

Level 3 Certificate in Printing and Graphic Communications (5405-30/31/32/33/34)

October 2017 Version 1.2



Qualification at a glance

Subject area	Printing and Graphic Communications
City & Guilds number	5405
Age group approved	All
Entry requirements	There are no entry requirements.
Assessment	Assessment will be via short answer questions.
Automatic approval	Available
Support materials	Centre handbook Assessment pack
Registration/ certification dates	Consult the Walled Garden/Online Catalogue for last dates

Title and level	GLH`	TQT	City & Guilds number	Accreditati on number
Level 3 Certificate in Printing and Graphic Communications – Pre-Press	107	140	5405-30	600/1931/1
Level 3 Certificate in Printing and Graphic Communications - Desktop Publishing	107	140	5405-31	600/1931/1
Level 3 Certificate in Printing and Graphic Communications - Machine Printing	107	140	5405-32	600/1931/1
Level 3 Certificate in Printing and Graphic Communications - Mechanised Print Finishing and Binding	107	140	5405-33	600/1931/1
Level 3 Certificate in Printing and Graphic Communications - Carton Manufacture	107	140	5405-34	600/1931/1

Version and date	Change detail	Section
1.1 October 2011	Test specification added for Unit 201	Assessment
	Range in Unit 201, Learning Outcome 1 under Regulations	Unit 201
1.2 October 2017	Added TQT and GLH details	Qualification at a Glance, Structure
	Deleted QCF	Appendix



Contents

1	Introduction	5
	Structure	5
2	Centre requirements	8
	Approval	8
	Resource requirements	8
	Candidate entry requirements	8
3	Delivering the qualification	9
	Initial assessment and induction	9
	Support materials	9
4	Assessment	10
	Assessment of the qualification	10
5	Units	11
Unit 201	Working in the printing and graphic communications industry	13
Unit 302	Productivity and quality assurance in desktop publishing (DTP) and pre-press	29
Unit 303	Productivity, quality assurance and maintenance in machine printing and print finishing	36
Unit 304	Digital pre-press processes	47
Unit 305	Desktop publishing (DTP)	54
Unit 306	Machine printing (sheet fed lithography)	63
Unit 307	Machine printing (web fed lithography)	72
Unit 308	Machine printing (flexography)	81
Unit 309	Machine printing (gravure)	90
Unit 310	Machine printing (screen)	99
Unit 311	Mechanised print finishing and binding	108
Unit 312	Carton manufacturing processes	121
Appendix 1	Relationships to other qualifications	127
Appendix 2	Sources of general information	128



1 Introduction

This document tells you what you need to do to deliver the qualifications:

Area	Description
Who are the qualifications for?	For candidates who work or want to work in the printing and graphic communications sector
What do the qualifications cover?	They allow candidates to learn, develop and practise the skills required for employment and/or career progression in the printing and graphic communications sector. Candidates can also choose a specialist pathway to meet their career or employer's requirements.
Are the qualifications part of a framework or initiative?	They serve as technical certificate in the printing Apprenticeship framework.
What opportunities for progression are there?	They allow candidates to progress into employment.

Structure

To achieve the **Level 3 Certificate in Printing and Graphic Communications**, learners must achieve **14** credits from the mandatory and optional units dependent on the pathway chosen.

Level 3 Certificate in Printing and Graphic Communications – Pre-Press

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
H/503/1759	201	Working in the printing and graphic communications industry	4
Y/503/1807	302	Productivity and quality assurance in desktop publishing (DTP) and pre-press	5
K/503/1813	304	Digital pre-press processes	5

Level 3 Certificate in Printing and Graphic Communications – Desktop Publishing

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
H/503/1759	201	Working in the printing and graphic communications industry	4
Y/503/1807	302	Productivity and quality assurance in desktop publishing (DTP) and pre-press	5
J/503/1818	305	Desktop publishing (DTP)	5

Level 3 Certificate in Printing and Graphic Communications - Machine Printing

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
H/503/1759	201	Working in the printing and graphic communications industry	4
D/503/1808	303	Productivity, quality assurance and maintenance in machine printing and print finishing.	5
Optional		Learners must achieve a minimum of 5 credits from this group	
D/503/1971	306	Machine printing (sheet fed lithography)	5
K/503/2119	307	Machine printing (web fed lithography)	5
D/503/2120	308	Machine printing (flexography)	5
K/503/2122	309	Machine printing (gravure)	6
H/503/2121	310	Machine printing (screen)	5

Level 3 Certificate in Printing and Graphic Communications - Mechanised Print Finishing and Binding

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
H/503/1759	201	Working in the printing and graphic communications industry	4
D/503/1808	303	Productivity, quality assurance and maintenance in machine printing and print finishing	5
A/503/2139	311	Mechanised print finishing and binding	5

Level 3 Certificate in Printing and Graphic Communications - Carton Manufacture

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
H/503/1759	201	Working in the printing and graphic communications industry	4
D/503/1808	303	Productivity, quality assurance and maintenance in machine printing and print finishing	5
T/503/2141	312	Carton manufacturing processes	5

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 Certificate in Printing and Graphic Communications – Pre-Press	107	140
Level 3 Certificate in Printing and Graphic Communications - Desktop Publishing	107	140
Level 3 Certificate in Printing and Graphic Communications - Machine Printing	107	140
Level 3 Certificate in Printing and Graphic Communications - Mechanised Print Finishing and Binding	107	140
Level 3 Certificate in Printing and Graphic Communications - Carton Manufacture	107	140



2 Centre requirements

Approval

If your Centre is approved to offer the qualification Level 3 Certificate in Printing and Graphic Communications (5261) you will receive automatic approval for the new Level 3 Certificate in Printing and Graphic Communications (5405-30/31/32/33/34).

To offer this qualification, new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

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

Resource requirements

Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be technically knowledgeable in the area[s] for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- have credible experience of providing training.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Continuing professional development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training, assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

Candidate entry requirements

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that candidates have the potential and opportunity to gain the qualifications successfully.

Age restrictions

There is no age restriction for these qualifications unless this is a legal requirement of the process or the environment.



3 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs,
- support and guidance they may need when working towards their qualification[s].
- any units they have already completed, or credit they have accumulated which is relevant to the qualification[s].
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualification[s], their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Support materials

The following resources are available for these qualifications:

Description	How to access
Assignment (Assessment) guide	City & Guilds website
Marking guide	City & Guilds website



4 Assessment

Assessment of the qualification

Candidates must:

- successfully complete one short answer test for each mandatory and optional unit chosen
- successfully complete one online multiple choice test for mandatory unit 201.

City & Guilds has written the following assessments to use with this qualification:

- short answer tests
- online multiple choice test for unit 201.

Test Specifications

Test 1: Unit 201

Duration: 1 hour 40 mins

Unit	Outcome	Number of questions	%
201	1 Understand the responsibility of an employee for health and safety under the Health and Safety at Work Act 1974	12	18
	2 Know the health and safety risks associated with equipment and processes in the workplace	7	10
	3 Know the safety clothing, footwear and equipment suitable for use in the printing industry	4	6
	4 Understand how to create and maintain effective working relationships	3	4.5
	5 Understand the principles of personal development planning and training	4	6
	6 Understand the principles and techniques of communicating with others	4	6
	7 Know the printing processes and their common applications	5	8
	8 Know the stages in the printing process from pre-press to finished printing product	10	16
	9 Know the types of representative organisations and other associations	3	4.5
	10 Know the key job functions and their main purposes within the printing industry	2	3
	11 Understand legal issues concerning employment and working in the printing industry	12	18
	Total	66	100



5 Units

Availability of units

The following units are also on The Register of Regulated Qualifications:
<http://register.ofqual.gov.uk/Unit>

Structure of units

These units each have the following:

- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- unit aim
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria
- range.

Summary of units

Unit number	Unit title	Credits	Unit number (UAN)
201	Working in the printing and graphic communications industry	4	H/503/1759
302	Productivity and quality assurance in desktop publishing (DTP) and pre-press	5	Y/503/1807
303	Productivity, quality assurance and maintenance in machine printing and print finishing	5	D/503/1808
304	Digital pre-press processes	5	K/503/1813
305	Desktop publishing (DTP)	5	J/503/1818
306	Machine printing (sheet fed lithography)	5	D/503/1971
307	Machine printing (web fed lithography)	5	K/503/2119
308	Machine printing (flexography)	5	D/503/2120
309	Machine printing (gravure)	6	K/503/2122

Unit number	Unit title	Credits	Unit number (UAN)
310	Machine printing (screen)	5	H/503/2121
311	Mechanised print finishing and binding	5	A/503/2139
312	Carton manufacturing processes	5	T/503/2141

Unit 201

Working in the printing and graphic communications industry

UAN:	H/503/1759
Level:	Level 2
Credit value:	4
GLH:	33
Relationship to NOS:	This unit contributes towards the knowledge and understanding required for units 001 and 002 of the Level 2/3 NVQ in Printing.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via an online multiple choice test.
Aim:	This unit is concerned with developing an understanding of working in the printing and graphic communications industry, including health and safety, personal development, working relationships, an industry overview and the rights and responsibilities of employers and employees.

Learning outcome	The learner will:
1.	Understand the responsibility of an employee for health and safety under the Health and Safety at Work Act 1974
Assessment criteria	
The learner can:	
1.1	explain why the Health and Safety at Work Act 1974 was introduced
1.2	describe the employees primary legal duties under the Health and Safety at Work Act 1974
1.3	describe the employer's primary legal duties under the Health and Safety at Work Act 1974
1.4	explain how the regulations (with revisions) may apply to employees working in the printing industry
1.5	explain methods used by the Health and Safety Executive or local Environmental Health Authority to implement the Health and Safety at Work Act 1974 and other relevant regulations
1.6	explain what should be covered by a health and safety policy in a company that employs more than five people
1.7	explain the duty of care for any visitors to the work area
1.8	describe the procedures for dealing with an accident to a colleague
1.9	identify the information which should be entered into the Accident Book
1.10	list the principal duties of the company appointed first aider

- 1.11 explain the requirement for reporting **incidents/accidents** to the Health and Safety Executive or Environmental Health Authority
- 1.12 explain the procedures for **reporting and recording** accidents under the RIDDOR regulations
- 1.13 describe the general **fire precautions** appropriate to an organisation
- 1.14 describe the **procedure** employees should follow on hearing the fire alarm
- 1.15 describe the **role** of a fire marshal/warden
- 1.16 outline the **employer's responsibility** to control hazardous substances under the COSHH regulations
- 1.17 identify the **chemicals** used in the printing industry that are covered by the Hazardous Waste (England and Wales) Regulation 2005 and require disposal to a licensed carrier.

Range

Legal duties (employee's) (AC1.2)

- a. taking reasonable care for their own health and safety and that of others who may be affected by what they do or do not do
- b. co-operating with their employer on health and safety
- c. correctly using work items provided by their employer, including Personal Protective Equipment (PPE), in accordance with training or instructions
- d. not interfering with or misusing anything provided for health and safety

Legal duties (employer's) (AC1.3)

- a. making the workplace safe and without risks to health
- b. ensuring that plant and machinery are safe and that safe systems of work are set and followed
- c. ensuring articles and substances are moved, stored and used safely
- d. providing adequate welfare facilities
- e. giving employees the information, instruction, training and supervision necessary for their health and safety

Regulations

- a. Control of Substances Hazardous to Health Regulations (COSHH) 2002
- b. Health and Safety (Display Screen Equipment) Regulations 1992
- c. Electricity at Work Regulations 1989
- d. Fire Precautions (Workplace) 1999
- e. Health and Safety (First-Aid) Regulations 1981
- f. Workplace (Health, Safety and Welfare) Regulations 1992
- g. Management of Health and Safety at Work Regulations 1999
- h. Manual Handling Operations Regulations 1992
- i. The Control of Noise at Work Regulation 2005
- j. Personal Protective Equipment Regulations 1994
- k. Provision and Use of Work Equipment Regulations 1998
- l. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995
- m. Health and Safety (Safety Signs and Signals) Regulations 1996
- n. Special Waste Regulations 1996

Methods

- a. inspections
- b. improvement notices
- c. prohibition notices
- d. prosecutions
- e. investigation of accidents or complaints

Health and safety policy

- a. the general aims of the company in relation to the employee's health and safety
- b. the organisation's health and safety
- c. the systems and procedures in place for ensuring the health and safety of employees
- d. brought to the attention of all employees
- e. revised if the organisation changes or new hazards arise
- f. supported by sufficient resources

Duty of care

- a. identifying actual or potential hazards
- b. providing any required PPE, eg ear defenders
- c. understanding the law with regard to managing contractors when they are on site

Procedures

- a. ensuring the safety of the immediate work area
- b. seeking help from the competent person/first aider
- c. providing help (as directed by the competent person/first aider) to assist with the injured person
- d. ensuring the accident is reported and recorded

Information

- a. looking after first aid equipment and facilities
- b. preventing any deterioration in an existing condition
- c. promoting the recovery of the patient
- d. calling the emergency services when required

Principal duties

- a. keeping of details for the accident
- b. notifying of your enforcing authority immediately, under various circumstances as listed under Item 13
- c. reporting of certain diseases suffered by workers, who do specified types of work, as soon as possible on receiving a written diagnosis from a medical practitioner
- d. investigating of the cause and the reviewing of procedures as appropriate
- e. notifying dangerous occurrences to the enforcing authority

Incidents/accidents

- a. a fatality
- b. an employee receiving a major injury requiring hospitalisation
- c. a visitor injured on the premises and requiring hospital treatment

- d. an employee injured on the premises and unable to perform their normal job for three days
- e. an accident/incident arising from an electric shock or poisoning
- f. an accident/incident arising from an explosion or fire which stops work for 24 hours

Reporting and recording

- a. name, home address and occupation of the injured person
- b. signature, date, home address and occupation of the person completing the record
- c. time, date and place of the accident
- d. details about the accident - how it happened and the cause (if known)

Fire precautions

- a. knowing what to do in case of a fire
- b. knowing how to raise the alarm and use fire extinguishers where appropriate
- c. knowing what to do if you need to call the fire brigade
- d. all fire exits are clearly marked and unobstructed
- e. fire escape doors are easily opened whenever anyone is on the premises, they must never be wedged open

Procedure (AC1.14)

- a. leaving the building as quickly as possible by the nearest fire exit
- b. going to the appointed fire assembly point
- c. ensuring presence is recorded by the Fire Marshal/Warden
- d. not re-entering the building until told to do so by the Fire Brigade or Fire Marshal/Warden

Role

- a. identifying potential hazards
- b. maintaining emergency exits and fire fighting equipment
- c. raising the alarm in the event of a fire
- d. liaising with the Fire Brigade
- e. identifying and recording the presence of employees and visitors at the Fire Assembly Point
- f. giving instructions for the re-occupation of the building when safe to do so

Employer's responsibility

- a. assessing the risks to health arising from the use of hazardous substances at work
- b. reviewing assessment if changes occur
- c. preventing or controlling the risk
- d. ensuring that control measures are used and maintained
- e. monitoring exposure and carrying out health surveillance when necessary
- f. informing, instructing and training employees about the risks and the precautions needed
- g. keeping records where required

Chemicals

- a. aerosol cans
- b. blanket wash
- c. plate cleaners
- d. etch solution
- e. gravure etching solutions
- f. Isopropyl Alcohol (IPA)
- g. plate developer
- h. solvent based inks
- i. wash-up solvents

Learning outcome	The learner will:
2.	Know the health and safety risks associated with equipment and processes in the workplace
Assessment criteria	
The learner can:	
2.1	identify the principal hazards of working in the printing industry
2.2	describe the risks and hazards that commonly occur in printing companies
2.3	describe how machine guarding , safe systems of work and machine maintenance contribute to machine safety
2.4	describe how to stop and isolate machinery in the event of an emergency
2.5	list the safety checks that should be carried out on equipment daily, weekly, monthly or before use
2.6	identify equipment used in the printing industry which people under the age of 18 are prohibited from using
2.7	describe the correct procedures used in manual handling
2.8	identify what is involved in risk assessment
2.9	explain the importance of complying with safety instructions from suppliers, manufacturers and companies concerning the use of materials and operation of equipment.

Range

Principal hazards

- a. noisy machinery
- b. the use of chemicals
- c. manual handling
- d. moving parts of machinery

Risks and hazards

- a. trips caused by badly placed items such as pallets
- b. slips caused by spilt chemicals
- c. trapping caused by clothing or rags being caught in machinery
- d. crushing caused by heavy objects falling on hands or feet
- e. electric shock caused by poorly maintained wiring
- f. cuts caused by careless use of sharp blades
- g. accidents/damage caused by poorly maintained/checked machinery and equipment

Machine guarding

- a. identifying basic machinery hazards
- b. interlocking guards
- c. machine controls
- d. integrity of guard interlocks

Equipment (AC2.5)

- a. machines
- b. machine guards
- c. guillotines – a written record must be kept
- d. hand tools
- e. services to machines, eg electricity, compressed air, gas, supplies
- f. reporting wear and tear

Equipment (AC2.6)

- a. platens
- b. wire stitchers
- c. guillotines
- d. forklift trucks, which require a licence for use

Procedures

- a. planning the lift
- b. standing close to load and bending knees
- c. taking a firm grip of the object and holding it close to the body
- d. standing up, keeping back straight and elbows tucked in
- e. moving forward smoothly, using small steps and not jerking or twisting
- f. when destination is reached, bending knees and positioning object
- g. altering hand hold and pushing into final position

Risk assessment

- a. identifying hazards
- b. deciding who might be harmed and how
- c. assessing how great the risk is:
 - i. how often do people approach the hazard
 - ii. how long are they exposed to the hazard
 - iii. how serious could the consequences be
- d. deciding whether existing controls are adequate or more are required
- e. recording the significant findings
- f. putting in place the additional precautions needed
- g. reviewing the assessment

Learning outcome	The learner will:
3.	Know the safety clothing, footwear and equipment suitable for use in the printing industry
Assessment criteria	
The learner can:	
3.1	describe employer's responsibilities under the Personal

	Protective Equipment (PPE) at Work Regulations Act 1992
3.2	list the PPE commonly used in the printing industry
3.3	describe safe working conditions for the operation of computer equipment
3.4	identify the types and uses of fire extinguishers
3.5	identify and describe the signage used for information, warning, prohibition and mandatory instruction within the printing industry.

Range	
Employer's responsibilities	
a.	assess risks to health and safety, which have not been avoided before providing PPE
b.	provide suitable PPE free of charge to protect employees against risks, which have not been controlled by other means
c.	take all reasonable steps to ensure PPE is properly used
d.	maintain PPE provided, in clean and efficient working order with appropriate storage accommodation for when it is not in use
e.	give information, instruction and training for the use of PPE
f.	ensure that employees must use PPE provided and report any loss or obvious defect to the employer
PPE	
a.	safety hand and footwear
b.	eye, face and ear protection
c.	barrier cream and cleansing soaps
Safe working conditions	
a.	adequate space to work
b.	suitable environment – lighting, noise free, good ventilation
c.	adjustable chair – back and height
d.	adjustable screen height and visibility
e.	adequate working area including space in front of keyboard to allow wrists to be supported
Fire extinguishers	
a.	water
b.	carbon dioxide (CO ₂)
c.	foam
d.	dry powder

Learning outcome	The learner will:
4.	Understand how to create and maintain effective working relationships
Assessment criteria	
The learner can:	
4.1	describe the advantages of team working
4.2	describe the results of poor team working
4.3	explain the importance of teams working together towards the same goal, supporting and assisting colleagues to overcome production problems or difficulties

- 4.4 describe **ways of resolving conflict** with a colleague
- 4.5 describe **methods** of maintaining communication and productivity within the workplace
- 4.6 explain how **equal opportunities legislation** influences the workplace.

Range

Advantages

- a. a productive, stimulating atmosphere
- b. individuals feeling they belong and having commitment
- c. problems being overcome/resolved and targets being achieved
- d. continuous improvement in performance

Results

- a. little or no communication
- b. failure to accept responsibility
- c. poor quality work – mistakes, inaccuracies and sub-standard work are the norm
- d. low productivity and low rates of achievement by individuals
- e. poor understanding of the requirements of the job
- f. no improvement in working practices
- g. uncooperative atmosphere, with conflict, lethargy and a general disinterest

Ways of resolving conflict

- a. not walking away as the conflict will still be there
- b. staying calm and not shouting or getting angry
- c. checking the facts of the matter in dispute
- d. not telling lies and apologising if in error
- e. being assertive
- f. asking another member of the team to mediate
- g. treating colleagues with respect

Methods

- a. reporting difficulties in completing the work
- b. identifying problems in delivering the completed work in the allocated time
- c. identifying problems during the production process that will impact upon subsequent operations reporting problems in the immediate work area – eg a health and safety hazard
- d. ensuring all necessary information is passed on to colleagues and line managers at the end of the shift

Equal opportunities legislation

- a. discriminate against another person for reasons of race, gender, religion, disability, age or sexual orientation
- b. harass or bully a colleague for any reason
- c. ignore or belittle another person
- d. display inappropriate material in the workplace which some people may find offensive.

Learning outcome	The learner will:
5.	Understand the principles of personal development planning and training
Assessment criteria	
The learner can:	
5.1	describe techniques individuals use to identify their existing skills
5.2	explain how setting goals and implementing a personal action plan may contribute to development
5.3	describe how identifying personal strengths and weaknesses contributes to the process of personal development planning
5.4	explain the common content of an individual learning plan and the importance of it
5.5	explain the importance of continuing to learn new skills and acquire further knowledge throughout working life
5.6	identify where skills and knowledge required for personal development can be obtained .

Range
Techniques
a. self-assessment of skills and knowledge, often with reference to national standards or qualifications
b. setting goals to improve skills and knowledge
c. implementing a personal action plan to achieve the goals
Common content
a. target dates for completion of parts of the learning programme
b. the method of delivery of the programme
c. a system to review progress against the target dates
Obtained
a. teachers
b. trainers
c. mentors
d. assessors
e. colleges
f. self study

Learning outcome	The learner will:
6.	Understand the principles and techniques of communicating with others
Assessment criteria	
The learner can:	
6.1	describe ways of communicating with others at work
6.2	describe how to communicate with colleagues and visitors, making appropriate use of technical language
6.3	explain the difference between open and closed questions
6.4	describe the characteristics of formal language
6.5	describe the characteristics of informal language

6.6 identify the **techniques**, both verbal and written, for giving constructive feedback to colleagues.

Range

Characteristics – formal language (AC6.4)

- a. organised or prepared
- b. avoidance of slang and colloquialisms
- c. use of complete sentences
- d. used in larger groups or official circles, eg meetings/groups

Characteristics – informal language (AC6.5)

- a. improvised and spontaneous
- b. the use of slang and colloquialisms
- c. often ignoring conventional sentences
- d. use in one-to-one or small groups

Techniques

- a. verbal (one-to-one discussions, group presentations)
- b. written (memos, notes, reports).

Learning outcome	The learner will:
7.	Know the printing processes and their common applications
Assessment criteria	
The learner can:	
7.1	identify the main printing processes
7.2	describe the basic principles of each printing process
7.3	describe the image carriers used to reproduce the image
7.4	identify the products that are associated with the printing processes
7.5	describe the characteristics of the printed image within the printing process
7.6	describe how the choice of substrate to be printed effects which printing process is suitable for output.

Range

Main printing processes

- a. lithography
- b. flexography
- c. letterpress
- d. gravure
- e. screen
- f. pad
- g. digital print

Products

- a. lithography - primarily for printing onto paper and board to produce magazines, brochures, leaflets, packaging, stationery and many other products requiring high quality multi-colour images
- b. flexography - primarily for printing onto flexible roll materials eg for

<p>food packaging or other types of wrappings, but can also be used for producing books, newspapers, labels, wall coverings etc</p> <p>c. letterpress is used for roll tickets, vouchers, labels and pads where the image is carried on a metal or wooden block or metal type, and is nowadays often adapted for cutting and creasing, foiling and numbering work</p> <p>d. gravure - primarily to produce magazines, packaging and security work</p> <p>e. screen printing - primarily for printing on non-standard shapes and substrates, eg clothing, large format rigid display material</p> <p>f. pad uses a metal or plastic photo engraved plate (called a cliché) to transfer the image to an intermediate silicone rubber and onto the substrate, with the ink supplied to the plate after each impression and is used primarily to print on irregular shaped substrate surfaces, eg basketballs, masking tape</p> <p>g. digital printing uses electronic data from a computer system and outputs it direct to a reproduction system which can range from simple desktop printers to large directly imaged printing presses.</p>

Learning outcome	The learner will:
8.	Know the stages in the printing process from pre-press to finished printed product
Assessment criteria	
The learner can:	
8.1	identify the key stages in the production process within print
8.2	describe the responsibilities of each production area toward the finished product
8.3	explain the key operations undertaken within each production area
8.4	describe the importance of carrying out checks throughout production
8.5	list the types of checks which take place in each production area
8.6	explain how pre-press creates designs which are made up of text and images
8.7	explain the different broad families of type (serif and sans serif) and the different styles (roman, italic and bold)
8.8	explain the term image
8.9	describe how digital images are created
8.10	explain how digital type and digital images may be obtained
8.11	list the main operations in finishing and converting
8.12	define the terms cutting and trimming
8.13	define the term folding
8.14	describe common methods of binding used in the printing industry
8.15	describe additional operations that may be carried out by some print finishing departments
8.16	describe the process of carton manufacture.

Range
<p>Key stages</p> <p>a. design – usually text, images and illustrations</p> <p>b. image carrier – layout, imposition</p> <p>c. printing – method – sheet work, half-sheet work, work and turn, work and tumble</p>

- d. finishing – cutting, folding, securing

Created

- a. scanning an existing hard copy photograph or illustration
- b. drawing or painting an image directly in a software application
- c. using a digital camera to take pictures

Obtained

- a. removable digital storage media, eg CD, external hard-drive
- b. another computer via a network, eg Internet/e-mail/ISDN

Additional operations

- a. collating
- b. laminating or encapsulation
- c. decoration, eg gold blocking
- d. hole punching or drilling
- e. slitting
- f. cutting and creasing
- g. numbering

Learning outcome	The learner will:
9.	Know the types of representative organisations and other associations
Assessment criteria	
The learner can:	
9.1	identify the main bodies in the printing industry that represent employers
9.2	describe the general role of employer’s organisations
9.3	identify the role of the trade unions
9.4	identify professional bodies that are open for individuals to join
9.5	describe the role relating to the printing and graphic communication industry of national and international organisations.

Range

Main bodies

- a. British Printing Industries Federation (BPIF)
- b. British Association of Printers and Copyshops (BAPC)
- c. Corrugated Packaging Association (CPA)
- d. European Flexographic Trade Association (EFTA)
- e. Metal Packaging Manufacture’s Association (MPMA)
- f. Screen Printing Association (SPA)
- g. Scottish Printing Employer’s Federation (SPEF)
- h. Local Chambers of Commerce

General role

- a. providing a forum for members to discuss common problems
- b. representing the views of employers to government and other statutory bodies

<ul style="list-style-type: none"> c. negotiating with trade unions and employee representatives on wages and conditions d. assisting companies to improve their effectiveness and performance <p>Role (AC9.3)</p> <ul style="list-style-type: none"> a. negotiate with employers at local and national levels about wages and conditions b. represent the view of members to government and other statutory bodies c. provide benefits to members during times of distress and unemployment <p>Professional bodies</p> <ul style="list-style-type: none"> a. Institute of Printing (IoP) b. Institute of Directors c. Institute of Management <p>Role (AC9.5)</p> <ul style="list-style-type: none"> a. maintain qualifications and standards and/or promote training eg Sector Skills Council b. research and publish technical and economic information, eg PIRA, GATF c. agree international protocols for use by manufacturers of equipment and software developers. eg ISO, CIP.
--

Learning outcome	Learning outcome
10. Know the key job functions and their main purposes within the printing industry	
Assessment criteria	
The learner can:	
10.1 identify the departments that may exist within a printing company	
10.2 describe the activities of the departments within a printing company	
10.3 identify the roles of the management team in a large printing company	
10.4 identify the principal job roles in production departments.	

Range
<p>Departments</p> <ul style="list-style-type: none"> a. sales and marketing b. production (pre-press, printing, finishing and despatch) c. administration and accounting <p>Activities</p> <p>sales and marketing role is to:</p> <ul style="list-style-type: none"> a. market the business to potential customers b. obtain profitable orders for the company <p>production activities:</p> <ul style="list-style-type: none"> a. works order processing and/or control b. production planning and control

<p>administration and accounting usually deal with:</p> <ol style="list-style-type: none"> estimating costing, pricing and customer invoicing payment of salaries and suppliers' invoices monthly and end of year accounts <p>Management team</p> <ol style="list-style-type: none"> a managing director or chief executive a finance manager or accountant a sales and/or marketing manager a production manager <p>Principal job roles</p> <ol style="list-style-type: none"> pre-press – desktop publisher, planner, platemaker, scanner printing – printer, assistant finishing – folder, guillotine operator, finisher, binder, cutting and creasing operator despatch – warehouseman, forklift truck driver, van driver.
--

Learning outcome	The learner will:
11. Understand legal issues concerning employment and working in the printing industry	
Assessment criteria	
The learner can:	
11.1 explain that employers and employees have statutory rights and responsibilities under UK and European employment law	
11.2 define the term 'contract of employment'	
11.3 identify the purpose of employment contract terms	
11.4 identify the most relevant issues for the printing industry covered by employment law	
11.5 explain the reasons why an employer may dismiss an employee	
11.6 identify employees' responsibilities under their contract of employment	
11.7 explain that employment contracts are recognised in law as being based on the principle of mutual trust and confidence and that a major breach of this principle by either party is likely to result in the contract being broken	
11.8 explain on what grounds employers are not entitled to discriminate against employees	
11.9 identify the sources of external help in resolving a serious employment problem	
11.10 outline the purpose of the Data Protection Act 1998	
11.11 describe how the law protects individuals and groups in relation to printing and publication	
11.12 explain the possible consequences of breaching the laws which govern printing and publishing	
11.13 explain why some work must carry the details of the printing company who produced it	
11.14 describe the types of company in relation to their ownership	
11.15 identify the information about the company that company stationery, including letterheads and invoices, must carry.	

Range

Relevant issues

- a. the minimum wage that must be paid (with exceptions for some young people in training)
- b. the maximum time that an individual may be required to work each week
- c. the minimum paid holiday that must be given each year
- d. the minimum sick pay (SSP) that must be paid to someone who is off work and genuinely sick
- e. the entitlement of parents to time off for maternity and paternity leave
- f. minimum periods of notice to be given to employees (other than in cases of immediate dismissal for gross misconduct)

Reasons

- a. behaviour has been sufficiently bad to justify dismissal
- b. capability or qualifications do not allow the job to be performed competently
- c. role is redundant, because the job no longer needs to be done
- d. who, for a legal requirement, can no longer be employed, eg a driver who loses their licence
- e. dismissal was for a justifiable and substantial reason

Employees' responsibilities

- a. giving and working the required amount of notice
- b. using any grievance procedure in the event of an unresolved grievance or dispute with their employer
- c. not breaching their duty of confidentiality to their employer

Discriminate

- a. race
- b. gender
- c. religion
- d. disability
- e. trade union membership or activity
- f. sexual orientation
- g. maternity

Sources

- a. any trade union of which they are a member
- b. a Citizens Advice Bureau
- c. a solicitor

Purpose

- a. inaccurate
- b. incomplete
- c. irrelevant

Law

- a. untrue statements about a person or organisation which diminish

- their reputation (libel)
- b. statements which incite racial hatred or are highly offensive
- c. obscenity
- d. unauthorised reproduction of copyright material, (usually something created and owned by another person)
- e. reproducing licenses, passports, currency, postage stamps etc

Consequences

- a. either criminal or civil proceedings, or both,
- b. criminal courts sentencing the offender to imprisonment, a fine or other punishment
- c. civil courts awarding monetary compensation to be paid by the defendant if he/she loses the case

Types of company

- a. sole traders/proprietors
- b. partnerships
- c. limited (liability) companies – private or public

Information

- a. trading name and address
- b. names of the proprietor, partners
- c. full company name and registered number, registered office and place of registration (if a company)

Unit 302

Productivity and quality assurance in desktop publishing (DTP) and pre-press

UAN:	Y/503/1807
Level:	Level 3
Credit value:	5
GLH:	36
Relationship to NOS:	This unit contributes towards the knowledge and understanding required for units B1, B2, 002, 212 IT, 305 IT, 340, 705, 706 and 707 of Level 3 NVQ in Printing.
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	This unit is concerned with developing a clear understanding of productivity, quality assurance and the common production processes in DTP and pre-press including workflow, proofing and archiving.

Learning outcome	The learner will:
1. Understand the issues which affect profitable production and productivity	
Assessment criteria	
The learner can:	
1.1 describe the importance of ensuring all jobs are produced profitably and meet customer requirements	
1.2 summarise the requirements in terms of time and quality for an organisation to produce work profitably	
1.3 identify the factors that can affect the profitability of printed work	
1.4 explain the importance of meeting deadlines and that some printed work is required for other manufacturing processes	
1.5 identify the key issues affecting profitable production in DTP and pre-press	
1.6 explain the importance of following manufacturers' instructions and specifications to maintain equipment in serviceable condition	
1.7 explain why it is important that digital files are correctly configured and are compatible with the hardware and software in use	
1.8 summarise the procedures to follow to ensure that the materials required for a particular job are available	
1.9 summarise the quality assurance procedures that are in place to ensure previous operations or processes have been completed to the correct specification and standard before work is released to the	

next stage of production
1.10 analyse the potential benefits of improved productivity to a company

Range
<p>Issues</p> <ul style="list-style-type: none"> a. equipment is in serviceable condition, correctly calibrated and available for production b. correctly configured digital files are compatible with the equipment in use are produced or received c. accurate work instructions have been prepared and passed to those who will produce the job d. earlier operations or processes have been completed to the correct specification and standard e. workers who will produce the job have been properly trained and have the skills and knowledge necessary to do the work successfully f. materials needed to produce proofs, image carriers, etc. are available when required <p>Procedures</p> <ul style="list-style-type: none"> a. an order from a supplier must have been raised or b. the materials identified as being in stock, and c. at the time of delivery or stock allocation, the materials specification and quantity must have been carefully checked to confirm that they are correct

Learning outcome	The learner will:
2.	Understand the main features of quality assurance and quality control systems
Assessment criteria	
The learner can:	
2.1	define the term 'quality product or service'
2.2	define quality control and quality assurance
2.3	explain the reasons why a company implements a quality assurance system
2.4	describe the techniques used in quality control
2.5	describe the purpose and use of equipment used for maintaining quality standards in DTP and pre-press areas
2.6	summarise the potential benefits of ensuring machinery is cleaned, lubricated and maintained in accordance with the manufacturer's recommendations
2.7	explain the areas usually covered by an organisation's quality assurance system
2.8	identify the current quality assurance standards which organisations can work towards.

Range
<p>Techniques</p> <ul style="list-style-type: none"> a. inspection b. testing

- c. sampling
- d. the use of input and output controls

Equipment

- a. calibrated densitometers – transmission and reflection
- b. calibrated dot meter
- c. colour reference books/swatches (eg pantone)
- d. calibrated ruler
- e. calibrated targets for scanners
- f. colour management software
- g. spectrophotometer

Quality assurance system

- a. control of suppliers
- b. receive goods in
- c. detailed operating procedures
- d. a system for tracing production and controlling documentation
- e. arrangements for dealing with non-conforming products
- f. arrangements for internally auditing the quality system and procedures
- g. a system for calibration and maintenance of equipment

Quality assurance standards

- a. lighting
- b. paper
- c. colour
- d. proofing
- e. quality assurance system (currently ISO9000)

Learning outcome	The learner will:
3.	Understand the activities and processes within DTP and pre-press areas and plan the workflow
Assessment criteria	
The learner can:	
3.1	define the term 'analogue'
3.2	explain the term 'digital'
3.3	summarise the activities of DTP and pre-press production
3.4	summarise the benefits of identifying and addressing faults in files and proofs during DTP and pre-press
3.5	evaluate the importance of colour management software being installed and configured correctly on digital devices
3.6	summarise the British Standards for text and copy (BS5261) and for colour reproduction (BS4785)
3.7	identify the DTP and pre-press workflow for any given job
3.8	explain the checks to assure quantity at each stage of the DTP pre-press process.

Range**Activities**

- a. creating and/or receiving artwork for reproduction in print or electronically
- b. identifying any printing and post-printing requirements, including scheduled production times
- c. assessing the suitability of artwork, originals, data files and proofs supplied by the customer
- d. planning DTP and/or pre-press work required for the job
- e. carrying out the colour reproduction activities required to achieve the job specification (colour management, scanning and colour separation)
- f. verifying the thumbnails for multi page documents
- g. determining any imposition requirements outputting image carriers which meet the specification for the job
- h. producing proofs for approval
- i. archiving data and/or image carriers and proofs

Benefits

- a. reduced risk of delays in the later stages of production and completion
- b. prevent additional costs being incurred production
- c. avoid wasted materials caused by having to repeat work
- d. avoid disputes with the customer as to responsibility for defects in the finished job

Workflow

- a. the steps needed to ensure that the layout and content of the document meet or will meet with the customer's instructions and/or specification
- b. the steps needed to ensure any supplied graphic images have sufficient resolution to achieve the job specification
- c. the steps needed to ensure that the document is free from spelling, literal and grammatical errors
- d. the scanning requirements, retouching, enlarging or screening of images
- e. the output requirements – eg film, paper, plate, screen or a data file
- f. the emulsion requirements - ensuring that the contact emulsion of any film is appropriate for the printing process
- g. the imposition scheme
- h. the method of working, ie analogue or digital or a mix of the two
- i. printing production processes
- j. substrates to be printed on together with any special finishes
- k. folding and binding requirements.

Learning outcome	The learner will:
4.	Understand the administrative control procedures in DTP and pre-press areas
Assessment criteria	
The learner can:	
4.1	identify the details required from the works instruction/ job bag / job specification in order to undertake work in the DTP and pre-press areas
4.2	describe how uncertainties in job specifications may be addressed
4.3	summarise the methods used to protect customers' artwork from loss or damage
4.4	explain the procedure for approval when amendments or additional work is required in pre-press which was not identified when the job was first received
4.5	describe how to verify that the resources are available to meet the job specification
4.6	describe how to clarify that equipment calibration and maintenance is up to date
4.7	analyse the procedure for proof approval and the requirement to record alterations and amendments
4.8	summarise the goals which should have been achieved after completion of all DTP and pre-press processes
4.9	explain the production records and information required to record DTP and pre-press processes for the purpose of quality assurance, job costing and invoicing.

Range
Methods
a. labelling any originals and/or placing them in a labelled artwork bag
b. copying any original digital files to another storage media prior to opening
Goals
a. the work must meet the standard in any customer supplied proof for the job or alternatively that a new proof has been produced and approved by the customer
b. that any final proof must be clearly identified as such
c. that adequate records are kept to trace the progress and approval of proofing for the job

Learning outcome	The learner will:
5.	Understand the different methods of producing proofs and the strengths and weaknesses of each
Assessment criteria	
The learner can:	
5.1	explain the purpose of a proof
5.2	explain the checks that may be carried out on a proof
5.3	define a high resolution proof
5.4	define a low resolution proof

- 5.5 explain the importance of ensuring the customer is aware of the limitations of the proofing system
- 5.6 analyse the **factors** which can effect colour reproduction of different types of proofs
- 5.7 explain why colours viewed on screen cannot always match colour proofs produced in printed format
- 5.8 explain what is meant by colour space and how it determines what can or cannot be represented on any particular type of proof
- 5.9 identify the **institutions/systems** established to set standards in the industry
- 5.10 evaluate how the standards set are relevant to **print production**
- 5.11 identify the **colour reproduction, colour classification and colour standards**
- 5.12 justify the recommendation of a particular type of proof to a customer.

Range

Checks

- a. text layout, spelling and grammar
- b. image resolution and quality
- c. page imposition
- d. correct font usage
- e. colour accuracy
- f. colour trapping, overprinting and knockouts

Factors

- a. substrate on which the proof is printed
- b. pigments in the dyes, inks or toners used to produce the proofs
- c. colour calibration of the device used to make the proof
- d. resolution of the image and proofing device
- e. use of colour management software and device profiles
- f. machine printing conditions for wet proofs

Institutions/systems

- a. British Standards Institution (BSI)
- b. International Standards Institution (ISO)
- c. Deutsch Industrie Norm (DIN)

Print production

- a. pre-press
- b. image carriers
- c. machine printing
- d. process inks
- e. substrates

Colour reproduction, classification and standards

- a. colour mixture, light and pigment terminology
- b. auto typical colour mixture, colour illusions and perception, juxtaposition, moiré and screen angles
- c. colour classification and colour space, CIE L *a*b*, CMC

- d. colour standards – Specifications for Web Offset Publications (SWOP)
- e. colour viewing standards, BSI 960 Parts 1 and 2 and the metamerism effects of artificial lighting
- f. additional process printing, Hi-Fi (CMYK and RGB, up to 7 colour printing), Hexachrome (CMYK plus orange and green), Boosted CMYK (plus light cyan and magenta).

Learning outcome	The learner will:
6.	Understand the methods used to archive DTP and pre-press work
Assessment criteria	
The learner can:	
6.1	explain the reasons for archiving/saving original, intermediate and final digital artwork
6.2	explain how the archiving system is applied
6.3	summarise methods in use for storing digital files
6.4	explain the legal ownership of DTP and pre-press products and how it is determined
6.5	explain the need to identify the cause and/or responsibility for faults, which may be attributable to DTP and pre-press, in the finished product
6.6	explain how archiving can help to achieve identify the cause and/or responsibility for faults which may be attributable to DTP and pre-press.

Range
<p>Archiving system</p> <ul style="list-style-type: none"> a. indexing b. identification and location c. protection from physical damage or loss d. identification of final approved artwork/films/files <p>Methods</p> <ul style="list-style-type: none"> a. CD or CD-RW b. DVD c. Memory stick d. External hard-drive e. Memory cards

Unit 303

Productivity, quality assurance and maintenance in machine printing and print finishing

UAN:	D/503/1808
Level:	Level 3
Credit value:	5
GLH:	38
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	The aim of this unit is to develop a clear understanding of productivity and quality assurance in candidates along with an understanding of the common production processes in printing and print finishing.

Learning outcome	The learner will:
1. Understand the issues which affect profitable production and productivity	
Assessment criteria	
The learner can:	
1.1	describe the importance of ensuring all jobs are produced profitably and meet customer requirements
1.2	explain the implications for an organisation if it doesn't provide work which is of the quality required by its customers
1.3	summarise the requirements in terms of time and quality for an organisation to produce work profitably
1.4	describe those factors that can affect the profitability of printed work
1.5	justify that some printed work is required for a specific date and time
1.6	evaluate the potential consequences of printed work failing to meet deadlines in terms of dates and of work for other manufacturing processes
1.7	classify the key issues affecting profitable production in printing and print finishing
1.8	explain the importance of following the manufacturer's instructions and specifications to maintain equipment in serviceable condition
1.9	summarise what needs to happen in order to ensure that the materials required for a particular job are available
1.10	summarise the quality assurance procedures that are in place to ensure previous operations or processes have been completed to

the correct specification and standard before work is released to the next stage of production

1.11 analyse the potential benefits of improved productivity to a company.

Range
<p>Issues</p> <ul style="list-style-type: none"> a. plant and equipment being in serviceable condition and available for production b. correct materials for the job being available in the required quantity at the required time c. accurate works instructions having been prepared and passed to those who will produce the job. d. previous operations or processes having been completed to the correct specification and standard e. workers who will produce the job having been properly trained and having the skills and knowledge necessary to do the work successfully <p>Serviceable condition</p> <ul style="list-style-type: none"> a. clean – inks, coatings, substrate particles and solvents must not be contaminating rollers, cylinders and surfaces which will come into contact with the product b. lubricated – to ensure that moving parts of the equipment do not suffer unnecessary wear or damage c. maintained – in accordance with the manufacturer’s instructions and specifications, so as to ensure safety of operation and satisfactory performance in operation

Learning outcome	The learner will:
2.	Understand the main features of quality assurance and quality control systems
Assessment criteria	
<p>The learner can:</p> <ul style="list-style-type: none"> 2.1 define the term ‘quality product or service’ 2.2 define quality control and quality assurance 2.3 explain the reasons why a company implements a quality assurance system 2.4 define the techniques used in quality control 2.5 describe the purpose and use of equipment used for maintaining quality standards in printing and print finishing 2.6 summarise the potential benefits of ensuring machinery is cleaned, lubricated and maintained in accordance with manufacturer’s recommendations 2.7 explain how the quality assurance system may be applied to organisational procedures 2.8 identify the current quality assurance standards which organisations can work towards. 	

<p>Range</p> <p>Techniques</p> <ol style="list-style-type: none"> inspection testing sampling the use of input and output controls <p>Equipment</p> <ol style="list-style-type: none"> densitometer dot meter colour reference book (eg pantone) calibrated ruler light boxes (controlled viewing conditions) <p>Quality assurance system</p> <ol style="list-style-type: none"> control of suppliers receiving goods in detailed operating procedures a control system and documentation for traceability of raw materials and finished goods arrangements for dealing with non-conforming products arrangements for internally auditing the quality system and procedures calibration and machine maintenance <p>Quality assurance standards</p> <ol style="list-style-type: none"> lighting paper colour proofing quality assurance system (currently ISO9000).
--

Learning outcome	The learner will:
3.	Understand systems and documentation used to organise and control production
Assessment criteria	
The learner can:	
3.1	define the main categories of jobs in production
3.2	summarise the procedure to be followed by the production department within an organisation upon receipt of an order
3.3	explain how production is planned and schedules are confirmed so that delivery dates can be met
3.4	summarise how disruptions to the schedule may impact on delivery dates
3.5	describe common factors that may cause disruption to the production schedule
3.6	evaluate systems for approving production runs
3.7	explain how organisations with a quality assurance system will have

- a documented procedure for authorising work to commence on jobs
- 3.8 describe procedures for authorising completion of various stages of production before releasing work onto the next process
 - 3.9 explain why a customer-approved proof is usually the basis for determining the standard for the job, unless there are other instructions contained on or in the job bag/work
 - 3.10 explain why most printing companies require production workers to keep a record, either on paper or electronically, recording the jobs they have worked on and the time taken
 - 3.11 explain how errors can be caused by production workers failing to read or fully comprehend the job instructions or specification
 - 3.12 summarise the benefits of collating production information from machines and operatives at the end of each shift in terms of maintaining the production schedule.

Range

Categories

- a. new jobs
- b. reprints of previously printed jobs
- c. amendments and changes to previously printed jobs

Procedure

- a. the specification of the job is clearly understood, including size, quantity, number of colours, finishing method
- b. the time needed to produce the job is calculated and a delivery deadline agreed with the customer
- c. a written works order (also known as a works instruction ticket or job bag) will be produced containing all the information and instructions needed for those who are going to produce the job
- d. the materials needed for the job are identified and, where necessary, an order placed with a supplier
- e. a production plan is produced, listing all the processes and the sequence in which they will be undertaken
- f. a production schedule is produced, so that the workflow through the production departments is efficient and will guarantee that the delivery deadline is met

Factors

- a. machines or equipment not being available for production because of breakdowns
- b. machines or equipment not performing to the required standards because of lack of maintenance, lubrication or cleaning
- c. materials not being available in the required quantities at the time they are required
- d. unplanned absence of staff
- e. work being produced which does not meet the required standard

Systems

- a. signed sheet sheet
- b. production check list.

Learning outcome	The learner will:
4.	Understand the roles and responsibilities for cleaning, lubrication and preventative maintenance and for reporting and recording machine faults
Assessment criteria	
<p>The learner can:</p> <p>4.1 describe the responsibilities of those involved in carrying out preventative maintenance and/or repairs to the printing or finishing machinery</p> <p>4.2 describe the factors to consider when determining who should carry out repairs</p> <p>4.3 summarise why cleaning, lubricating and preventative maintenance work should be planned to balance the needs of the activity and the production requirements</p> <p>4.4 evaluate the benefits of planning the cleaning, lubricating and preventative maintenance</p> <p>4.5 identify the factors that need to be taken into account when organising cleaning, lubrication and preventative maintenance schedules</p> <p>4.6 summarise the preparation of a planned cleaning, lubrication or preventative maintenance operation</p> <p>4.7 describe what a cleaning, lubrication and preventative maintenance plan includes</p> <p>4.8 evaluate the maintenance plan at the conclusion of the work to try to eliminate any defects arising in the drawing up of future plans</p> <p>4.9 identify items to be checked after cleaning, lubrication or preventative maintenance operations, to ensure any equipment or machinery is safe to operate</p> <p>4.10 categorise those faults occurring on a piece of equipment or machinery</p> <p>4.11 explain the importance of reporting faults, which are not the responsibility of the operator to rectify, to the appropriate authority in accordance with organisational procedures</p> <p>4.12 analyse the benefits of keeping a written record or log of all machine faults, including any downtime resulting from those faults.</p>	

Range
<p>Those involved</p> <p>a. machine operator</p> <p>b. team members eg assistants</p> <p>c. qualified in-house maintenance staff</p> <p>d. machine manufacturer's, or agent's electrical or mechanical engineer</p> <p>Factors (AC4.2)</p> <p>a. cost of the component</p> <p>b. safety aspects of replacing the component</p> <p>c. cost and length of time required to replace the component</p> <p>d. tasks involved in replacing component</p>

Benefits

- a. the machinery/equipment is kept at maximum efficiency
- b. downtime and loss of production is minimised
- c. workflow from/to other departments is controlled

Factors (AC4.5)

- a. the timing – daily, weekly, monthly
- b. responsibilities for undertaking the required operation – items within own responsibility, items to be undertaken by other personnel (operatives, support staff)
- c. implications of downtime whilst operations are taking place – loss of production within the department, effect on other departments

Preparation

- a. consultations with other team members to identify the items to be cleaned and maintained
- b. identification of the individual responsibilities for completing the required tasks
- c. discussions with supervisor/line manager about timing of operations, with reference to work loadings during relevant period
- d. discussions with fellow workers in department on production implications of proposed operation
- e. consultations with other departments on implications of workflow during operations

Maintenance plan

- a. a list of items on the equipment/machinery to be cleaned, lubricated or replaced
- b. identifying the personnel responsible for each item
- c. the materials and chemicals/solvents to be used for cleaning, lubricating or replacing each item
- d. the checks that should be made at the end of the work to ensure the safe and efficient operation of the piece of equipment/machinery

Items

- a. equipment or machinery – to ensure the removal of all cleaning material/chemical/solvents/waste materials from immediate work area – to ensure it is clear of waste materials
- b. components – to ensure they are restored to their operating positions
- c. personnel – to check they are clear of the equipment or machinery
- d. all guards and safety protection equipment – to ensure they have been restored to position/operating positions

Faults

- a. faults that disrupt production
- b. recurring faults
- c. faults that impair the required quality of the output

Learning outcome	The learner will:
5.	Understand the principal activities involved with machine cleaning, lubricating and component replacement as part of a preventative maintenance programme
Assessment criteria	
The learner can:	
5.1	analyse the purpose of cleaning any piece of machinery
5.2	explain why cleaning of machinery must only be undertaken within the operator's area of responsibility
5.3	summarise the precautions that cleaning operations must include
5.4	define the purposes of lubrication
5.5	summarise the main types of lubricants commonly used
5.6	describe the main methods of lubrication
5.7	evaluate the properties of lubricants
5.8	critically compare the use of oil and grease to lubricate moving parts
5.9	explain that oil is graded according to viscosity (resistance to flow)
5.10	identify the viscosity of light and heavy oil
5.11	summarise the purpose of regular preventative maintenance
5.12	identify the parts/components typically found in printing, finishing and converting machines which will require periodic refurbishment or replacement
5.13	explain why preventative maintenance should only be carried out in accordance with machine manufacturer and organisational procedures
5.14	clarify the responsibility for decisions relating to replacement of worn or defective components
5.15	explain the importance of replacing worn or defective components with the correct replacement parts
5.16	clarify the importance of using the correct tools for the removal and replacement of defective components.

Range
<p>Purpose (AC5.1)</p> <ol style="list-style-type: none"> ensure the efficient and effective working of the machinery prevent damage or discolouration of the output <p>Precautions</p> <ol style="list-style-type: none"> reference to the relevant Safety Data Sheets to identify the potential hazards of any solvents the correct use of any personal protective equipment (PPE) ensuring that the machinery is rendered safe before commencing cleaning operations <p>Purposes (AC5.4)</p> <ol style="list-style-type: none"> reduce friction prevent wear prevent overheating of moving parts

Types of lubricants

- a. oil
- b. grease

Methods

- a. by hand
- b. automatic

Properties

- a. fluid or
- b. semi-solid
- c. viscosity

Purpose (AC5.11)

- a. ensure the effective and efficient operation of the piece of machinery
- b. reduce wear and tear on the moving parts
- c. prolong the working life of the equipment
- d. prevent unexpected breakdown of the machinery

Parts/components

- a. filters (air/oil/water)
- b. bearings
- c. rubber rollers and wheels
- d. suckers
- e. chains
- f. belts
- g. blankets
- h. sleeves
- i. bulbs
- j. knives
- k. oils

Responsibility

- a. within the responsibility of the operator
- b. reportable to a higher authority

Learning outcome	The learner will:
6.	Understand machine faults and how they can be rectified
Assessment criteria	
The learner can:	
6.1	summarise the steps to be taken to determine the nature of a fault
6.2	summarise the ways information relating to machine faults may be obtained
6.3	explain why machine faults will usually be the result of either machine operation or component wear and tear
6.4	analyse faults and explain which will be rectified by the machine operator and which require reporting to the appropriate authority
6.5	explain the importance of following manufacturer's instructions when diagnosing machine faults, their rectification and/or resetting

- of machine parameters
- 6.6 summarise how, if it is safe to do so, **information** about the performance of a machine may be obtained
 - 6.7 identify the **tools** available to the machine operator which may be used to diagnose and/or rectify machine faults and replace defective components
 - 6.8 evaluate the use of a parts manual for identifying machine manufacturer part numbers and ordering replacement parts/components.

Range

Steps

- a. determining if the fault is electrical, electronic or mechanical
- b. identifying whether the fault has occurred previously
- c. determining whether the fault requires immediate attention or a scheduled repair
- d. considering if the fault may lead to component/machine/product damage if not repaired immediately

Ways

- a. reports from other members of the crew or support staff (verbally or in writing)
- b. examination of the piece of machinery
- c. examination of the output from the piece of machinery

Information

- a. listening for unusual or unexpected sounds whilst the machine is running
- b. feeling for or smelling excessive heat from the machine or ancillary equipment
- c. observing the operation of the machine and/or individual components in operation

Tools

- a. micrometer
- b. callipers
- c. feeler gauges
- d. screwdriver (Phillips/slot)
- e. socket wrench/Allen key
- f. open ended spanner
- g. ring spanner
- h. box spanner
- i. socket wrench
- j. torque wrench/spanner
- k. tommy bar
- l. circuit tester

Learning outcome	The learner will:
7.	Understand the procedures for the safe use of chemicals and the disposal of waste
Assessment criteria	
The learner can:	
7.1 identify the regulation governing the storage, use and disposal of chemicals and solvents	
7.2 identify those chemicals commonly used in the printing industry that are covered by the Hazardous Waste (England and Wales) Regulations 2005	
7.3 summarise the necessity for chemicals covered by the Hazardous Waste (England and Wales) Regulations 2005 to be consigned for disposal to a licensed carrier	
7.4 summarise the requirements for risk assessment of chemicals and solvents as stipulated in the COSHH regulations	
7.5 summarise the areas that will be identified when complying with regulations and assessing the risk of chemicals	
7.6 evaluate ways to prevent exposure to hazards, having assessed the risk and determined that the chemical or solvent presents a hazard	
7.7 explain the steps which must be taken where it is not practicable to prevent exposure	
7.8 explain why a chemical or solvent is considered hazardous	
7.9 describe the safe storage conditions relating to chemicals or solvents	
7.10 analyse the responsibility individuals have for their own health and safety when using chemicals and solvents	
7.11 summarise the waste commonly created within the printing industry	
7.12 summarise the internal organisations governing the disposal of waste.	

Range
<p>Chemicals</p> <ul style="list-style-type: none"> a. aerosol cans b. blanket wash c. plate cleaners d. etch solution e. gravure etching solutions f. Isopropyl Alcohol (IPA) g. plate developer h. solvent based inks i. wash-up solvents <p>Areas</p> <ul style="list-style-type: none"> a. what hazards exist and the physical state of the hazardous substance b. who will be affected by any hazards c. how much they will be exposed to any hazards and for how long d. the affected locations e. the control measures necessary to maintain acceptable exposure limits f. the control measures necessary to monitor the substance

- g. the level of instruction, information and training required for employees

Ways to prevent exposure

- a. preventing employees from gaining exposure to the chemical
- b. changing the process
- c. replacing it with a safer alternative
- d. using the chemical or solvent in safer form

Steps

- a. controlling the exposure by enclosing the process, providing local or general ventilation, using systems that minimise the exposure, reducing the number of people exposed or the amount of time they are exposed
- b. ensuring the control measures are maintained by providing adequate supervision and keeping any equipment in efficient working order and repair
- c. monitoring the exposure and keeping records
- d. reviewing the assessment at regular intervals to ensure no significant changes have occurred
- e. informing and training the employees on the risks and the use of any protective equipment

Responsibility

- a. taking advantage of any training and information provided about the safe use of chemicals and solvents
- b. following the procedures laid down for using and storing chemicals and solvents
- c. using the personal protective equipment supplied and reporting any faults in the equipment to the appropriate authority

Waste

- a. used PPE
- b. used cloths
- c. spoiled materials – paper, board or other substrate

Organisational procedures

- a. identification of products, containers and materials covered by Special Waste regulations by department
- b. designation of responsibility for collection of special waste to supervisors/line managers/operatives
- c. storage of special waste products in sealed containers
- d. contract with authorised carrier of special waste
- e. preparation of required consignment note identifying location of special waste after disposal
- f. pick up and handling of special waste and consignment note by authorised carrier.

UAN:	K/503/1813
Level:	Level 3
Credit value:	5
GLH:	38
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	This unit is concerned with developing a clear understanding of controlling digital pre-press, including hardware devices, software applications, conversion of originals to digital files, preflighting and ripping of files, digital creation of image carriers, and digital proofing. Candidates will be expected to cover this unit in the context of their chosen production process eg lithography, gravure, flexography, screen etc.

Learning outcome	The learner will:
1.	Understand the hardware and software systems typically used in pre-press
Assessment criteria	
The learner can:	
1.1	clarify the activities which take place within 'pre-press'
1.2	describe the functions of hardware used in digital pre-press production
1.3	explain the software applications used in pre-press
1.4	explain the importance of calibrating hardware such as scanners and Computer to Plate devices
1.5	differentiate between the principles RGB and CMYK colours
1.6	analyse compatibility problems which arise from software and hardware in explaining how these may be overcome
1.7	explain the primary functions of colour management software
1.8	identify the areas in pre-press which require 'colour management' control
1.9	describe what must be considered when using software to raise a colour profile for the press.

Range
<p>Functions (AC1.2)</p> <ul style="list-style-type: none"> a. computer platform – eg PC, MAC b. display (screen or monitor) c. graphic pen tablets d. low resolution printers (eg desktop inkjet or laser, black and white or colour) e. high resolution printers (eg proofing printers) f. imagesetters/film recorders/CTP systems g. scanners: flatbed / drum h. removable storage media i. modem j. Raster Image Processor (RIP) <p>Software applications</p> <ul style="list-style-type: none"> a. word processing b. photo-editing c. drawing d. page make up e. scanning f. colour management electronic imposition g. Portable Document Format (PDF) creation h. RIP i. pre-flighting j. files transfer, eg e-mail, the Internet, ISDN <p>Compatibility problems</p> <ul style="list-style-type: none"> a. allowing different platforms to communicate across networks b. converting fonts and images for use on different platforms c. creating PDFs which can be opened on any platform <p>Primary Functions (AC1.7)</p> <ul style="list-style-type: none"> a. determining the standard and meaning of colour objects in an original document b. translating the colour values of each object to values that give the same appearance when displayed or printed on different devices c. maintaining files containing the colour characteristics or profiles of different devices and using the information contained in a device profile when printing or displaying to that device.

Learning outcome	The learner will:
2.	Understand how to convert originals into digital files and the implications which can arise
Assessment criteria	
The learner can:	
2.1	explain the terminology used in digital reproduction
2.2	explain the importance of image resolution to the printed output.
2.3	define the term 'bitmap'

- 2.4 summarise the key factors to consider prior to scanning an image for reproduction
- 2.5 describe the principles of reproducing an original image into a digital format
- 2.6 evaluate the effects of poor highlight, shadow or mid tones within an image for reproduction
- 2.7 distinguish between 'Brightness' and 'Contrast'
- 2.8 evaluate the benefits of 'GCR'
- 2.9 analyse the effects of 'Dot Gain'
- 2.10 critically compare the typical achievable areas of reproduction within the 'Colour Gamut'
- 2.11 explain the **factors** to be considered when correcting an image
- 2.12 describe the **values** that should be monitored when calibrating a monitor for production
- 2.13 explain the key **characteristics** to be considered when calibrating and setting up a computer monitor and how this can affect the appearance
- 2.14 explain the effects and implications of changing tonal values as a result of adjustments to an image.

Range

Terminology

- a. 'screening'
- b. 'screen angle'
- c. 'screen ruling'
- d. 'image resolution'
- e. 'bitmap'
- f. 'vector'

Factors

- a. tonal value range
- b. image sharpening
- c. colours cast
- d. under exposed or over exposed
- e. improper saturation

Values

- a. ambient lighting
- b. monitor settings
- c. screen age and warm-up time

Characteristics

- a. highlight is too low
- b. highlight is too high
- c. mid tones are set too high
- d. shadow is set too low
- e. shadow is set too high

Learning outcome	The learner will:
3.	Understand the principles of layout and imposition, including the use and placement of the control guides
Assessment criteria	
The learner can:	
3.1	evaluate what can be determined from an 'imposition'
3.2	describe the checks which should be made when creating an imposition
3.3	identify the common paper sizes identified under ISO
3.4	compare the 'A', RA and SRA paper sizes stating the reason for selecting one over another
3.5	explain the common methods of working when producing a printed sheet
3.6	identify the items which need to be taken into account when preparing a 'template/layout
3.7	explain why the items are important to the production of the printed copy
3.8	identify the areas which need to be calculated when preparing an imposition
3.9	evaluate the factors to be considered when planning multiple images/step and repeat
3.10	differentiate between the 'plate clamp' and 'grip allowance'.
3.11	evaluate the post press requirements to be considered when creating a multiple page imposition
3.12	identify the factors which need to be considered when planning for irregular shapes and sizes
3.13	analyse the commonly used quality control strips and explain how they aid the production of the job.

Range
<p>Methods of working</p> <ul style="list-style-type: none"> a. sheet work b. half sheet work c. work and turn d. work and tumble <p>Items (AC3.6 & 3.7)</p> <ul style="list-style-type: none"> a. the image dimensions b. allowances (clamp, grip and trim) for use during printing and finishing operations <p>Areas</p> <ul style="list-style-type: none"> a. the plate clamp and sheet grip allowances b. the centre line c. the page dimensions <p>Factors (AC3.9)</p> <ul style="list-style-type: none"> a. that all repeat images are identical b. that all repeat image are positioned accurately

Factors (AC3.12)

- a. ensuring the full economic use of the sheet size
- b. determining whether the method of cutting should be straight cuts, or additional punching or services
- c. how the shape will be held in the sheet and/or transported to the delivery during die-cutting operations
- d. how the shape will be removed die cutting from the sheet after die-cutting operations.

Learning outcome**The learner will:**

4. Understand the principles involved in the production of image carriers

Assessment criteria

The learner can:

- 4.1 describe the advantages and disadvantages of using digital image carrier reproduction for print
- 4.2 evaluate the **factors** to be considered when selecting an appropriate image carrier for print
- 4.3 describe the importance of image resolution when outputting an image carrier
- 4.4 critically compare the range of 'screens' used to create an image and give the desired appearance when printed
- 4.5 explain the function of image carriers available across the print production processes
- 4.6 explain the **checks** which should be made to verify that the finished image carrier is fit for purpose
- 4.7 explain the **factors** which impact on the cost of producing an image carrier
- 4.8 identify and interpret the use of the quality control aids and devices used to monitor the output of image carriers for print.

Range**Factors (AC4.2)**

- a. shelf life of the image carrier
- b. production time to produce the image carrier
- c. image resolution requirements
- d. likely hood of the job being reordered

Checks

- a. visual inspection, eg dot glass, control strip
- b. measurement, eg dot meter

Factors (AC4.7)

- a. number of original image masters (plates/cylinders/screen) required
- b. cost of image carrier substrate and any surface preparation
- c. cost of imaging and processing the image carrier

Learning outcome	The learner will:
5.	Understand the principles involved in the production of digital proofs for output
Assessment criteria	
The learner can:	
5.1	critically compare a range of proofs in use
5.2	explain the purpose of colour profiles in relation to both hardware and software when producing colour digital proofs
5.3	describe the checks that should be made to a job prior to proof output
5.4	identify the range of ' printer aids ' which assist in the calibration of proofing devices
5.5	explain the limitations of a proof and the importance of making customers aware of these limitations
5.6	describe why output of a file to different devices may result in a difference in print appearance.
5.7	explain the principles of colour management software when producing digital proofs
5.8	explain the principles of 'RIP' technology and how it contributes to digital proofing.

Range
Range of proofs
a. Low resolution proofs
b. High resolution proofs
c. Cost
d. Production time
Printer aids
a. colour measurement devices
b. colour reference guides
c. grey balance test prints

Learning outcome	The learner will:
6.	Understand the principles of pre-flighting and ripping files in digital pre-press
Assessment criteria	
The learner can:	
6.1	explain the elements to be checked in a digital pre-press document
6.2	Define the term ' pre-flight ' check
6.3	clarify the items to be checked in a digital pre-press file prior to production output
6.4	describe the elements which should be checked prior to ripping a file
6.5	define the terms ' Postscript, PDF, and RIP'.

Range

Elements (AC6.1)

- a. final size reproduction
- b. font usage / list
- c. image usage / list
- d. location of images
- e. number and names of colour separations

Pre-flight check

- a. all fonts are present and available
- b. all images are present and the correct colour mode and resolution
- c. the document setup/page size is correct
- d. the appearance against the signed off proof

Items

- a. all pages of the job are available
- b. all fonts for printing are embedded or available in the correct format
- c. all page layouts match any supplied proof
- d. all the image files are linked or embedded
- e. all image files are at a suitable resolution for outputting
- f. all image files are in a suitable colour mode and format for outputting
- g. the document settings are appropriate for the final device
- h. all the colours are defined and named correctly
- i. all the bleeds and trap specifications are correct
- j. the total ink content used in any part of the document does not exceed the total recommended for the substrate and printing processes

Elements (AC6.4)

- a. page orientation
- b. presence and position of printer's marks
- c. colour separation into correct number of colours
- d. right/wrong-reading
- e. positive/negative
- f. correct fonts
- g. resolution of images

UAN:	J/503/1818
Level:	Level 3
Credit value:	5
GLH:	40
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	This unit is concerned with developing an understanding of the requirements regarding design and production of DTP documents. It includes taking responsibility and well defined steps toward preparing and agreeing a design task. Consideration is given to the use of type, photographs and other images, digital image manipulation, document layout and use of colour, proofing and pre-flighting jobs prior to print.

Learning outcome	The learner will:
1.	Understand the main issues affecting the design of DTP documents
Assessment criteria	
The learner can:	
1.1	explain the factors that need to be considered before commencing work on a desktop publish (DTP) task
1.2	describe the stages involved in producing a job using a desktop publishing (DTP) system
1.3	clarify the term 'corporate identity'
1.4	define the term 'house style'
1.5	summarise the checks that should be carried out when producing desktop published (DTP) documents.

Range
Factors
a. the purpose of the document
b. the target audience
c. the information needed to be contained in the document
d. the illustrations or images to be used in the document (if any)
Stages
a. finding out what is required by the customer and obtaining clear instructions

- b. identifying a suitable style for the document eg by looking at similar types of work, considering any templates available, finding out about any corporate identities or house styles
- c. checking how much text or copy has to be fitted in the document
- d. identifying how the text or copy is structured and the relative prominence that should be given to each word, sentence, paragraph etc
- e. preparing visual draft layouts for discussion with the customer
- f. producing the document in the agreed style and submitting proofs for approval

Corporate identify

- a. one or more logos/images and directions for their use/position/size
- b. a particular typeface and directions for use/style
- c. one or more colours with directions for their use either as mono, spot colour or process colour

Learning outcome	The learner will:
2.	Understand the operation of hardware and software systems typically used in DTP
Assessment criteria	
The learner can:	
2.1	describe the hardware used within desktop publishing (DTP)
2.2	explain a range of software and the applications they are used for
2.3	describe the implications associated with hardware and software incompatibility
2.4	critically compare the methods used to transfer digital documents between computers.
2.5	evaluate the primary function of colour management software
2.6	clarify the key components of a DTP system which require colour management and control and calibration
2.7	explain why, irrespective of the display, the high resolution colour images in digital documents may exist in either RGB or CMYK mode and may be composite or separated
2.8	explain why it is important for the DTP operator to understand where the colour management mode or colour conversion is taking place
2.9	describe the scanning process and determine the key items to be controlled and monitored when reproducing an 'original'.

Range
Software
a. word processing
b. photo-editing (for bitmap images)
c. drawing/illustration (for vector images)
d. page make up (DTP)
e. scanning
f. PDF(Portable Document Format) creation
g. e-mail
h. compression, eg ZIP

Methods

- a. a local area network (LAN)
- b. removable media, eg CD
- c. e-mail/the Internet

Key Components

- a. computer display
- b. scanner and separations software
- c. printers and their RIPs or printer drivers
- d. page make-up and graphics software

Learning outcome	The learner will:
3.	Understand the creation of digital fonts and how they are applied in DTP

Assessment criteria

The learner can:

- 3.1 interpret the 'terminology' used in the creation and design of 'fonts'
- 3.2 describe the **constituent parts** of a typographic letter which contributes to the creation of a font
- 3.3 interpret the **terminology** given to the 'alignment' of text
- 3.4 describe what **typographical attributes** should be considered when preparing and selecting text for a document
- 3.5 describe the variable **characteristics** which can be applied to type
- 3.6 explain the 'copyright law' with regard to the use of fonts
- 3.7 describe how type designs can be broken down into a range of families covering **serif and non serif types**
- 3.8 define the term 'postscript'
- 3.9 explain what is understood by a 'true type font'
- 3.10 critically compare the basic **letter shape families** used in typography
- 3.11 explain the importance of selecting the correct fonts when producing a Desktop Published document
- 3.12 compare a range of **'file formats'** used for saving text
- 3.13 describe how a 'qwerty' keyboard compensates for all the characters and symbols to be produced
- 3.14 evaluate the range and ability of application **software** used to create or generate textual elements for DTP
- 3.15 define the group of **text attributes** which enable consistency in a document and increased speed of production layout
- 3.16 explain the available **options** for paragraph styles
- 3.17 explain the **methods** of obtaining from many sources for use in DTP
- 3.18 evaluate the possible implications when 'importing' text files into a document.

Range

Constituent parts

- a. an 'x' height
- b. base line
- c. the ascender the descender

Terminology

- a. aligned left
- b. aligned right
- c. centred
- d. fully justified

Typographical attributes

- a. font or type style
- b. font size
- c. interline spacing/leading
- d. font colour
- e. bold or italic styles
- f. upper or lower case
- g. inter word spacing
- h. spacing for paragraph indents
- i. spacing for above or below headings

Characteristics

- a. style
- b. weight
- c. width
- d. size

Serif and non-serif types

- a. serif type having lines at the top, bottom or end of the characters
- b. sans serif type having no lines at the end of the characters

Letter shape families

- a. Gothic or black letter
- b. Roman old style
- c. Latin Modern
- d. Egyptian
- e. Grotesque/sans serif
- f. Manuscript
- g. adorned/pictorial

File formats

- a. .txt
- b. .rtf
- c. .doc

Software

- a. word processor
- b. vector graphic
- c. bitmapped graphic
- d. DTP programs
- e. optical character recognition

Text attributes

- a. main heading

- b. minor heading
- c. subheading
- d. body text
- e. normal
- f. caption
- g. bullet
- h. header or footer

Options

- a. typeface, font style, size, colour and attribute (eg underline)
- b. character, word and line spacing, including kerning
- c. paragraph alignment, indentation and spacing
- d. widow and orphan control, breaks and keep with commands
- e. hyphenation and justification
- f. bullets, effects and numbering
- g. tabulation (tabs) – left, right, centre, decimal
- h. case – upper, lower, title

Methods

- a. 'cut or copy and paste' from other documents
- b. import text files created in other programmes
- c. scan in using optical character recognition software to convert printed type into digital format

Learning outcome	The learner will:
4.	Understand the issues connected with the creation, editing and use of digital images
Assessment criteria	
The learner can:	
4.1	compare images used for reproduction within the design of a job
4.2	explain the different methods of obtaining and creating digital images
4.3	summarise the techniques used to improve the appearance and impact of images and graphics
4.4	analyse the important factors to be considered when correcting an image for output
4.5	explain the manipulation techniques which can be used to enhance images prior to output
4.6	identify the types and scope of the tools and palettes available to allow manipulation of an image
4.7	distinguish the 'file formats' used for saving graphics
4.8	evaluate the advantages of compressing bitmap images
4.9	identify the options for saving files in TIFF format
4.10	define the terminology used in the creation of digital images
4.11	describe why consideration should be given to 'resolution' when working with images
4.12	evaluate the effects of using the 'wrong resolution'
4.13	explain what influences the choice of 'screen ruling'
4.14	analyse the effects of changes to an image when changes are made to the 'dpi'

- 4.15 explain why it is important to be able to control the visual appearance of a monitor
- 4.16 explain how calibration of devices can contribute to achieving the desired colour.
- 4.17 describe the process of 'scanning' an image and the necessary checks which need to be made to allow for reproduction
- 4.18 critically compare the techniques of 'UCR' and 'GCR'
- 4.19 explain the effects of 'dot gain' identifying where in the printing process this could take place.

Range

Images

- a. illustrations
- b. photographs
- c. charts and diagrams

Methods

- a. copyrighting free clip-art images
- b. licensing use of copyright images, eg from photo image libraries
- c. scanning of copyright free art work publications
- d. creating bit-mapped images
- e. creating vectored draw-type line images
- f. using digital cameras, (still or video)

Techniques (AC4.3)

- a. cropping the graphic to show a part or small section
- b. rotating the graphic to any angle
- c. changing the colours of the graphic
- d. wrapping text around the graphic

Factors

- a. tonal value range
- b. image sharpening
- c. colours cast
- d. under exposed or over exposed
- e. improper saturation
- f. hue shift

Techniques (AC4.5)

- a. enhancing images to make them clearer, or more easily reproduced
- b. modifying images to create visual effects

Tools

- a. paint tools to apply or amend material to an image - fill, eraser, pencil, brush, spray, line, curve, rectangle, ellipse
- b. selection tools to adjust an image using filters to apply special effects and change the appearance of an image - ripple, contours, negative, posterize
- c. image editing tools to make visual adjustment to an image for reproduction

<p>Options</p> <ul style="list-style-type: none"> a. non compressed - saving a raster image file with no compression b. LZW compressed (Lempel-Ziv and Welch) - no data is lost, used only for grey scale and RGB images <p>Terminology</p> <ul style="list-style-type: none"> a. screening b. screen angle c. screen ruling d. hardware resolution e. image resolution f. stochastic or FM screening g. bitmap – a digital image made up of dots or pixels h. vector – a digital image made up of lines or curves
--

Learning outcome	The learner will:
5.	Understand the issues connected with colour in DTP documents
Assessment criteria	
The learner can:	
5.1	describe the ' colour models ' used when producing using desktop publishing (DTP)
5.2	explain the effects of producing documents which contain the wrong 'colour model' for the intended output
5.3	evaluate the effects of not converting all colours in a document into the correct colour mode prior to output
5.4	explain why colours seen on a screen can appear different to the printed output
5.5	explain the steps which can be taken to 'reduce the risk' of unexpected colour differences between screen and printed output
5.6	define the terminology used in 'desktop publishing (DTP)' relating to colour control
5.7	describe what is meant by colour separation
5.8	evaluate the effects on colour when changes are made to viewing (lighting) conditions
5.9	describe the term 'metamerism' giving a typical example of a metameric colour
5.10	evaluate the effects and implications of reproducing fine text in CMYK
5.11	interpret the term 'trap'
5.12	define the term 'overprint'
5.13	describe the visual appearance of a 'knockout' on the printed output.

Range
<p>Colour models</p> <ul style="list-style-type: none"> a. CMYK - Cyan, Magenta, Yellow and Black (Key) b. RGB - Red, Green and Blue c. a spot colour matching standard system – eg Pantone, Focal Tone <p>Terminology</p> <ul style="list-style-type: none"> a. trapping

- b. knockout
- c. overprint

Learning outcome	The learner will:
6.	Understand the principles of setting up and laying out documents in DTP
Assessment criteria	
The learner can:	
6.1	summarise the information required to set up a 'desktop publish (DTP)' document
6.2	explain what should be considered when setting up page templates
6.3	analyse the effects on the page layout when using a range of impositions
6.4	describe how page numbering and layout should match the imposition
6.5	describe the purpose of using frames and boxes when producing a document for print
6.6	analyse the effects of introducing 'bleed' into a job
6.7	explain the terminology used in 'desktop publishing (DTP)' relating to page layout and design
6.8	describe the purpose of embedding graphic images
6.9	explain the advantages of being able to link text boxes within a document
6.10	explain how 'page grids' and 'column guides' can help toward page layout.

Range
Information
a. portrait or landscape orientation
b. page size
c. single or double sided pages
d. output destination
e. number of colours permissible
f. document purpose
Purpose
a. linking images leaves the high resolution image file outside the publication and uses a low resolution header in the image file for display purposes in the document
b. linking images results in a small DTP native file, because the image files are not included in it
c. linked images have to be supplied separately as well as the DTP document if it is sent for printing elsewhere.

Learning outcome	The learner will:
7.	Understand the issues connected to proofing and pre-flighting DTP documents.
Assessment criteria	
The learner can:	
7.1	critically compare a range of 'proofs'
7.2	describe why it is important for customers to be made aware of the limitations of a proof
7.3	explain the sequence of proofing within a company
7.4	define the items which need to be checked on a proof
7.5	explain the benefits of carrying out 'pre-flight checks'
7.6	analyse the process of 'pre-flight checks'
7.7	interpret the quality control aids used when outputting within prepress
7.8	evaluate the benefits of supplying a hard copy proof as well digital format
7.9	describe the importance of obtaining a 'customer signature and date' prior to output of the job
7.10	explain the importance of maintaining a standard set of authors/publishers proofreading symbols when checking copy output
7.11	explain the advantages of using 'low resolution pdf files' as a form of proof
7.12	evaluate the advantages of supplying a 'high resolution composite pdf' to pre-press.

Range
Pre-flight checks
a. using electronic pre-flight software to identify and report on all the elements in a publication
b. examining each page of a document and checking all elements (lines, boxes, images, objects, fonts, fills etc) against pre-defined requirements
c. printing a comprehensive report and analysis using the DTP software programme features
Quality control aids
a. Star targets
b. Process control bars
c. Eye Glass
d. Solid patches
e. Grey tone
f. Screen angle tester
g. Densitometer

Unit 306

Machine printing (sheet fed lithography)

UAN:	D/503/1971
Level:	Level 3
Credit value:	5
GLH:	43
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	To develop a clear understanding of the procedures to control machine printing processes, including the products appropriate to each printing process, control systems for inking, coatings and drying systems, properties and structures of materials, use of microprocessors, control of and rectification of common faults, control of quality and completion of quality assurance documentation.

Learning outcome	The learner will:
1. Understand the printed products associated with the various printing processes and why to use one over another	
Assessment criteria	
The learner can:	
1.1	describe the printed products associated with the common print production processes
1.2	explain the key characteristics of the main printing processes
1.3	differentiate between the types and variety of image carriers used in the machine printing processes
1.4	critically compare the types and construction of the printing presses used within the industry.

Range
Printed products
a. digital
b. flexography
c. letterpress
d. lithography
e. pad
f. photogravure
g. screen process

<p>Characteristics</p> <ul style="list-style-type: none"> a. flexography, photopolymer (or rubber) b. letterpress, cast metal, engraved metal, etched metal, photo polymer, duplicate plates, plastic moulded, flat, rotary, roller c. gravure, (invert and semi-invert) conventional, double positive, single positive, variable area engraving, cell shape, cell and wall ratio/size, cell angles d. lithography, analogue, digital, photo emulsions, ablation, direct, negative and positive working plates, multiple exposure, step and repeat, screen angles e. screen processes, stencils types, direct coating, transfer systems, capillary, plotter cutters, screen angles, mesh types, mesh count, mesh tension <p>Image carriers</p> <ul style="list-style-type: none"> a. 'H' or 'Y' units b. blanket to blanket perfecter c. common blanket d. common impression, 'satellite and tandem' e. half unit f. intermittent web g. perfecting h. stack or arch i. unit type press j. variable.

Learning outcome	The learner will:
2.	Understand the types and characteristics of common substrates
Assessment criteria	
The learner can:	
2.1 explain the key characteristics of paper and board	
2.2 describe the tests which can be performed to monitor the characteristics of paper and board	
2.3 analyse the main features and uses for papers	
2.4 describe the techniques used to give paper special features	
2.5 classify the range and typical applications of board types	
2.6 explain the key factors to be considered when handling and storing paper and board	
2.7 describe the defects associated with paper and board in print production	
2.8 explain the characteristics of foils and filmic materials.	

Range
Characteristics (AC2.1)
a. brightness/whiteness
b. opacity
c. tensile strength
d. wet strength
e. dimensional stability
f. sizing

- g. picking resistance
- h. weight
- i. caliper/thickness
- j. gloss

Papers

- a. bulky mechanical
- b. part mechanical
- c. recycled
- d. woodfree
- e. newsprint
- f. machine-finished (MF)
- g. matt-coated
- h. gloss-coated
- i. machine-glazed (MG)
- j. chromo paper
- k. cast-coated
- l. specialist papers:
- m. kraft (bleached or unbleached)
- n. handmade paper
- o. carbonless paper
- p. heat sealable paper
- q. pressure sealable paper
- r. self-adhesive paper
- s. gummed paper

Board types

- a. unlined chipboard
- b. lined chipboard
- c. straw board
- d. pulp board
- e. coated board
- f. art board
- g. corrugated board

Defects

- a. hickies
- b. debris or lint piling
- c. surface picking
- d. chalking
- e. cheesey drying
- f. mottle
- g. set-off
- h. ink-rub or matt-rub
- i. show-through
- j. blade scratches
- k. distortion
- l. creasing
- m. tail end hook
- n. reel defects:

<ul style="list-style-type: none"> o. web breakage p. burst reel q. telescoped reel r. reel out of round s. web wrinkles t. chain marks <p>Characteristics (AC2.8)</p> <ul style="list-style-type: none"> a. polypropylene films b. polyester films c. polyethylene films d. nylon films e. physical properties f. printing and handling characteristics

Learning outcome	The learner will:
3. Understand the procedures for controlling the inking, coatings drying systems commonly used in machine printing	
Assessment criteria	
The learner can:	
3.1 describe the types of roller coverings used on the inking, damping and impression cylinders of a press	
3.2 describe the structure and manufacture of impression and printing rollers	
3.3 explain the function of component parts of the inking systems employed on print production presses	
3.4 describe the functions of 'hydraulic' and 'pneumatic' employed on production presses	
3.5 interpret the drying processes of inks within the printing processes	
3.6 explain the principles of accelerated drying methods of ink and the health and safety implications which surround them	
3.7 explain why the viscosity of an ink should be adjusted and considered when preparing the press for print.	

Range
<p>Roller coverings</p> <ul style="list-style-type: none"> a. synthetic rubber, - plastics, nylon and polymers b. metals - brass, copper, chrome <p>Structure</p> <ul style="list-style-type: none"> a. bearings b. coating bonded to core (vulcanised, electrolysis) c. journals d. multi component impression rollers e. steel core <p>Component parts</p> <ul style="list-style-type: none"> a. litho/letterpress

- b. gravure
- c. flexography
- d. screen processes
- e. others

Drying processes

- a. absorption
- b. evaporation
- c. quick setting inks
- d. precipitation
- e. oxidation
- f. polymerisation – heat assisted
- g. polymerisation - UV assisted
- h. polymerisation – electron beam assisted
- i. temperature controlled waterless systems
- j. use of chilling units

Accelerated drying methods

- a. Infra Red
- b. Ultra Violet
- c. Warm Air
- d. Powder Spray

Learning outcome	The learner will:
4.	Understand the theory of colour and the properties, structures and manufacture of the materials commonly used in machine printing
Assessment criteria	
The learner can:	
4.1	define the terms ‘Solute’ and ‘Solvent’
4.2	explain the key components which should be monitored in a fount solution
4.3	analyse the effects of adding alcohol to a fount solution
4.4	evaluate the advantages of introducing a ‘buffered fount solution’
4.5	describe the ways that water can be treated to aid purification
4.6	explain the effects of choosing the wrong grade of oil or grease when maintaining equipment
4.7	describe how viscosity is recorded by the Society of Automotive Engineering (SAE)
4.8	interpret the effect which takes place when the temperature of an oil changes
4.9	clarify the colours found in the visible spectrum of light
4.10	critically compare the ‘ additive and subtractive colour theory’
4.11	explain the primary and secondary principles with regard to light
4.12	explain where ‘Ultra violet and Infra red’ fall on the visible spectrum
4.13	explain how the ‘Pantone’ matching system is used to identify formulas to producing spot colour for print
4.14	summarise the terminology in place to describe colour
4.15	describe the main types of colorants used within an ink
4.16	evaluate the properties of a pigment within ink
4.17	explain how acetates, vinyls, polyester and polycarbonates are

used in the print production
 4.18 compare the types of **cleaning fluids and solvents** used in printing and graphic communications.

Range
<p>Additive colour</p> <ul style="list-style-type: none"> a. red b. green c. blue <p>Subtractive colour</p> <ul style="list-style-type: none"> a. cyan b. yellow c. magenta <p>Cleaning fluids and solvents</p> <ul style="list-style-type: none"> a. alcohol or water based b. hydrocarbons c. petro-chemicals d. vegetable based

Learning outcome	The learner will:
5.	Understand the principal types of proof used and their role in the printing process
Assessment criteria	
The learner can:	
5.1	explain the possible implications of not providing a proof to the customer
5.2	critically compare the different types of proof available
5.3	explain the effects on a job when items on a proof are found to not meet the customer specification
5.4	describe the properties on a proof which can often be affected when printing on the chosen substrate.

Range
<p>Properties</p> <ul style="list-style-type: none"> a. Surface b. Absorbency c. Shade d. Colour

Learning outcome	The learner will:
6.	Understand the use of microprocessors and computers commonly found in machine printing
Assessment criteria	
The learner can:	
6.1	explain the benefits of using computers and microprocessors on production printing machines

- 6.2 evaluate how computers and microprocessors can be used to monitor and analyse printed output
- 6.3 describe what functions on the press can be controlled by microprocessors
- 6.4 summarise the key functions of a MIS (Management Information System) used within the printing industry
- 6.5 explain the types of information the MIS systems can give to the printer.

Learning outcome	The learner will:
7.	Understand the make-ready and operating procedures for Sheet fed lithography
Assessment criteria	
The learner can:	
7.1	explain the principles of the 'lithographic process'
7.2	explain why it is necessary to identify all the job instructions prior to press 'start up'
7.3	describe the make-ready sequence and procedure of a sheet fed lithographic press
7.4	describe the relationship between plate cylinder, blanket cylinder and impression cylinder production presses
7.5	illustrate the paper transport systems employed on lithographic printing presses
7.6	explain the procedures used to 'set' the rollers employed on a lithographic press and the checks that have to be made
7.7	analyse the effects of changes to a 'fount solution' and how it can be monitored and maintained
7.8	explain the considerations to take into account when mounting lithographic printing plates
7.9	explain how 'waterless' offset printing plates work
7.10	explain the key characteristics of 'lithographic blankets' and the influencing factors when choosing one
7.11	evaluate the factors which influence the choice of ink
7.12	describe the uses of in-line equipment employed on production presses giving consideration to the advantages and disadvantages
7.13	explain the term 'press finger printing' identifying benefits towards production output
7.14	explain the procedures to follow having completed the output of printed work.

Range
<p>Production presses</p> <ul style="list-style-type: none"> a. single colour press b. two colour unit press c. multiple colour unit press d. perfecting presses e. convertible presses f. common impression cylinder presses <p>Factors</p> <ul style="list-style-type: none"> a. warp and weft

- b. release opportunities
- c. resilience
- d. smash resistance
- e. durability
- f. compressible blankets
- g. hardness of the blanket

Learning outcome	The learner will:
8.	Understand the procedures for controlling quality in machine printing including sampling and inspection regimes
Assessment criteria	
The learner can:	
8.1	define the term 'Quality Product'
8.2	explain the term 'inspection' outlining why it is important to production output
8.3	define the term 'testing' giving typical examples of the methods in use
8.4	explain the reason for regular sampling during production output
8.5	explain the items of information which can be monitored by regular sampling with regard to quality of output
8.6	describe the terminology used within inspection sampling
8.7	explain the basic functions of the specialist equipment used to assist in the monitoring and inspection of materials in print
8.8	analyse the effects of 'metamerism' and 'juxtaposition' with regard to colour
8.9	explain why it is important to standardise viewing conditions
8.10	evaluate the factors which can have an effect on quality
8.11	describe the common printing faults encountered in print giving the method used for rectification.

Range
Terminology
a. mean
b. median
c. mode
d. normal distribution
e. output
f. process
g. random
h. range
i. sentence
Functions
a. broad head micrometers
b. colorimeters
c. colour viewing booths
d. densitometers
e. drying time tester
f. dyne tester

- g. grain direction test
- h. magnetic ink oscilloscope
- i. rub testers
- j. shore meter
- k. special lighting conditions
- l. spectro-photometers
- m. tack meter
- n. tensile strength tester
- o. tension meter
- p. viscometers
- q. visual display monitors

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. reproduction
- h. storage and handling
- i. training

Printing faults

- a. adhesion
- b. bad ink transfer
- c. bleeding
- d. blocking
- e. brittleness
- f. curing (UV)
- g. dark/dirty print
- h. dot gain
- i. feathering
- j. foaming
- k. filling in
- l. gear marks
- m. ghosting
- n. hickies/spots
- o. halo
- p. ink drying too slow
- q. ink drying too fast
- r. misregister
- s. moiré
- t. mottled print
- u. odour
- v. picking
- w. pin holing
- x. plate swelling
- y. skip out
- z. smearing/tracking

Unit 307

Machine printing (web fed lithography)

UAN:	K/503/2119
Level:	Level 3
Credit value:	5
GLH:	43
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	To develop a clear understanding of the procedures to control machine printing processes, including the products appropriate to each printing process, control systems for inking, coatings and drying systems, properties and structures of materials, use of microprocessors, control of and rectification of common faults, control of quality and completion of quality assurance documentation.

Learning outcome	The learner will:
1. Understand the printed products associated with the various printing processes and why to use one over another	
Assessment criteria	
The learner can:	
1.1 describe the printed products associated with the common print production processes	
1.2 explain the key characteristics of the main printing processes	
1.3 differentiate between the types and variety of image carriers used in the machine printing processes	
1.4 critically compare the types and construction of the printing presses used within the industry.	

Range
Printed products
a. digital
b. flexography
c. letterpress
d. lithography
e. pad
f. photogravure
g. screen process

<p>Image carriers</p> <ul style="list-style-type: none"> a. flexography, photopolymer (or rubber) b. letterpress, cast metal, engraved metal, etched metal, photo polymer, duplicate plates, plastic moulded, flat, rotary, roller c. gravure, (invert and semi-invert) conventional, double positive, single positive, variable area engraving, cell shape, cell and wall ratio/size, cell angles d. lithography, analogue, digital, photo emulsions, ablation, direct, negative and positive working plates, multiple exposure, step and repeat, screen angles e. screen processes, stencils types, direct coating, transfer systems, capillary, plotter cutters, screen angles, mesh types, mesh count, mesh tension <p>Printing presses</p> <ul style="list-style-type: none"> a. 'H' or 'Y' units b. blanket to blanket perfecter c. common blanket d. common impression, 'satellite and tandem' e. half unit f. intermittent web g. perfecting h. stack or arch i. unit type press j. variable

Learning outcome	The learner will:
2.	Understand the types and characteristics of common substrates
Assessment criteria	
The learner can:	
2.1	explain the key characteristics of paper and board
2.2	describe the tests which can be performed to monitor the characteristics of paper and board
2.3	describe the main features and uses for papers
2.4	describe the techniques used to give paper special features
2.5	classify the range and typical applications of board types
2.6	summarise the key factors to consider when handling and storing paper and board
2.7	describe the defects associated with paper and board
2.8	explain the characteristics of foils and filmic materials.

Range
Characteristics (AC2.1)
<ul style="list-style-type: none"> a. brightness/whiteness b. opacity c. tensile strength d. wet strength e. dimensional stability f. sizing

- g. picking resistance
- h. weight
- i. caliper/thickness
- j. gloss

Papers

- a. bulky mechanical
- b. part mechanical
- c. recycled
- d. woodfree
- e. newsprint
- f. machine-finished (MF)
- g. matt-coated
- h. gloss-coated
- i. machine-glazed (MG)
- j. chromo paper
- k. cast-coated
- l. specialist papers:
- m. kraft (bleached or unbleached)
- n. handmade paper
- o. carbonless paper
- p. heat sealable paper
- q. pressure sealable paper
- r. self-adhesive paper
- s. gummed paper

Board types

- a. unlined chipboard
- b. lined chipboard
- c. straw board
- d. pulp board
- e. coated board
- f. art board
- g. corrugated board

Defects

- a. hickies
- b. debris or lint piling
- c. surface picking
- d. chalking
- e. cheesey drying
- f. mottle
- g. set-off
- h. ink-rub or matt-rub
- i. show-through
- j. blade scratches
- k. distortion
- l. creasing
- m. tail end hook
- n. reel defects:

- o. web breakage
- p. burst reel
- q. telescoped reel
- r. reel out of round
- s. web wrinkles
- t. chain marks

Characteristics (AC2.8)

- a. polypropylene films
- b. polyester films
- c. polyethylene films
- d. nylon films
- e. physical properties
- f. printing and handling characteristics

Learning outcome	The learner will:
3.	Understand the procedures for controlling the inking, coatings drying systems commonly used in machine printing
Assessment criteria	
The learner can:	
3.1	describe the types of roller coverings used on the inking, damping and impression cylinders of a press
3.2	describe the structure and manufacture of impression and printing rollers
3.3	explain the function of component parts of the inking systems employed on print production presses
3.4	describe the functions of 'hydraulic' and 'pneumatic' employed on production presses
3.5	interpret the drying processes of inks within the printing processes
3.6	explain the principles of accelerated drying methods of ink and the health and safety implications associated which surround them
3.7	explain why the viscosity of an ink should be adjusted and considered when preparing the press for print.

Range
<p>Roller coverings</p> <ul style="list-style-type: none"> a. synthetic rubber, - plastics, nylon and polymers b. metals - brass, copper, chrome <p>Printing rollers</p> <ul style="list-style-type: none"> a. bearings b. coating bonded to core (vulcanised, electrolysis) c. journals d. multi component impression rollers e. steel core <p>Print production presses</p> <ul style="list-style-type: none"> a. litho/letterpress

- b. gravure
- c. flexography
- d. screen processes

Drying processes

- a. absorption
- b. evaporation
- c. quick setting inks
- d. precipitation
- e. oxidation
- f. polymerisation – heat assisted
- g. polymerisation - UV assisted
- h. polymerisation – electron beam assisted
- i. temperature controlled waterless systems
- j. use of chilling units

Accelerated drying methods

- a. Infra Red
- b. Ultra Violet
- c. Warm Air
- d. Powder Spray

Learning outcome	The learner will:
4.	Understand the theory of colour and the properties, structures and manufacture of the materials commonly used in machine printing
Assessment criteria	
The learner can:	
4.1	define the terms ‘Solute’ and ‘Solvent’
4.2	explain the key components which should be monitored in a fount solution
4.3	analyse the effects of adding alcohol to a fount solution
4.4	evaluate the advantages of introducing a ‘buffered fount solution’
4.5	describe the ways that water can be treated to aid purification
4.6	explain the effects of choosing the wrong grade of oil or grease when maintaining equipment
4.7	describe how viscosity is recorded by the Society Automotive Engineering (SAE)
4.8	interpret the effect which takes place when the temperature of an oil changes
4.9	clarify the colours found in the visible spectrum of light
4.10	critically compare the ‘ additive and subtractive colour theory’
4.11	explain the primary and secondary principles with regard to light
4.12	explain where ‘Ultra violet and Infra red’ fall on the visible spectrum
4.13	explain how the ‘Pantone’ matching system is used to identify formulas to producing spot colour for print
4.14	summarise the terminology in place to describe colour
4.15	describe the main types of colorants used within an ink
4.16	evaluate the properties of a pigment within ink
4.17	explain how acetates, vinyls, polyester and polycarbonates are used in the print production environment

4.18 compare the types of **cleaning fluids and solvents** used in printing and graphic communications.

Range

Additive colour

- a. red
- b. green
- c. blue

Subtractive colour

- a. cyan
- b. yellow
- c. magenta

Cleaning fluids and solvents

- a. alcohol or water based
- b. hydrocarbons
- c. petro-chemicals
- d. vegetable based

Learning outcome	The learner will:
5.	Understand the principal types of proof used and their role in the printing process
Assessment criteria	
The learner can:	
5.1	explain the possible implications of not providing a proof to the customer
5.2	critically compare the different types of proof available
5.3	explain the effects on a job when items on a proof are found to not meet the customer specification
5.4	describe the properties on a proof which can often be affected when printing on the chosen substrate.

Range

Properties

- a. Surface
- b. Absorbency
- c. Shade
- d. Colour

Learning outcome	The learner will:
6.	Understand the use of microprocessors and computers commonly found in machine printing
Assessment criteria	
The learner can:	
6.1	explain the benefits of using computers and microprocessors on production printing machines
6.2	evaluate how computers and microprocessors can be used to

monitor and analyse printed output
6.3 describe what functions on the press can be controlled by microprocessors
6.4 summarise the key functions of a MIS (Management Information System) used within the printing industry
6.5 explain the types of information the MIS systems can give to the printer.

Learning outcome	The learner will:
7.	Understand the make-ready and operating procedures for web fed lithography
Assessment criteria	
The learner can:	
7.1	explain the principles of the 'lithographic process'
7.2	explain why it is necessary to identify all the job instructions prior to press 'start up'
7.3	describe the make-ready sequence and procedure of a web fed lithographic press stating the necessary checks to be made
7.4	describe the relationship between plate cylinder, blanket cylinder and impression cylinder on production presses
7.5	illustrate the paper transport system employed on a web fed lithographic printing presses
7.6	explain the procedures used to 'set' the roller employed on a lithographic press and the checks that have to be made
7.7	analyse the effects of changes to a 'fount solution' and how it can be monitored and maintained
7.8	explain the considerations to take into account when mounting lithographic printing plates
7.9	describe how 'waterless' offset printing plates work
7.10	explain the key characteristics of lithographic blankets and the influencing factors when choosing one
7.11	evaluate the factors which influence the choice of ink
7.12	describe the uses of in-line equipment employed on production presses giving consideration to the advantages and disadvantages
7.13	explain the procedures to follow having completed the output of printed work
7.14	describe the term 'press finger printing' identifying the benefits toward production output.

Range
Production presses
a. satellite presses
b. multicolour unit press
c. Stack press
Characteristics
a. warp and weft
b. release opportunities
c. resilience
d. smash resistance

- e. durability
- f. compressible blankets
- g. hardness of the blanket

Learning outcome	The learner will:
8.	Understand the procedures for controlling quality in machine printing including sampling and inspection regimes
Assessment criteria	
The learner can:	
8.1	define the term 'Quality Product'
8.2	explain the term 'inspection' outlining why it is important to production output
8.3	define the term 'testing' giving typical examples of the methods in use
8.4	explain the reason for regular sampling during production output
8.5	explain the items of information which can be monitored by regular sampling with regard to quality of output
8.6	describe the terminology used within inspection sampling
8.7	explain the basic functions of the specialist equipment used to assist in the monitoring and inspection of materials in print
8.8	analyse the effects of 'metamerism' and 'juxtaposition' with regard to colour
8.9	explain why it important to standardise viewing conditions
8.10	evaluate the factors which can have an effect on quality
8.11	describe the common printing faults encountered in print giving the method used for rectification.

Range
Terminology
a. mean
b. median
c. mode
d. normal distribution
e. output
f. process
g. random
h. range
i. sentence
Functions
a. broad head micrometers
b. colorimeters
c. colour viewing booths
d. densitometers
e. drying time tester
f. dyne tester
g. grain direction test
h. magnetic ink oscilloscope
i. rub testers

- j. shore meter
- k. special lighting conditions
- l. spectro-photometers
- m. tack meter
- n. tensile strength tester
- o. tension meter
- p. viscometers
- q. visual display monitors

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. reproduction
- h. storage and handling
- i. training

Printing faults

- a. adhesion
- b. bad ink transfer
- c. bleeding
- d. blocking
- e. brittleness
- f. curing (UV)
- g. dark/dirty print
- h. dot gain
- i. feathering
- j. foaming
- k. filling in
- l. gear marks
- m. ghosting
- n. hickies/spots
- o. halo
- p. ink drying too slow
- q. ink drying too fast
- r. misregister
- s. moiré
- t. mottled print
- u. odour
- v. picking
- w. pin holing
- x. plate swelling
- y. skip out
- z. smearing/tracking

Unit 308

Machine printing (flexography)

UAN:	D/503/2120
Level:	Level 3
Credit value:	5
GLH:	43
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test
Aim:	To develop a clear understanding of the procedures to control machine printing processes, including the products appropriate to each printing process, control systems for inking, coatings and drying systems, properties and structures of materials, use of microprocessors, control of and rectification of common faults, control of quality and completion of quality assurance documentation.

Learning outcome	The learner will:
1. Understand the printed products associated with the various printing processes and why to use one over another	
Assessment criteria	
The learner can:	
1.1	describe the printed products associated with the common print production processes
1.2	explain the key characteristics of the main printing processes
1.3	differentiate between the types and variety of image carriers used in the machine printing processes
1.4	critically compare the types and construction of the printing presses used within the industry.

Range
Print production processes
a. digital
b. flexography
c. letterpress
d. lithography
e. pad
f. photogravure
g. screen process

<p>Image carriers</p> <ul style="list-style-type: none"> a. flexography, photopolymer (or rubber) b. letterpress, cast metal, engraved metal, etched metal, photo polymer, duplicate plates, plastic moulded, flat, rotary, roller c. gravure, (invert and semi-invert) conventional, double positive, single positive, variable area engraving, cell shape, cell and wall ratio/size, cell angles d. lithography, analogue, digital, photo emulsions, ablation, direct, negative and positive working plates, multiple exposure, step and repeat, screen angles e. screen processes, stencils types, direct coating, transfer systems, capillary, plotter cutters, screen angles, mesh types, mesh count, mesh tension <p>Printing presses</p> <ul style="list-style-type: none"> a. 'H' or 'Y' units b. blanket to blanket perfector c. common blanket d. common impression, 'satellite and tandem' e. half unit f. intermittent web g. perfecting h. stack or arch i. unit type press j. variable.
--

Learning outcome	The learner will:
2.	Understand the types and characteristics of common substrates
Assessment criteria	
The learner can:	
2.1	explain the key characteristics of paper and board
2.2	describe the tests which can be performed to monitor the characteristics of paper and board
2.3	analyse the main features and uses for papers
2.4	describe the techniques used to give paper special features
2.5	classify the range and typical applications of board types
2.6	explain the key factors to be considered when handling and storing paper and board
2.7	describe the defects associated with paper and board
2.8	explain the characteristics of foils and filmic materials.

Range
Characteristics (AC2.1)
<ul style="list-style-type: none"> a. brightness/whiteness b. opacity c. tensile strength d. wet strength e. dimensional stability f. sizing

- g. picking resistance
- h. weight
- i. caliper/thickness
- j. gloss

Papers

- a. bulky mechanical
- b. part mechanical
- c. recycled
- d. woodfree
- e. newsprint
- f. machine-finished (MF)
- g. matt-coated
- h. gloss-coated
- i. machine-glazed (MG)
- j. chromo paper
- k. cast-coated
- l. specialist papers:
- m. kraft (bleached or unbleached)
- n. handmade paper
- o. carbonless paper
- p. heat sealable paper
- q. pressure sealable paper
- r. self-adhesive paper
- s. gummed paper

Board types

- a. unlined chipboard
- b. lined chipboard
- c. straw board
- d. pulp board
- e. coated board
- f. art board
- g. corrugated board

Defects

- a. hickies
- b. debris or lint piling
- c. surface picking
- d. chalking
- e. cheesey drying
- f. mottle
- g. set-off
- h. ink-rub or matt-rub
- i. show-through
- j. blade scratches
- k. distortion
- l. creasing
- m. tail end hook
- n. reel defects:

<ul style="list-style-type: none"> o. web breakage p. burst reel q. telescoped reel r. reel out of round s. web wrinkles t. chain marks <p>Characteristics (AC2.8)</p> <ul style="list-style-type: none"> a. polypropylene films b. polyester films c. polyethylene films d. nylon films e. physical properties f. printing and handling characteristics

Learning outcome	The learner will:
3. Understand the procedures for controlling the inking, coatings drying systems commonly used in machine printing	
Assessment criteria	
The learner can:	
3.1 describe the types of roller coverings used on the inking, damping and impression cylinders of a press	
3.2 describe the structure of the printing unit on a flexographic print	
3.3 explain the function of component parts of the inking systems used on print production presses	
3.4 describe the functions of 'hydraulic' and 'pneumatic' employed on production presses	
3.5 interpret the drying processes of inks within the printing processes	
3.6 explain the principles of accelerated drying methods of ink and the health and safety implications which surround them	
3.7 explain why the viscosity of ink should be adjusted and considered when preparing the press for print.	

Range
<p>Roller coverings</p> <ul style="list-style-type: none"> a. synthetic rubber, - plastics, nylon and polymers b. metals - brass, copper, chrome <p>Printing unit</p> <ul style="list-style-type: none"> a. printing unit b. paper path <p>Print production presses</p> <ul style="list-style-type: none"> a. litho/letterpress b. gravure c. flexography d. screen processes

Drying processes

- a. absorption
- b. evaporation
- c. quick setting inks
- d. precipitation
- e. oxidation
- f. polymerisation – heat assisted
- g. polymerisation - UV assisted
- h. polymerisation – electron beam assisted
- i. temperature controlled waterless systems
- j. use of chilling units

Accelerated drying methods

- a. Infra Red
- b. Ultra Violet
- c. Warm Air
- d. Powder Spray

Learning outcome	The learner will:
4.	Understand the theory of colour and the properties, structures and manufacture of the materials commonly used in machine printing
Assessment criteria	
The learner can:	
4.1	define the terms 'Solute' and 'Solvent'
4.2	explain the effects of choosing the wrong grade of oil or grease when maintaining equipment
4.3	describe how viscosity is recorded by the Society of Automotive Engineering (SAE)
4.4	interpret the effect which takes place when the temperature of oil changes
4.5	clarify the colours found in the visible spectrum of light
4.6	critically compare the ' additive and subtractive colour theory'
4.7	explain the primary and secondary principles with regard to light
4.8	explain where 'Ultra violet and Infra red' fall on the visible spectrum
4.9	explain how the 'Pantone' matching system is used to identify formulas to produce spot colour for print
4.10	summarise the terminology in place to describe colour
4.11	describe the main types of colorants used within an ink
4.12	evaluate the properties required of a pigment within ink
4.13	explain how acetates, vinyls, polyester and polycarbonates are used in the print production environment
4.14	compare the types of cleaning fluids and solvents used in the printing and graphic communications industry.

Range**Additive colour**

- a. red
- b. green
- c. blue

Subtractive colour

- a. cyan
- b. yellow
- c. magenta

Cleaning fluids and solvents

- a. alcohol or water based
- b. hydrocarbons
- c. petro-chemicals
- d. vegetable based

Learning outcome	The learner will:
5.	Understand the principal types of proof used and their role in the printing process
Assessment criteria	
The learner can:	
5.1	explain the possible implications of not providing a proof to the customer
5.2	critically compare the different types of proof available
5.3	explain the effects on a job when items on a proof are found to not meet the customer specification
5.4	describe the properties on a proof which can often be affected when printing on the chosen substrate.

Range
Properties
a. Surface
b. Absorbency
c. Shade
d. Colour

Learning outcome	The learner will:
6.	Understand the use of microprocessors and computers commonly found in machine printing
Assessment criteria	
The learner can:	
6.1	explain the benefits of using computers and microprocessors on production printing machines
6.2	evaluate how computers and microprocessors can be used to monitor and analyse printed output
6.3	describe what functions on the press can be controlled by microprocessors
6.4	summarise the key functions of a MIS (Management Information System) used within the printing industry
6.5	explain the types of information the MIS systems can give to the printer.

Learning outcome	The learner will:
7.	Understand the make-ready and operating procedures for the flexographic process
Assessment criteria	
The learner can:	
7.1	explain the principles of the 'flexographic process'
7.2	explain the implications of not identifying all the job instructions prior to press 'start up'
7.3	describe the make-ready sequence and procedure of a flexographic press identifying what checks should be carried out
7.4	describe the function of the main parts employed on a web and sheet fed flexographic press
7.5	illustrate the paper transport systems employed in flexographic printing presses identifying the component parts
7.6	illustrate the relationship between plate cylinder and impression cylinder on a range of press designs
7.7	explain the considerations to take into account when mounting flexographic printing plates
7.8	describe the function of the component parts of a flexographic inking system
7.9	explain the factors which would influence the choice of anilox roller
7.10	describe the uses of in-line equipment used on production presses explaining the advantages toward production
7.11	describe the factors which determine the type of ink selected for print production
7.12	evaluate the effects on the printed output when using the wrong 'viscosity' of ink
7.13	explain how the viscosity of the ink can affect the printed output
7.14	explain the different types of ink metering systems
7.15	describe the term 'press finger printing' identifying the benefits toward production output
7.16	describe the procedures to follow having completed the output of printed work.

Range
<p>Press designs</p> <ul style="list-style-type: none"> a. Sheet fed – (corrugated production) b. Stack press c. Common impression presses d. In-line presses <p>In-line equipment</p> <ul style="list-style-type: none"> a. Rewinding b. Sheeting c. Conversion processes <p>Ink metering systems</p> <ul style="list-style-type: none"> a. 2 roll b. Single blade

c. Chambered blade

Learning outcome	The learner will:
8.	Understand the procedures for controlling quality in machine printing including sampling and inspection regimes.
Assessment criteria	
The learner can:	
8.1	define the term 'Quality Product'
8.2	explain the term 'inspection' outlining why it is important to production output
8.3	define the term 'testing' giving typical examples of the methods in use.
8.4	explain the reason for regular sampling during production output
8.5	explain the items of information which can be monitored by regular sampling with regard to quality of output
8.6	describe the terminology used within inspection sampling
8.7	explain the basic functions of the specialist equipment used to assist in the monitoring and inspection of materials in print
8.8	analyse the effects of 'metamerism' and 'juxtaposition' with regard to colour
8.9	explain why it is important to standardise viewing conditions
8.10	evaluate the influencing factors which can have an effect on quality
8.11	describe the common printing faults encountered in print giving the method used for rectification.

Range
Terminology
a. mean
b. median
c. mode
d. normal distribution
e. output
f. process
g. random
h. range
i. sentence
Functions
a. broad head micrometers
b. colorimeters
c. colour viewing booths
d. densitometers
e. drying time tester
f. dyne tester
g. grain direction test
h. magnetic ink oscilloscope
i. rub testers
j. shore meter

- k. special lighting conditions
- l. spectro-photometers
- m. tack meter
- n. tensile strength tester
- o. tension meter
- p. viscometers
- q. visual display monitors

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. reproduction
- h. storage and handling
- i. training

Printing faults

- a. adhesion
- b. bad ink transfer
- c. bleeding
- d. blocking
- e. brittleness
- f. curing (UV)
- g. dark/dirty print
- h. dot gain
- i. feathering
- j. foaming
- k. filling in
- l. gear marks
- m. m) ghosting
- n. hickies/spots
- o. halo
- p. ink drying too slow
- q. ink drying too fast
- r. misregister
- s. moiré
- t. mottled print
- u. odour
- v. picking
- w. pin holing
- x. plate swelling
- y. skip out
- z. smearing/tracking

UAN:	K/503/2122
Level:	Level 3
Credit value:	6
GLH:	43
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	To develop a clear understanding of the procedures to control machine printing processes, including the products appropriate to each printing process, control systems for inking, coatings and drying systems, properties and structures of materials, use of microprocessors, control of and rectification of common faults, control of quality and completion of quality assurance documentation.

Learning outcome	The learner will:
1.	Understand the printed products associated with the various printing processes and why to use one over another
Assessment criteria	
The learner can:	
1.1	describe the printed products associated with the common print production processes
1.2	explain the key characteristics of the main printing processes
1.3	differentiate between the types and variety of image carriers used in the machine printing processes
1.4	critically compare the types and construction of the printing presses used within the industry to date.

Range
Print production processes
a. digital
b. flexography
c. letterpress
d. lithography
e. pad
f. photogravure
g. screen process

<p>Image carriers</p> <ul style="list-style-type: none"> a. flexography, photopolymer (or rubber) b. letterpress, cast metal, engraved metal, etched metal, photo polymer, duplicate plates, plastic moulded, flat, rotary, roller c. gravure, (invert and semi-invert) conventional, double positive, single positive, variable area engraving, cell shape, cell and wall ratio/size, cell angles d. lithography, analogue, digital, photo emulsions, ablation, direct, negative and positive working plates, multiple exposure, step and repeat, screen angles e. screen processes, stencils types, direct coating, transfer systems, capillary, plotter cutters, screen angles, mesh types, mesh count, mesh tension <p>Printing presses</p> <ul style="list-style-type: none"> a. 'H' or 'Y' units b. blanket to blanket perfecter c. common blanket d. common impression, 'satellite and tandem' e. half unit f. intermittent web g. perfecting h. stack or arch i. unit type press j. variable.
--

Learning outcome	The learner will:
2.	Understand the types and characteristics of common substrates
Assessment criteria	
The learner can:	
2.1	explain the key characteristics of paper and filmic material
2.2	describe the types of tests which can be performed to monitor the characteristics of paper
2.3	analyse the main features and uses for papers
2.4	describe the techniques used to give paper special features
2.5	explain the key factors to be considered when handling and storing paper and filmic material
2.6	describe the defects associated with paper and filmic materials
2.7	explain the characteristics of foils and filmic materials.

Range
Characteristics (AC2.1)
<ul style="list-style-type: none"> a. brightness/whiteness b. opacity c. tensile strength d. wet strength e. dimensional stability f. sizing g. picking resistance

- h. weight
- i. caliper/thickness
- j. gloss

Papers

- a. bulky mechanical
- b. part mechanical
- c. recycled
- d. woodfree
- e. newsprint
- f. machine-finished (MF)
- g. matt-coated
- h. gloss-coated
- i. machine-glazed (MG)
- j. chromo paper
- k. cast-coated
- l. specialist papers:
- m. kraft (bleached or unbleached)
- n. handmade paper
- o. carbonless paper
- p. heat sealable paper
- q. pressure sealable paper
- r. self-adhesive paper
- s. gummed paper

Defects

- a. hickies
- b. debris or lint piling
- c. surface picking
- d. chalking
- e. cheesey drying
- f. mottle
- g. set-off
- h. ink-rub or matt-rub
- i. show-through
- j. blade scratches
- k. distortion
- l. creasing
- m. tail end hook
- n. reel defects:
- o. web breakage
- p. burst reel
- q. telescoped reel
- r. reel out of round
- s. web wrinkles
- t. chain marks

Characteristics (AC2.7)

- a. polypropylene films
- b. polyester films

- c. polyethylene films
- d. nylon films
- e. physical properties
- f. printing and handling characteristics.

Learning outcome	The learner will:
3.	Understand the procedures for controlling the inking, coatings drying systems commonly used in machine printing
Assessment criteria	
The learner can:	
3.1	describe the types of roller coverings used on the inking and impression cylinders of a press
3.2	explain the function of component parts of the inking systems employed on print production presses
3.3	describe the functions of 'hydraulic' and 'pneumatic' employed on production presses
3.4	interpret the drying processes of inks within the printing processes
3.5	explain the principles of accelerated drying methods of ink and the health and safety implications which surround them
3.6	explain why the viscosity of ink should be adjusted and considered when preparing the press for print.

Range
<p>Roller coverings</p> <ul style="list-style-type: none"> a. synthetic rubber, - plastics, nylon and polymers b. metals – steel, alloys <p>Print production presses</p> <ul style="list-style-type: none"> a. litho/letterpress b. gravure c. flexography d. screen processes <p>Drying processes</p> <ul style="list-style-type: none"> a. absorption b. evaporation c. quick setting inks d. precipitation e. oxidation f. polymerisation – heat assisted g. polymerisation - UV assisted h. polymerisation – electron beam assisted i. temperature controlled waterless systems j. use of chilling units <p>Accelerated drying methods</p> <ul style="list-style-type: none"> a. Infra Red b. Ultra Violet

- c. Warm Air
- d. Powder Spray

Learning outcome	The learner will:
4.	Understand the theory of colour and the properties, structures and manufacture of the materials commonly used in machine printing
Assessment criteria	
The learner can:	
4.1	define the terms 'Solute' and 'Solvent'
4.2	explain the effects of choosing the wrong grade of oil or grease when maintaining equipment
4.3	describe how viscosity is recorded by the Society of Automotive Engineering (SAE)
4.4	interpret the effect which takes place when the temperature of oil changes
4.5	clarify the colours found in the visible spectrum of light
4.6	critically compare the ' additive and subtractive colour theory'
4.7	explain the primary and secondary principles with regard to light
4.8	explain where 'Ultra violet and Infra red' fall on the visible spectrum
4.9	explain how the 'Pantone' matching system is used to identify formulas to producing spot colour for print
4.10	summarise the terminology in place to describe colour
4.11	describe the main types of colorants used within an ink
4.12	evaluate the properties of a pigment within ink
4.13	explain how acetates, vinyls, polyester and polycarbonates are used in the print production environment
4.14	compare the types of cleaning fluids and solvents used in the printing and graphic communications industry.

Range
Additive colour
a. red
b. green
c. blue
Subtractive colour
a. cyan
b. yellow
c. magenta
Cleaning fluids and solvents
a. alcohol or water based
b. hydrocarbons
c. petro-chemicals
d. vegetable based

Learning outcome	The learner will:
5.	Understand the principal types of proof used and their role in the printing process
Assessment criteria	
The learner can:	
5.1	explain the possible implications of not providing a proof to the customer
5.2	critically compare the different types of proof available
5.3	explain the effects on a job when items on a proof are found to not meet the customer specification
5.4	describe the properties on a proof which can often be affected when printing on the chosen substrate.

Range
Properties
a. Surface
b. Absorbency
c. Shade
d. Colour

Learning outcome	The learner will:
6.	Understand the use of microprocessors and computers commonly found in machine printing
Assessment criteria	
The learner can:	
6.1	explain the benefits of using computers and microprocessors on production printing machines
6.2	evaluate how computers and microprocessors can be used to monitor and analyse printed output
6.3	describe what functions on the press can be controlled by microprocessors
6.4	summarise the key functions of a MIS (Management Information System) used within the printing industry
6.5	explain the types of information the MIS systems can give to the printer.

Learning outcome	The learner will:
7.	Understand the make-ready and operating procedures for Gravure printing
Assessment criteria	
The learner can:	
7.1	explain the principles of the 'gravure' process
7.2	explain why it is necessary to identify all the job instructions prior to press 'start up'
7.3	describe the make-ready sequence and procedure of a 'gravure' press
7.4	describe the function of the main parts used on a gravure press
7.5	illustrate the paper transport systems employed on gravure

printing presses
7.6 illustrate the relationship between the plate cylinder and impression cylinder on a range of production presses
7.7 explain the considerations to take into account when preparing and mounting printing cylinders/plates
7.8 justify the component parts of a gravure inking system
7.9 describe the uses of in-line equipment employed on production presses explaining the advantages and disadvantages
7.10 describe the procedures to follow having completed the output of printed work
7.11 describe the factors which affect or influence the choice of ink in gravure printing
7.12 explain how the viscosity of the ink can affect the printed output
7.13 describe the term 'press finger printing' identifying the benefits.

Range
Production presses
a. Sheet fed
b. In-line presses
c. Packaging press
d. Publication press
In-line equipment
a. Rewinding
b. Sheeting
c. Conversion processes
d. Conversion processes

Learning outcome	The learner will:
8.	Understand the procedures for controlling quality in machine printing including sampling and inspection regimes
Assessment criteria	
The learner can:	
8.1	define the term 'Quality Product'
8.2	explain the term 'inspection' outlining why it is important to production output.
8.3	define the term 'testing' giving typical examples of the methods in use
8.4	explain the reason for regular sampling during production output
8.5	explain the items of information which can be monitored by regular sampling with regard to quality of output
8.6	describe the terminology used within inspection sampling
8.7	explain the basic functions of the specialist equipment used to assist in the monitoring and inspection of materials in print
8.8	analyse the effects of 'metamerism' and 'juxtaposition' with regard to colour
8.9	explain why it is important to standardise viewing conditions
8.10	evaluate the influencing factors which can have an effect on quality
8.11	describe the common printing faults encountered in print giving the method used for rectification.

Range

Terminology

- a. mean
- b. median
- c. mode
- d. normal distribution
- e. output
- f. process
- g. random
- h. range
- i. sentence

Functions

- a. broad head micrometers
- b. colorimeters
- c. colour viewing booths
- d. densitometers
- e. drying time tester
- f. dyne tester
- g. grain direction test
- h. magnetic ink oscilloscope
- i. rub testers
- j. shore meter
- k. special lighting conditions
- l. spectro-photometers
- m. tack meter
- n. tensile strength tester
- o. tension meter
- p. viscometers
- q. visual display monitors

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. reproduction
- h. storage and handling
- i. training

Printing faults

- a. adhesion
- b. bad ink transfer
- c. bleeding
- d. blocking
- e. brittleness

- f. curing (UV)
- g. dark/dirty print
- h. dot gain
- i. feathering
- j. foaming
- k. filling in
- l. gear marks
- m. ghosting
- n. hickies/spots
- o. halo
- p. ink drying too slow
- q. ink drying too fast
- r. misregister
- s. moiré
- t. mottled print
- u. odour
- v. picking
- w. pin holing
- x. plate swelling
- y. skip out
- z. smearing/tracking

Unit 310

Machine printing (screen)

UAN:	H/503/2121
Level:	Level 3
Credit value:	5
GLH:	40
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	To develop a clear understanding of the procedures to control machine printing processes, including the products appropriate to each printing process, control systems for inking, coatings and drying systems, properties and structures of materials, use of microprocessors, control of and rectification of common faults, control of quality and completion of quality assurance documentation.

Learning outcome	The learner will:
1. Understand the printed products associated with the various printing processes and why to use one over another	
Assessment criteria	
The learner can:	
1.1	describe the printed products associated with the common print production processes
1.2	explain the key characteristics of the main printing processes
1.3	differentiate between the types of image carriers used in the machine printing processes
1.4	critically compare the types and construction of the printing presses used within the industry to date
1.5	describe the influencing factors which contribute to selecting the correct printing process.

Range
Printed products
a. digital
b. flexography
c. letterpress
d. lithography
e. pad
f. photogravure

g. screen process

Image carriers

- a. flexography, photopolymer (or rubber)
- b. letterpress, cast metal, engraved metal, etched metal, photo polymer, duplicate plates, plastic moulded, flat, rotary, roller
- c. gravure, (invert and semi-invert) conventional, double positive, single positive, variable area engraving, cell shape, cell and wall ratio/size, cell angles
- d. lithography, analogue, digital, photo emulsions, ablation, direct, negative and positive working plates, multiple exposure, step and repeat, screen angles
- e. screen processes, stencils types, direct coating, transfer systems, capillary, plotter cutters, screen angles, mesh types, mesh count, mesh tension

Printing presses

- a. 'H' or 'Y' units
- b. blanket to blanket perfecter
- c. common blanket
- d. common impression, 'satellite and tandem'
- e. half unit
- f. intermittent web
- g. perfecting
- h. stack or arch
- i. unit type press
- j. variable.

Learning outcome	The learner will:
2.	Understand the types and characteristics of common substrates
Assessment criteria	
The learner can:	
2.1	describe the main uses for substrates suitable for printing using the screen process
2.2	explain the characteristics which should be considered when selecting a suitable substrate
2.3	summarise the key factors to consider when handling substrates used in screen printing
2.4	describe the faults associated with printing on different substrates using the screen process
2.5	describe what tests can be carried out to check the suitability of a substrate in use

Range
Substrates
a. paper
b. board
c. transfer paper
d. corrugated board
e. fluted board (correx)

- f. vinyl
- g. rigid PVC
- h. textiles
- i. plastic
- j. fabricated panels

Characteristics

- a. surface finish
- b. colour
- c. absorbancy or otherwise
- d. printability in its natural state
- e. any surface treatment necessary to improve printability
- f. dimensions
- g. dimensional stability
- h. shape
- i. location factors
- j. rigidity
- k. ink/colour/printing medium selection
- l. post treatment requirement, if any
- m. effect of multiple passes, if required
- n. processing limitations - temperature, time etc
- o. any special characteristics

Learning outcome	The learner will:
-------------------------	--------------------------

3.	Understand the procedures for controlling the inking and drying systems used in machine printing
----	--

Assessment criteria

The learner can:

- 3.1 describe the screen printing process
- 3.2 describe the preparation of the image carrier
- 3.3 describe the **screen printing presses** in use
- 3.4 identify the range of stencils in use
- 3.5 describe the function of the squeegee
- 3.6 explain what needs to be **considered** when selecting a suitable squeegee
- 3.7 describe the function of a flow coater
- 3.8 explain how altering the parameters can have an **effect** on the printed output
- 3.9 explain the **drying processes** of inks within the printing processes
- 3.10 explain the principles of **accelerated drying methods** of ink and the health and safety implications which surround them
- 3.11 explain why the viscosity of an ink should be adjusted and considered when preparing the press for print.

Range

Screen printing presses

- a. hand bench
- b. semi-auto flatbed
- c. auto flatbed with grippers and belt fed

- d. cylinder press
- e. cylindrical screen
- f. surface mount/electronics
- g. multi-colour in-line flatbed
- h. multi-colour in-line cylinder
- i. carousel textile press manual and automatic
- j. three dimensional object press
- k. cylindrical object press, single and multi-colour
- l. in-line web fed flatbed and cylindrical, single and multi-colour

Considered

- a. Shore hardness
- b. Profile degree
- c. Profile edge

Effect

- a. the squeegee angle - its effect on ink flow and the deposit
- b. the squeegee speed - its effect on the time ink has to flow through the mesh
- c. the squeegee pressure - its effect on the angle of the squeegee to the stencil, the ink flow; image distortion and excessive wear on the stencil and the squeegee
- d. the squeegee edge and how it contributes to maintaining an even ink deposit along the length of the squeegee
- e. snap distance (off contact) - its effect on ink flow, image size and wear on the stencil
- f. peel off and ink tack - the effect on image size and stress on the mesh
- g. mesh tension - its effect on registration and evenness of ink film

Drying processes

- a. absorption
- b. evaporation
- c. quick setting inks
- d. precipitation
- e. oxidation
- f. polymerisation – heat assisted
- g. polymerisation - UV assisted
- h. polymerisation – electron beam assisted
- i. temperature controlled waterless systems
- j. use of chilling units

Accelerated drying methods

- a. Infra Red
- b. Ultra Violet
- c. Warm Air
- d. Powder Spray

Learning outcome	The learner will:
4.	Understand the theory of colour and the properties, structures and manufacture of the materials commonly used in machine printing
Assessment criteria	
The learner can:	
4.1	define the terms 'Solute' and 'Solvent'
4.2	explain the effects of choosing the wrong grade of oil or grease when maintaining equipment
4.3	describe how viscosity is recorded by the Society of Automotive Engineering (SAE)
4.4	interpret the effect which takes place when the temperature of oil changes
4.5	clarify the colours found in the visible spectrum of light
4.6	critically compare the ' additive and subtractive colour theory'
4.7	explain the primary and secondary principles with regard to light
4.8	explain where 'Ultra violet and Infra red' fall on the visible spectrum
4.9	explain how the 'Pantone' matching system is used to identify formulas to producing spot colour for print
4.10	summarise the terminology in place to describe colour
4.11	describe the main types of colorants used within an ink
4.12	evaluate the properties required of a pigment within ink
4.13	explain how acetates, vinyls, polyester and polycarbonates are used in the print production environment
4.14	compare the types of cleaning fluids and solvents used in the printing and graphic communications industry.

Range
Additive colour
a. red
b. green
c. blue
Subtractive colour
a. cyan
b. yellow
c. magenta
Cleaning fluids and solvents:
a. alcohol or water based
b. hydrocarbons
c. petro-chemicals
d. vegetable based

Learning outcome	The learner will:
5.	Understand the principal types of proof used and their role in the printing process
Assessment criteria	
The learner can:	
5.1	explain the possible implications of not providing a proof to the customer.
5.2	critically compare the different types of proof available.
5.3	explain the effects on a job when items on a proof are found to not meet the customer specification.
5.4	describe the properties on a proof which can often be affected when printing on the chosen substrate.

Range
Properties
a. Surface
b. Absorbency
c. Shade
d. Colour

Learning outcome	The learner will:
6.	Understand the use of microprocessors and computers commonly found in machine printing
Assessment criteria	
The learner can:	
6.1	explain the benefits of using computers and microprocessors on production printing machines
6.2	evaluate how computers and microprocessors can be used to monitor and analyse printed output
6.3	describe what functions on the press can be controlled by microprocessors
6.4	summarise the key functions of a MIS (Management Information System) used within the printing industry
6.5	explain the types of information the MIS systems can give to the printer.

Learning outcome	The learner will:
7.	Understand the make-ready and operating procedures for the screen printing process
Assessment criteria	
The learner can:	
7.1	explain the principles of the 'screen' process'
7.2	explain why it is necessary to identify all the job instructions prior to press 'start up'
7.3	describe the make-ready sequence and procedure of a 'screen' press identifying what checks would be carried out
7.4	illustrate the function of the component parts used on a 'screen' press (automated and manual)

7.5	illustrate the substrate feeding systems/methods employed in 'screen' printing presses
7.6	describe the relationship between screen, impression bed/cylinder and the squeegee on a screen press
7.7	explain the considerations to take into account when selecting, preparing and mounting the screen
7.8	describe the function of the inking methods/systems employed
7.9	identify the different types of ink used in screen printing
7.10	differentiate between the range of inks considering the factors which influence the choice when preparing for print
7.11	explain the role of a 'squeegee' and the effects of not using the correct one
7.12	explain the benefits of 'finger printing' a press for production
7.13	describe the procedures to follow having completed the output of printed work.

Range
Screen press
a. Carousel
b. Flat bed
c. Unit press

Learning outcome	The learner will:
8.	Understand the procedures for controlling quality in machine printing including sampling and inspection regimes
Assessment criteria	
The learner can:	
8.1	define the term 'Quality Product'
8.2	explain the term 'inspection' outlining why it is important to production output
8.3	define the term 'testing' giving typical examples of the methods in use
8.4	explain the reason for regular sampling during production output
8.5	explain the items of information which can be monitored by regular sampling with regard to quality of output
8.6	describe the terminology used within inspection sampling
8.7	explain the basic functions of the specialist equipment used to assist in the monitoring and inspection of materials in print
8.8	analyse the effects of 'metamerism' and 'juxtaposition' with regard to colour
8.9	explain the importance of standardising viewing conditions
8.10	evaluate the factors which can have an effect on quality
8.11	describe the common printing faults encountered in print giving the method used for rectification.

Range
Terminology
a. mean
b. median

- c. mode
- d. normal distribution
- e. output
- f. process
- g. random
- h. range
- i. sentence

Specialist equipment

- a. broad head micrometers
- b. colorimeters
- c. colour viewing booths
- d. densitometers
- e. drying time tester
- f. dyne tester
- g. grain direction test
- h. magnetic ink oscilloscope
- i. rub testers
- j. shore meter
- k. special lighting conditions
- l. spectro-photometers
- m. tack meter
- n. tensile strength tester
- o. tension meter
- p. viscometers
- q. visual display monitors

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. reproduction
- h. storage and handling
- i. training

Printing faults

- a. adhesion
- b. bad ink transfer
- c. bleeding
- d. blocking
- e. brittleness
- f. curing (UV)
- g. dark/dirty print
- h. dot gain
- i. feathering
- j. foaming
- k. filling in

- l. gear marks
- m. ghosting
- n. hickies/spots
- o. halo
- p. ink drying too slow
- q. ink drying too fast
- r. misregister
- s. moiré
- t. mottled print
- u. odour
- v. picking
- w. pin holing
- x. plate swelling
- y. skip out
- z. smearing/tracking

Unit 311

Mechanised print finishing and binding

UAN:	A/503/2139
Level:	Level 3
Credit value:	5
GLH:	38
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	This unit is concerned with developing a clear understanding of the procedures to control the processes involved in mechanised print finishing and binding operations, including the properties and characteristics of materials, controlling and rectifying faults and quality control.

Learning outcome	The learner will:
1.	Understand the terminology commonly used for imposition and folding schemes in mechanised print finishing and binding
Assessment criteria	
The learner can:	
1.1	explain the benefits of standardising paper internationally.
1.2	explain what the A, B and C series paper size are typically used to produce
1.3	describe how the A series paper sizes can be sub-divided into standard divisions
1.4	describe how paper is measured in terms of size and weight and bulk
1.5	critically compare a range of imposition schemes identifying the effects on the binding process
1.6	explain the factors to be considered when preparing an imposition scheme
1.7	describe the most common methods of working , when producing a printed sheet
1.8	explain the implications of using the 'incorrect' method of working
1.9	illustrate the items which need to be taken into account when preparing a 'template/layout
1.10	describe why the items are important to the production of the printed copy
1.11	clarify why it is important to identify a 'grip' and 'lay' edge on the printed sheet
1.12	describe the methods used to identify the grain direction in paper and board

1.13 explain **implications** of the grain direction being 'incorrect' in the output of a job.

Range

Methods of working

- a. sheet work
- b. half sheet work
- c. work and turn
- d. work and tumble

Items

- a. page position
- b. head margins
- c. gutter margins
- d. spine margins
- e. trim allowances
- f. grip or sheet transfer allowances

Methods

- a. bending
- b. wetting
- c. tearing
- d. folding

Implications

- a. cracking - if folding thick material
- b. inaccurate folding – consistent folds are often difficult to maintain
- c. warping - if adhesive binding uses water-based adhesives.

Learning outcome	The learner will:
2.	Understand the characteristics of paper and board
Assessment criteria	
The learner can:	
2.1	explain the key attributes of paper and board and the types of tests which can be performed to check the characteristics
2.2	analyse the main features and uses for a range of papers and identify how paper can be given special features
2.3	explain how the characteristics can have an effect on the post press operations
2.4	identify what special features can be added to paper during production
2.5	describe the main types of paper in use and their features
2.6	describe the main types of board in use and their features
2.7	explain the key factors to be considered when handling and storing paper and board.

Range

Attributes

- a. brightness/whiteness
- b. opacity
- c. tensile strength
- d. wet strength
- e. dimensional stability
- f. sizing
- g. picking resistance
- h. weight
- i. caliper/thickness
- j. gloss
- k. permanence
- l. rigidity
- m. ink hold/adhesion

Special features

- a. watermarks - use of a dandy roller
- b. textures - use of embossed rollers on paper making machine

Types of paper

- a. bulky mechanical
- b. part mechanical
- c. recycled
- d. woodfree
- e. newsprint
- f. machine-finished (MF)
- g. matt-coated
- h. gloss-coated
- i. machine-glazed (MG)
- j. chromo paper
- k. cast-coated
- l. specialist papers:
 - i kraft (bleached or unbleached)
 - ii hand-made paper
 - iii carbonless paper
 - iv heat sealable paper
 - v pressure sealable paper
 - vi self-adhesive paper
 - vii gummed paper

Types of board

- a. unlined chipboard
- b. lined chipboard
- c. straw board
- d. pulp board
- e. coated board
- f. art board

Learning outcome	The learner will:
3.	Understand the uses, properties and characteristics of materials found in mechanised print finishing and binding
Assessment criteria	
The learner can:	
3.1	evaluate the use of substrates used in mechanised print finishing and binding
3.2	explain the properties and characteristics of the types of adhesives in use
3.3	describe the methods that can be used to enhance the appearance of printed products
3.4	analyse the methods of binding and securing, used in print finishing process
3.5	describe what methods can be used to protect the printed product from regular use
3.6	evaluate the influencing factors used when selecting 'materials' used in the finishing and binding process.

Range
<p>Substrates</p> <ul style="list-style-type: none"> a. paper b. board c. plastic d. clear film e. linen f. bookcloth (covering material) <p>Adhesives</p> <ul style="list-style-type: none"> a. PVA emulsions b. PUR adhesives c. hot melt d. animal glue e. scotch/pearl glue f. starch paste g. fan-apart adhesive h. double-sided tapes <p>Methods (AC3.3)</p> <ul style="list-style-type: none"> a. laminates b. varnishes c. foils <p>Methods (AC3.4)</p> <ul style="list-style-type: none"> a. wire b. sewing thread c. plastic comb d. wire O/spiral wire e. interscrews (brass/plastic)

f. slide bars

Factors

- a. cost
- b. units of purchase
- c. durability
- d. tensile strength
- e. suitability to different binding processes and techniques
- f. ideal storage conditions
- g. life expectancy (shelf life)
- h. conditions of use (where it will be used)
- i. Ph effect they may have on the product
- j. lead time for delivery of materials from suppliers
- k. details of suppliers.

Learning outcome	The learner will:
4.	Understand the main operations involved in mechanised print and finishing to cut, fold and secure printed material
Assessment criteria	
The learner can:	
4.1	describe the main operations which take place in mechanised print finishing and binding
4.2	describe a range of folding techniques in use, giving consideration to the imposition scheme
4.3	explain the factors which dictate how printed sections can be 'gathered' or 'Inset'
4.4	describe the cutting, slitting and trimming operations which take place in print finishing
4.5	critically compare the methods used in print finishing to 'secure' pre-printed products
4.6	describe what is meant by the term 'decorating' in print finishing
4.7	explain the ancillary operations which take place in the finishing of a product
4.8	evaluate the factors which determine the method of bookbinding to be used
4.9	explain why it is necessary to receive material from the previous operation which meets the correct lay down requirements
4.10	describe the possible implications of 'incorrect lay down' requirements.

Range
Operations
a. folding
b. trimming, dividing, cutting and creasing
c. insetting or gathering into a prescribed order
d. securing with thread, wire stitches or adhesive
e. protective covering
f. decorating
g. fabrication
h. ancillary operations

Cutting, slitting and trimming operations

- a. guillotining with a single knife to cut stock for production
- b. guillotining with a single knife to split printed sheets
- c. guillotining with a single knife to trim printed sheets
- d. trimming of secured sections with three or five knife trimmers
- e. using a slitting and winding machine to divide reels into two or more mini-reels
- f. cutting and creasing rules to allow carton shapes to be created and the box to be folded
- g. slitting wheels on machines such as folders

Ancillary operations

- a. drilling
- b. hole punching
- c. round cornering
- d. indexing
- e. riveting
- f. perforating
- g. thread stitching
- h. eyeleting
- i. numbering

Factors

- a. folding printed sheets to create a series of 8, 16 or 32 page sections
- b. securing sections together by thread and adhesive to make book block
- c. securing sections by perfect binding
- d. making, covering and decorating case (cover)
- e. casing-in, bringing together book block and case, and securing by adhesive and endpapers.

Learning outcome	The learner will:
5.	Understand the main operations involved in newspaper and magazine finishing processes.
Assessment criteria	
The learner can:	
5.1	describe the main activities involved in newspaper and periodical finishing.
5.2	identify the 'inline' and 'offline' activities
5.3	explain the advantages and disadvantages of 'inline' and 'off line' post press operations
5.4	summarise the terms 'inserting' and 'onserting'
5.5	define what is meant by 'stitching and trimming'
5.6	analyse the effects of poor 'palletising'
5.7	describe what is meant by 'bundling'
5.8	describe the methods used to move and transport goods in the production environment
5.9	explain the benefits of using lifting aids over regular manual handling of goods

5.10 clarify the types of information which must be recorded for quality and performance monitoring.

Range

Activities

- a. inserting
- b. onserting
- c. stitching and trimming of the product to achieve the job specification
- d. finishing, counting, bundling, labelling, wrapping and strapping publications
- e. palletising
- f. transporting stock, reels, discs and logs within the factory and between factories to meet production requirements

Methods

- a. pump trucks
- b. fork-lift trucks
- c. disc trucks

Learning outcome	The learner will:
6.	Understand the make-ready and operating procedures for a range of print finishing equipment
Assessment criteria	
The learner can:	
6.1	summarise the function of a range of equipment used in print finishing
6.2	explain why specific information is required to perform the task accurately and efficiently
6.3	describe the 'make ready' procedure of the equipment identified to achieve a 'pass sheet'
6.4	describe the operating procedures for a range of post press equipment
6.5	critically compare the types of paper transport systems in regular use
6.6	clarify the 'operational procedures' to be followed when completing the post press operation
6.7	describe the considerations and procedures that should be followed when disposing of finished waste
6.8	explain the types of information which should be recorded for quality and performance monitoring.

Range

Equipment

- a. guillotines
- b. folding machine
- c. spiral wire binder
- d. coating machine
- e. slitting and winding machine
- f. laminating machine

<ul style="list-style-type: none"> g. non-automated (hand operate) machine h. hopper fed inserting/gathering machine i. sewing machine j. enveloping machine <p>Specific information</p> <ul style="list-style-type: none"> a. Quantity b. Flat Sheet size c. Finished size d. Time allocated e. Packing requirements <p>Post press equipment</p> <ul style="list-style-type: none"> a. adhesive binding machinery b. case making machinery c. casing-in machinery d. multi-knife trimming machinery e. guillotines f. folding machines g. auto punching and cutting machinery h. foil blocking machinery i. mail processing machinery j. in-line insetting-stitching-trimming machinery k. in-line gathering-adhesive binding-trimming machinery l. in-line book block feeding-forwarding-case binding machinery
--

Learning outcome	The learner will:
7.	Understand the purpose and procedures for quality control in mechanised print finishing and binding
Assessment criteria	
The learner can:	
7.1	define the term 'Quality Product'
7.2	define the term 'tolerance' in relation to quality of output.
7.3	describe the purpose of quality control in print finishing and the key items to be monitored
7.4	define the term 'testing' giving typical examples of the methods in use
7.5	explain the terminology used in 'inspection sampling'
7.6	explain the terminology used in 'sampling'
7.7	explain how a sampling plan can help improve the quality of production output by reflecting on statistical information
7.8	describe the methods of monitoring finished output as part of a quality control system
7.9	define the term 'approved copy'
7.10	explain why it is important for the 'approved copy' to have been approved and authenticated
7.11	identify a range of finishing faults on guillotines, folding machines, slitting/winding machinery and non-automated machinery
7.12	evaluate the benefits which a company implementing a 'quality assurance program' will see

7.13 describe the influencing **factors** which contribute to the quality of a product.

Range

Items

- a. inspection
- b. testing
- c. sampling
- d. the use of input/output controls

Terminology (AC7.5)

- a. mean - average (total of items divided by the number of items)
- b. median - middle value
- c. mode - most common value
- d. normal distribution - measurements of an inspection are the same or distributed within a certain variance and mean
- e. output - materials or product after a process
- f. process - the task or procedure
- g. random - no fixed interval or frequency
- h. range - how far from the smallest value to the largest value
- i. sentence - result of inspection; accept, reject or rework

Terminology (AC7.6)

- a. 100 per cent inspection – every individual item
- b. batch - a given number of items
- c. frequency - how often a sample is taken

Statistical information

- a. standard deviation
- b. distribution curves
- c. previous records for the job

Finishing faults

- a. guillotines:
 - i overcut
 - ii undercut
 - iii wavy edge cut
 - iv bow or hollow cut
- b. folding machines:
 - i sheets fail to feed and separate
 - ii feeding doubles
 - iii sheets fail to transfer and run evenly on in-feed conveyor table or roller cross carrier
 - iv sheets fail to enter fold plate
 - v sheets fail to leave plate
 - vi sheets fold out of square at plate blank
 - vii sheets fail to be driven between knife fold rollers
 - viii perforating line splits

- ix sheets/sections creasing
 - x sheets/sections marking
 - xi sections insert into each other on delivery table/box
 - xii sections conveyed to delivery are uneven
- c. slitting and winding machinery:
- i glue reel joins
 - ii damaged reels
 - iii reel bouncing
 - iv creases
 - v poor edge cutting
 - vi web breaks
 - vii weak splice
 - viii missing print
 - ix tension fault
- d. non-automatic machines:
- i wire stitching machines
 - ii drilling machines
 - iii punching machines
 - iv riveting machines
 - v perforating machines
 - vi thread stitching machines
 - vii eyeletting machines (straight line or rotary)
 - viii rotary perforating machine
- e. hopper-fed inserting machinery:
- i missing section
 - ii pagination incorrect
 - iii misaligned sections
 - iv double feed
 - v hopper-fed gathering machinery:
 - vi missing section
 - vii pagination incorrect
 - viii misaligned sections
 - ix double feed
- f. auto-fed sewing machinery:
- i missing stitches
 - ii thread breaking
 - iii loose stitching
 - iv section dropping at head
 - v sections not square at head
 - vi insets sewn out of position
 - vii newspaper specific equipment, faults on:
 - viii inserting equipment
 - ix stitch and trim equipment
 - x moving materials equipment
 - xi feeder machinery
 - xii publishing equipment

xiii auto-palletising equipment.

Factors

- a. administration
- b. consumables
- c. customer support
- d. information
- e. materials
- f. process
- g. storage and handling
- h. training

Learning outcome	The learner will:
8.	Understand the procedures required to prevent the material from damage during finishing and binding operations
Assessment criteria	
The learner can:	
8.1	explain the type of 'checks' which should be carried out on the product during manufacture
8.2	describe the procedures for protecting material from damage during 'case making' operations
8.3	describe the procedures for protecting material from damage during 'casing in' operations
8.4	describe the procedures for protecting material from damage during multi-knife trimming operations
8.5	describe the procedures for protecting material from damage during 'guillotine' operations
8.6	describe the procedures for protecting material from damage during 'folding' operations
8.7	describe the procedures for protecting material from damage during 'auto punching and cutting' operations
8.8	describe the procedures for protecting material from damage during 'foil blocking' operations
8.9	describe the procedures for protecting material from damage during 'mail processing' operations
8.10	describe the procedures for protecting material from damage during 'inline inseting, stitching-trimming' operations
8.11	describe the procedures for protecting material from damage during 'inline gathering, adhesive binding and trimming operations
8.12	explain how an incorrect machine setting can cause damage to the material/substrate
8.13	explain the types of damage which can be caused by not following company and manufacturers procedures.

Range
Procedures (case-making) (AC8.2)
a. cleaning and setting rollers using appropriate methods to suit product
b. cleaning and setting feeders, ensuring covers/boards feed centrally and squarely into machine without damage

- c. setting/adjusting glue rollers to ensure sufficient gluing without marking
- d. cleaning suckers/grippers and ensuring they are set/adjusted correctly to suit product without marking
- e. ensuring delivery conveyor is clean and free from dirt, using appropriate solvents/cleaners

Procedures (casing in) (AC8.3)

- a. adjusting clamping pressure to suit product without marking
- b. setting/adjusting glue rollers to ensure sufficient gluing without marking
- c. setting/adjusting cover feeder to ensure feeding is centrally and squarely into the machine without damage
- d. cleaning transportation rollers/tapes using appropriate solvents/cleaners
- e. ensuring various units involved with casing-in such as jacketing, nipping units are clean; using appropriate methods and cleaning agents that comply with all aspects of health and safety, and are set to suit product without marking

Procedures (multi-knife trimming) (AC8.4)

- a. adjusting clamping pressure to suit product without marking
- b. cleaning the machine bed using appropriate solvents and cleaning agents
- c. cleaning knives and carriages using correct and appropriate methods that comply with all aspects of health and safety
- d. ensuring that product feeds into trimming unit squarely without damage
- e. ensuring that product leaves trimming unit squarely without damage

Procedures (guillotine) (AC8.5)

- a. adjusting clamping pressure to suit substrate without marking
- b. cleaning machine bed using appropriate solvents/cleaners
- c. cleaning knife and carriage using correct and appropriate methods and cleaning agents that comply with all aspects of health and safety

Procedures (folding) (AC8.6)

- a. adjusting roller pressures to ensure product is folded undamaged (marking, creasing etc)
- b. cleaning transportation tapes/rollers using appropriate solvents/cleaners
- c. ensuring anti-static devices are working correctly (sheets not sticking together, dragging etc)
- d. ensuring bundling unit is set to correct pressure so as not to distort folded output

Procedures (auto-punching and cutting) (AC8.7)

- a. adjusting roller pressures to ensure product enters the machine undamaged (marking, creasing etc)
- b. cleaning knife and carriage using correct and appropriate methods and cleaning agents that comply with all aspects of health and safety
- c. ensuring that punching/drilling bits are re-sharpened so as to produce clean sharp holes in the product, using correct and

- appropriate methods
- d. cleaning machine bed using appropriate solvents/cleaners

Procedures (foil blocking) (AC8.8)

- a. ensuring temperature is set correctly so as not to distort and burn the product
- b. ensuring pressure is set correctly so as not to damage the product
- c. cleaning machine bed using appropriate solvents/cleaners
- d. cleaning the image carrier – removing foil residue that could otherwise lower the quality of the finished product

Procedures (mail processing) (AC8.9)

- a. cleaning machine bed using appropriate solvents/cleaners
- b. cleaning transportation belts/rollers using appropriate solvents/cleaners
- c. cleaning knives using correct and appropriate methods and cleaning agents that comply with all aspects of health and safety
- d. adjusting clamping pressure to suit product without marking
- e. correctly positioning of inserts to ensure they feed centrally and squarely into the machine

Procedures (inline insetting, stitching trimming) (AC8.10)

- a. cleaning knives and clamps using correct and appropriate methods and cleaning agents that comply with all aspects of health and safety
- b. cleaning transportation belts/rollers using appropriate solvents/cleaners
- c. cleaning and adjusting stitching heads using appropriate methods and cleaning agents
- d. ensuring saddle chain is clean and free from dirt using appropriate methods and cleaning agents that comply with all aspects of health and safety
- e. cleaning suckers/grippers and ensuring they are set/adjusted correctly to suit product without marking

Procedures (inline gathering, adhesive binding and trimming) (AC8.11)

- a. adjusting clamping pressure to suit product without marking
- b. setting/adjusting glue rollers to ensure sufficient gluing without marking
- c. ensuring trimmings from circular saw go into waste extraction and do not contaminate glue
- d. correctly positioning of covers ensuring they feed centrally and squarely into machine without damage
- e. ensuring conveyor systems are clean and free from dirt, using appropriate solvents/cleaners
- f. ensuring book blocks are feeding centrally and squarely into the trimming unit
- g. adjusting clamping pressure in trimming unit to suit product without marking
- h. cleaning knives using correct and appropriate methods and cleaning agents that comply with all aspects of health and safety.

Unit 312

Carton manufacturing processes

UAN:	T/503/2141
Level:	Level 3
Credit value:	5
GLH:	5
Assessment requirements specified by a sector or regulatory body:	This unit is endorsed by Proskills. It will be assessed via a short-answer test.
Aim:	The aim of this unit is to develop a clear understanding of the procedures for controlling carton manufacture including design, technological development, materials technology, die forme manufacture, the 'make ready' and operation of carton production equipment and quality control.

Learning outcome	The learner will:
1. Understand the materials and equipment used in carton manufacturing processes	
Assessment criteria	
The learner can:	
1.1 differentiate between the substrates regularly used in carton manufacture	
1.2 explain the properties of the adhesives used in carton manufacture	
1.3 analyse the factors to consider when selecting an adhesive	
1.4 describe the different capabilities of the rules used in die forme manufacturer	
1.5 describe the component parts of a 'die forme'	
1.6 identify the different types of ' ejection materials '	
1.7 identify the different types of 'matrix materials' used for creasing.	
1.8 describe the types of materials used for enhancing carton appearance	
1.9 explain the equipment and software used to produce sample carton copies	
1.10 explain the function of ' matrix cutting ' equipment.	
1.11 explain the 'operational function' of the machines used in cutting, creasing and enhancing	
1.12 describe the types of equipment used in folding and gluing application.	

Range

Substrates

- a. carton boards
- b. corrugated boards

Adhesives

- a. emulsions
- b. hot melts
- c. adhesive tapes
- d. latexes

Capabilities

- a. cutting
- b. creasing
- c. scoring
- d. perforating
- e. special

Ejection materials

- a. open cell
- b. closed cell
- c. high performance shaped
- d. cork

Materials

- a. Foils
- b. laminates/films
- c. blocking/embossing dies

Equipment and software

- a. technical drawing equipment
- b. creasing tool and creasing rule
- c. computer and peripheral equipment
- d. CAD (computer-aided design) software

Matrix cutting equipment

- a. mitre cutters (bench and hand)
- b. chamfer knife/cutting knives
- c. counter cutting systems

Machines

- a. hand fed vertical platens
- b. automatic machine fed light platens
- c. automatic machine fed horizontal platens
- d. automatic machine fed cylinder press
- e. automatic machine fed rotary press
- f. machine stripping units
- g. hand stripping equipment

h. machine separating units

Equipment

- a. straight lines
- b. glued lock bottom
- c. 4/6 corners
- d. adhesive applicators.

Learning outcome	The learner will:
2.	Understand the principles, methods and techniques of carton design and manufacturing processes
Assessment criteria	
The learner can:	
2.1	summarise the types of information needed from a customer to create and design a sample carton for production.
2.2	describe the basic styles, types and parts of carton designs
2.3	describe the sequence of operations for making sample carton designs
2.4	clarify the checks that a sample design will be put through
2.5	explain the types of problems associated with carton design and manufacture
2.6	evaluate the benefits of using computer aided design (CAD) machines help with the design and manufacture
2.7	recognise the hazards associated with carton design and manufacture
2.8	clarify the production requirements needed for the carton layouts.

Learning outcome	The learner will:
3.	Understand the make ready and operational procedures for cutting and creasing machinery, multi-folding and gluing machinery and enhancing machinery
Assessment criteria	
The learner can:	
3.1	summarise the information required to set up and operate the machinery and equipment used in carton manufacture
3.2	describe the operator responsibilities when operating the machinery
3.3	describe the 'make-ready' process for setting up carton manufacturing equipment, detailing the checks to be made.
3.4	define the function of a 'matrix'
3.5	differentiate between the methods used to 'enhance output' of carton manufacture
3.6	interpret the problems associated with carton manufacture.

Learning outcome	The learner will:
4.	Understand the manufacturing procedures of die making and cutting, and creasing formes
Assessment criteria	
The learner can:	
4.1	explain the purpose of a 'die forme'
4.2	compare the range of forms in use
4.3	interpret the 'terminology' associated with die forme manufacture
4.4	describe the sequence of die forme manufacture
4.5	describe the relevance of the 'point system' used in die forme manufacture.

Learning outcome	The learner will:
5.	Understand the purpose and procedures for quality control in carton manufacturing processes
Assessment criteria	
The learner can:	
5.1	define the term 'Quality Product'
5.2	differentiate between the terms 'quality control' and 'quality assurance'
5.3	explain the importance of carrying out quality control checks during manufacture
5.4	describe the quality checks that should be carried out at each stage of production output
5.5	explain the term 'inspection' outlining why it is important to production output
5.6	define the term 'testing' giving typical examples of the methods in use
5.7	explain the reason for regular sampling during production output.
5.8	describe the terminology used within inspection sampling
5.9	evaluate the factors which can have an effect on quality
5.10	describe the importance of maintaining performance records.

Range
Quality checks
a. Die forme manufacture
b. Cutting and creasing
c. Product enhancing
d. Folding and gluing
Terminology
a. mean
b. median
c. mode
d. normal distribution
e. output
f. process
g. random

<ul style="list-style-type: none"> h. range i. sentence <p>Factors</p> <ul style="list-style-type: none"> a. administration b. consumables c. customer support d. information e. materials f. process g. reproduction h. storage and handling i. training

Learning outcome	The learner will:
6.	Understand the technological changes in design and manufacture of cartons as a form of packaging
Assessment criteria	
The learner can:	
6.1	explain the principle functions of CNC equipment
6.2	critically compare 'Inline die cutting' against 'Offline die cutting'
6.3	evaluate developments in carton manufacture technology.

Range
CNC Equipment
<ul style="list-style-type: none"> a. sample/graphics plotters b. automatic rule benders c. laser cutters d. cutting and creasing machines e. folder gluers

Learning outcome	The learner will:
7.	Understand the purpose and principles of machine stripping.
Assessment criteria	
The learner can:	
7.1	explain the principles of machine stripping
7.2	describe the principles of 'carton separation' as a process.

Range
Principles (machine stripping) (AC7.1)
<ul style="list-style-type: none"> a. types of stripping unit – plywood units, adjustable machine units b. costs – creating stripping units versus hand stripping c. running times – possible slower running to maintain sheet stability d. methods of stripping – removal of all waste, retention of front waste only
Principles (carton separation) (AC7.2)

- a. separated after having waste removed
- b. pressed through a frame
- c. stacked on a pallet for further processing - interleaving sheets will be inserted at pre-determined intervals to tie the stack together.



Appendix 1 Relationships to other qualifications

Links to other qualifications

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

This qualification has connections to the:

- Level 3 Certificate in Printing and Graphic Communications (5261)

Literacy, language, numeracy and ICT skills development

This qualification can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills Wales – see www.cityandguilds.com/esw



Appendix 2 Sources of general information

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

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

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

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

- **Walled Garden:** how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment:** how to register for e-assessments.

Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: learnersupport@cityandguilds.com
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: intcg@cityandguilds.com
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: singlesubjects@cityandguilds.com
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: walledgarden@cityandguilds.com
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: business@cityandguilds.com
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: feedbackandcomplaints@cityandguilds.com

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

Copyright

The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute and may not be copied, reproduced or distributed without prior written consent. However, approved City & Guilds centres and candidates studying for City & Guilds qualifications may photocopy this document free of charge and/or include a PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* (see the City & Guilds website) also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

Published by City & Guilds, a registered charity established to promote education and training

City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)844 543 0000
F +44 (0)20 7294 2413
www.cityandguilds.com

WW-02-5405

