and the sigma score

11 describe the difference between variable and attribute data

12 explain why it is advantageous to transform attribute data into variable data

13 explain how to transform attribute data into variable data

14 describe the significance of the 1.5S shift, and how it can be utilised to infer long-term metric values

15 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 324 Producing a characteristic selection matrix

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for producing a characteristic selection matrix. It involves working with the customer to score the customer requirements, and applying a characteristic selection matrix to the Six Sigma project to create greater customer satisfaction.

The learner will need to collect the necessary data and, by completing the five-step process, produce a characteristic selection matrix for the chosen activity. This will require them to list the customer key process output variables, score them, list the key process input variables that impact them, numerically rate the interaction between these input and output variables, and use ranking to prioritise future team focus. The learner will then be expected to use this information to identify 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 that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation and/or 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 will provide an informed approach to the techniques and procedures used. The learner will need to understand the principles and application for producing a characteristic selection matrix, 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 a characteristic selection matrix

2 Know how to produce 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. 24: Producing a characteristic selection matrix (Suite 3)

Unit 324 Producing a characteristic selection matrix

Outcome 1 Produce 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 work with the customer to score the customer requirements, and apply a characteristic selection matrix to the Six Sigma project

3 produce a characteristic selection matrix for two of the following:
- concept
- product
- design
- process
- system
- machine

4 complete the five-step process for generating a characteristic selection matrix:
- list the customer key process output variables
- 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

5 collect all the required data necessary to create the matrix

6 produce a characteristic selection matrix for the chosen activity

7 use the characteristic selection matrix produced to generate scoring parameters for:
- customers
- team members

8 use the matrix produced to identify activities in the process where improvements can be made

9 prepare an action plan that will bring about the improvements

Unit 324 Producing a characteristic selection matrix

Outcome 2 Know how to produce a characteristic selection matrix

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the characteristic selection matrix activity

2 describe a characteristic selection matrix; why we need to produce them; who should create them

3 explain how to generate a characteristic selection matrix using the five-step process

4 describe the meaning of the term 'customer' when producing a characteristic selection matrix

5 explain how to identify key process output variables and key process input variables

6 where the characteristic selection matrix appears in the quality function deployment matrix

7 describe the inter-relationship between a characteristic selection matrix and a failure modes and effects analysis

8 describe the inter-relationship between six sigma process mapping and a characteristic selection matrix

9 explain how to score a characteristic selection matrix

10 explain how a process map links into a characteristic selection matrix

11 explain how to utilise the results of a characteristic selection matrix

12 explain how to prioritise a six sigma project team's focus

13 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 325 Carrying out Measurement Systems Analysis (MSA)

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for carrying out Measurement Systems Analysis (MSA). It involves selecting an appropriate measurement system on which to carry out the analysis, and obtaining all the necessary data in order to carry out the measurement systems analysis. The learner will be expected to apply the principles and processes of measurement system analysis, which will include such things as 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.

The learner will be required to carry out the analysis using the appropriate techniques, and to record the results of the analysis in the appropriate format. From this information, they will need to determine the percentage gauge repeatability and reproducibility of the measurement system under study, and to produce 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 safe working practices will be a key issue throughout.

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Learning outcomes

1 Carry out Measurement Systems Analysis (MSA)

2 Know how to carry out Measurement Systems Analysis (MSA)

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: Carrying out Measurement Systems Analysis (MSA) (Suite 3)

Unit 325 Carrying out Measurement Systems Analysis (MSA)

Outcome 1 Carry out Measurement Systems Analysis (MSA)

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 measurement system on which to carry out the analysis

3 carry out 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

4 obtain all the necessary data in order to carry out the measurement systems analysis

5 carry out the analysis, using the appropriate techniques

6 determine the type of measurement system variation, to include two of the following:
- bias
- linearity
- stability
- accuracy
- repeatability
- reproducibility

7 record the results of the analysis in the appropriate format

8 determine the percentage gauge repeatability and reproducibility of the measurement system under study, and suggest ways of improving the measurement system

9 produce a measurement systems analysis report, detailing ways of improving the measurement system under study

Unit 325 Carrying out Measurement Systems Analysis (MSA)

Outcome 2 Know how to carry out Measurement Systems Analysis (MSA)

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the measurement systems analysis

2 explain why measurement systems should be studied

3 explain how to select a measurement system for analysis

4 describe the possible sources of measurement systems variation

5 describe the use of measurement systems analysis, and how it can be used in a six sigma improvement project

6 explain how to conduct a variable and a attribute repeatability and reproducibility study

7 describe the terminology used in measurement system analysis (such as bias, linearity, stability, accuracy, repeatability, discrimination, resolution, reproducibility)

8 explain how to conduct a measurement systems analysis study

9 explain how to calculate gauge repeatability and reproducibility

10 explain how to calculate gauge precision and tolerance

11 explain the industry rules for repeatability and reproducibility results

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 326 Carrying out capability studies

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for carrying out capability studies. It involves obtaining all the necessary data in order to carry out the study analysis, and determining the appropriate sample size using statistically based techniques. From the study, the learner will be required to produce statistical information, which will include calculating mean, mode, median, standard deviation, range, variance, and the capability indices Cp and Cpk for the process. The learner will also need to calculate 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 analyse the information gained, and to identify activities which will improve the process capability. The learner will also need to present their findings in 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 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 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 safe working practices will be a key issue throughout.

.

Learning outcomes

1 Carry out capability studies

2 Know how to carry out 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. 26: Carrying out capability studies (Suite 3)

Unit 326 Carrying out capability studies

Outcome 1 Carry out 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 carry out a capability study, which covers both:
- the short term
- the long term

3 obtain all the necessary data in order to carry out the capability study analysis

4 determine the appropriate sample size, using statistically based techniques

5 determine whether rational sub-grouping is appropriate

6 carry out the process capability study and produce relevant statistics

7 calculate the following statistics:
- mean
- median
- mode
- standard deviation
- range
- variance

8 calculate 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

9 produce a histogram to represent the Cp and Cpk graphically

10 analyse the information gained and identify activities to improve the process capability

11 produce a process capability report, highlighting the improvements to be made and the actions to be taken

Unit 326 Carrying out capability studies

Outcome 2 Know how to carry out capability studies

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are carrying out the capability studies

2 explain why we need to assess process capability, and how this affects a Six Sigma project

3 describe the meaning of the term 'sigma score' (Z)

4 explain how to calculate the sigma score (Z) and use this to estimate the percentage outside of specification

5 explain Cp and Cpk, and how they are calculated

6 explain how to calculate long-term capability from short term data

7 describe the number of samples needed for a statistically valid short-term capability study

8 describe the meaning of a 'population' and a 'sample'

9 explain how to select appropriate sample sizes

10 explain how to calculate parts per million

11 explain how to calculate mean, median, mode, standard deviation, range, and variance

12 explain how to perform rational sub-grouping

13 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 327 Producing multi-variance charts

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for producing multi-variance charts. It involves selecting a suitable activity on which to carry out the multi-variance charting process, consulting with the appropriate people and gathering the relevant data necessary for the analysis. The learner will be required to use the data collected to produce a data demographics form for the process and, subsequently, a multi-variance chart showing within part variation, piece-to-piece variation and time-to-time variation. The learner will need to record and display the information as bar charts, histograms, Pareto diagrams, stem and leaf diagrams, box plots and time series charts. The learner will also be expected to produce a report of the activity highlighting the opportunities for improvement and 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 that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation and/or 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 will 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 safe working practices will be a key issue throughout.

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Learning outcomes

1 Produce multi-variance charts

2 Know how to produce 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. 27: Producing multi-variance charts (Suite 3)

Unit 327 Producing multi-variance charts

Outcome 1 Produce 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 produce multi-variance charts for two of the following:
- concept
- product
- design
- process
- system
- machine

3 select a suitable activity on which to carry out the multi-variance charting process

4 consult with the appropriate people and gather the relevant data necessary for the multi-variance charting analysis

5 record 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

6 produce a data demographics form for the selected activity

7 use the data demographics form to produce a multi-variance chart, showing:
- within-part variation
- piece-to-piece variation
- time-to-time variation

8 produce a multi-variance chart on the activity selected

9 identify opportunities for improvement from the multi-variance chart

10 create an action plan that minimises variation, and make recommendations of how the improvements can be implemented

Unit 327 Producing multi-variance charts

Outcome 2 Know how to produce multi-variance charts

Assessment Criteria

The learner can:

1 describe the health and safety requirements of the area in which they are gathering the data for a multi-variance chart activity

2 explain the need to carry out multi-variance charting, and the benefits to be gained from this activity

3 explain how to construct a data demographics form and a multi-variance chart

4 explain how to assess the chart for within-piece variation, piece-to-piece variation and time-to-time variation

5 describe the amount of data required to draw statistically valid conclusions from the chart

6 explain how to draw further conclusions (by utilising such tools as bar charts, box plots, histograms, stem and leaf diagrams, Pareto diagrams and time series charts)

7 describe the benefits of multi-variance analysis with respect to design of experiments (DOE)

8 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 328 Applying hypothesis testing

Overview

Rationale

This unit covers the skills and knowledge needed to prove the competences required for applying hypothesis testing. It involves calculating the correct sample size to ensure the statistical validity of the hypothesis test, and producing a suitable sampling plan to reduce systematic errors. The tests should be conducted on a variable or 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 (analysis of variation). The learner will be required to produce a hypothesis test report on the variable or 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 that are outside their responsibility, to the relevant authority. The learner will need to ensure that all the necessary documentation and/or 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 will 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 safe working practices will be a key issue throughout.

.

Learning outcomes

1 Apply hypothesis testing

2 Know how to apply 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. 28: Applying hypothesis testing (Suite 3)

Unit 328 Applying hypothesis testing

Outcome 1 Apply 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 utilise sample size selection to ensure the statistical validity of a hypothesis test, and calculate the correct sample size required for the test

3 produce a suitable sampling plan to reduce systematic errors

4 conduct a hypothesis test on a variable or process in a six sigma project

5 determine 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

6 calculate the actual statistic from data collected

7 determine for a hypothesis test:

- the Delta/Sigma ratio
- the Alpha risk
- the Beta risk

8 use the appropriate test to compare the calculated statistic against actual statistic, and decide which hypothesis is true

9 determine the following:

- null hypothesis
- alternative hypothesis
- test statistic

10 produce a hypothesis test report on the variable or process studied

Unit 328 Applying hypothesis testing

Outcome 2 Know how to apply hypothesis testing

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

Assessment

Summary of assessment methods

These units must be assessed in a work environment and must be assessed in accordance with the 'Common Requirements for National Vocational Qualifications (NVQ).

Additional assessment requirements have been published by SEMTA. These additional assessment requirements are set down in SEMTA's Business-Improvement Techniques Level 2 Unit Assessment Strategy.

Both these documents can be downloaded from SEMTA's website:

http://www.semta.org.uk/training_providers__awarding/national_occupational_standard/qca_assessment_requirements.aspx

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.

Useful contacts

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