SEG Awards ABC Level 3 Diploma in Textile Design and Manufacture

Qualification Guidance

England
[60000880]

Wales
[C0003014]

D2154-03
60000880

Issue 7.3
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About Us

At the Skills and Education SEG Awards (ABC)[1] we continually invest in high quality qualifications, assessments and services for our chosen sectors. As a UK leading sector specialist we continue to support employers and skills providers to enable individuals to achieve the skills and knowledge needed to raise professional standards across our sectors.

ABC has an on-line registration system to help customers register learners on its qualifications, units and exams. In addition it provides features to view exam results, invoices, mark sheets and other information about learners already registered.

The system is accessed via a web browser by connecting to our secure website using a username and password: https://secure.ABCawards.co.uk/ors/secure_login.asp

Sources of Additional Information

The ABC website www.ABCawards.co.uk provides access to a wide variety of information.

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Contents

This is a live document and as such will be updated when required. It is the responsibility of the approved centre to ensure the most up-to-date version of the Qualification Guide is in use. Any amendments will be published on our website and centres are encouraged to check this site regularly.

Qualification Structure and Content

ABC Awards Level 3 Diploma in Textile Design and Manufacture

Qualifications	
Level 3 Diploma in Textile Design and Manufacture	
Regulated	The qualification, identified above, is regulated by Ofqual and Qualifications Wales
Assessment	Internal assessment, internal and external moderation
Grading	Pass
Progression	Centres should be aware that reasonable Adjustments which may be permitted for assessment may in some instances limit a learner's progression into the sector. Centres must, therefore, inform learners of any limits their learning difficulty may impose on future progression
Operational Start Date	01/12/2010
Review Date	31/07/2023
Operational End Date	31/08/2022
Certification End Date	31/08/2025
ABC Sector	Fashion and Textiles
Ofqual SSA Sector	4.2 Manufacturing Technologies
Stakeholder support	UKFT
Contact	See ABC website for the Centre Support Officer responsible for this qualification

Level 3 Diploma in Textile Design and Manufacture

Rules of Combination: Learners must achieve a minimum of 37 credits at Level 3.
23 credits must come from the Mandatory units in Group A.
A minimum of 14 credits must come from the Optional Units in Group B

Unit	Level	Credit Value	GLH
Group A Mandatory Units			
Managing health and safety and employment rights and responsibilities within the textile industry [H/502/6299]	3	7	40
General textile technology [R/502/2264]	3	9	80
Managing quality standards – textile production [D/502/2266]	3	7	60
Group B Optional Units			
Fibre and yarn processing [H/502/2267]	3	7	60
Weft knitting [M/502/2269]	3	7	60
Warp knitting and lace [H/502/2270]	3	7	60
Weaving [K/502/2271]	3	7	60
Narrow fabric manufacture [M/502/2272]	3	7	60
Carpet manufacturing processes [A/502/2274]	3	7	60
Non woven fabric production [F/502/2275]	3	7	60
Textiles dyeing and printing [J/502/2276]	3	7	60
Textile finishing [R/502/2278]	3	7	60
Knitted fabric design [Y/502/2279]	3	7	60
Woven fabric design [R/502/2281]	3	7	60
Knitwear and hosiery design and make-up [Y/502/2282]	3	7	60
Textile testing [D/502/2283]	3	7	60
Managing own relationships within textile production [M/502/6399]	3	9	60
Leading teams within textile technologies [A/502/2291]	3	7	60
Aspects of design within the textile industry [Y/502/6400]	3	7	40
Professional practice / preparation for employment within the textile industry [D/502/6401]	3	7	40
Buying including import/export within the textile industry [H/502/6402]	3	9	60
Manage information for action within the textile industry [K/502/6403]	3	8	50
Planning for textile production [F/502/2292]	3	7	60

Numbers in box brackets indicate unit number
If learners achieve credits from units of the same title (or linked titles) at more than one level, they cannot count credits achieved from both units towards the credit target of a qualification

Qualification Purpose	B. Prepare for further learning or training and/or develop knowledge and/or skills in a subject area B1. Prepare for further learning or training, B2. Develop knowledge and/or skills in a subject area					
Entry Requirements	There are no specific entry requirements for this qualification.					
Age Range	**Pre 16**		**16 – 18**	✓	**19 +**	✓
Learning Aims Ref.	60000880					
Recommended GLH[2]	280					
Recommended TQT[3]	370					
Credit Value	37					
Type of Funding Available	See LARS (Learning Aim Rates Service)					
Qualification Fee / Unit Fee	See ABC web site for current fees and charges					
Additional Information	See ABC website for resources available for this qualification					

[2] See Glossary of Terms
[3] See Glossary of Terms

Qualification Overview

Introduction

This qualification has been written to provide the knowledge component of the Apparel, Footwear and Leather Pathways of the Advanced Fashion and Textiles Apprenticeship Framework.

Aims

The ABC Level 3 Diploma in Textile Design and Manufacture aims to provide the knowledge and understanding to support the new ABC Level 3 NVQ in Manufacturing Textile Products within the Apparel, Footwear and Leather Pathways of the Advanced Fashion and Textiles Apprenticeship Framework.

Target Group

This qualification is designed for those learners who are working within the Fashion and Textile industry producing apparel, footwear or leather goods.

ABC expects approved centres to recruit with integrity on the basis of a learner's ability to contribute to and successfully complete all the requirements of a unit(s) or the full qualification.

Progression Opportunities

Centres should be aware that Reasonable Adjustments which may be permitted for assessment may in some instances limit a learner's progression into the sector. Centres must, therefore, inform learners of any limits their learning difficulty may impose on future progression.

Tutor/Assessor Requirements

We require those involved in the assessment process to be suitably experienced and / or qualified. In general terms, this usually means that the assessor is knowledgeable of the subject / occupational area to a level above that which they are assessing.
Assessors should also be trained and qualified to assess or be working towards appropriate qualifications.

Language

These specifications and associated assessment materials are in English only.

Unit Details

Managing Health and Safety and Employment Rights and Responsibilities within the Textile Industry

Unit Reference	**H/502/6299**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**40**
Unit Summary	This unit will enable the learner to understand the legal requirements of employers and employees with regard to health and safety and employment law in the textile sector. The work will cover the implications of current legislation. This unit will also cover the legal aspects of employment in respect of the individual employee and form part of the induction process to the world of work. Assessment must be linked to the real work environment
Learning Outcomes (1 to 6) ***The learner will***	**Assessment Criteria (1.1 to 6.2)** ***The learner can***
1. Understand the health and safety requirements for the textile sector	**1.1** For a business in their chosen sector, state the health and safety requirements of employers, as required by current law **1.2** State the health and safety responsibilities of employees at each level within the business as required by law **1.3** Report how the business manages its obligations to meet current health and safety legislation
2. Be able to carry out a risk assessment within the textile	**2.1** Carry out a risk assessment • using appropriate documentation • identifying and recording hazards

sector	• ranking hazards identified • making recommendations to remove or minimize risk **2.2** Carry out an assessment for COSHH purposes • using appropriate documentation • making recommendations to remove or minimize risk
3. Understand the career progression routes available within the textile sector	**3.1** Describe • the structure and organisation of the business • the main job roles in the business • careers paths available
4. Know about their statutory rights in employment	**4.1** Describe their current statutory rights in relation to • Employment Law • Contracts of employment • Sick pay • Work Time regulations • Holiday entitlement • Maternal and Paternal leave • Data Protection
5. Know about the expectations and relevant procedures in the textile sector	**5.1** Describe the standards of acceptable behaviour in the business **5.2** Explain the consequences of not meeting that standard **5.3** Describe relevant procedures within the business to include • Performance management • Disciplinary procedures • Grievance procedures
6. Know how to obtain further information about employment issues	**6.1** Know where to access information and advice concerning employment **6.2** Describe the role of Trade Unions in the work place, supporting and advising employees

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) HS1 Health, safety and security at work -

Supporting Unit Information

H/502/6299 Managing health and safety and employment rights and responsibilities within the textile industry – Level 3

Indicative Content

Learning Outcome 1. Understand the health and safety requirements for the textile sector

Current health and safety legislation – Requirements of each piece of legislation and its effect as implemented within the business to include COSHH

The organisation's rules, codes, guidelines and standards relating to health, safety and security to include

- Equipment operating procedures
- Appropriate training/licence for mechanical handling, and general handling and lifting techniques
- Correct use and maintenance of any protective clothing and/or equipment
- Responsibilities of employers and employees at each level under the Health and Safety at Work Act, COSSH (Control of Substances Hazardous to Health) and compressed air procedures
- Environmental requirements
- Manufacturer's instructions

Learning Outcome 2. Be able to carry out a risk assessment within the textile sector

A risk assessment = careful examination of what, in the workplace, could cause harm to people, so that can identify if enough precautions have been taken or should more be done to prevent harm. Workers and others have a right to be protected from harm caused by a failure to take reasonable control measures.

Need to recognise and record hazards found and rank them accordingly. Decide who may be harmed and how. Evaluate the risk and decide on precaution. Record findings on appropriate documentation used, making recommendations to remove or minimise risk. Review assessment and update as necessary.

COSHH assessment concentrates on the hazards and risks from substances in the workplace.
Look around workplace to identify where there is potential for exposure to substances that might be hazardous to health. Need to know in what way the substances may be harmful. Identify types of jobs/tasks that could lead to exposure to these substances.

Use appropriate documentation and make recommendations to reduce risk.

Learning Outcome 3. Understand the career progression routes available within the textile sector

Understand Structure and Organisation of the business, job roles and career pathways.
Know where roles and responsibilities fit into overall picture within the business.
Know typical career paths and where to find out information
Could look at own knowledge and skills to identify areas for development to make progress

Learning Outcome 4. Know about their statutory rights in employment

Ensure that most current information is sought in regards to Employment law, Contract of Employment, Statutory rights.

Know diversity guidelines and when these may not apply within the business.
Working Time Regulations and holiday entitlements; rights and responsibilities that apply to maternal or parental leave.
Statutory sick pay and the organisation's procedures.
Data Protection Act and access to personal information.
Systems of payment

Learning Outcome 5. Know about the expectations and relevant procedures in the textile sector

Identify the standards of acceptable behaviour in the business. Consider why, and possible consequences to self, others, production/the business etc if not followed

Performance Management and Grievance procedures of the organisation

Learning Outcome 6. Know how to obtain further information about employment issues

The role of Trade Unions, the legal actions and training resources they can implement and advise on.

Procedures and documentation within the business and where this information may be found.

Teaching Strategies And Learning Activities

Centres should adopt a delivery approach which supports the development of their particular learners. The aims and aspirations of all learners,

including those with identified special needs, should be considered and appropriate support mechanisms put in place.

This qualification is designed to provide underpinning knowledge to the competence based units in the apprenticeship framework.

Any teaching activities need to relate to realistic work situations.

If learners are undergoing an induction programme within an organisation, this should be the teaching and learning vehicle which is used to deliver the unit.

Learners could be encouraged to discuss their experiences. This could involve exchanging information about different businesses if learners are in work situations.

Methods Of Assessment

This unit will be internally assessed, internally and externally moderated via a learner's portfolio and other related evidence, against the unit outcomes and assessment criteria.

Minimum requirements when assessing this unit
ABC expects that staff will be appropriately qualified to assess learners against the outcomes and criteria within the units. Generally teaching staff should be qualified and/or vocationally experienced to at least a level above that which they are teaching.

Evidence Of Achievement

All learners must complete a portfolio of evidence that shows achievement of all the relevant learning outcomes and assessment criteria

Centres will need to devise assessment tasks which should be practical wherever possible. These tasks could be put together into one overarching assignment for the unit, or be a series of smaller separate tasks.

Evidence presented is not prescribed for each learning outcome. It could typically include

- Product evidence
- Observation reports
- Oral / written questions and answers
- Reports / notes
- Worksheets / workbooks

- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
- Interview / discussion

This is not an exhaustive list and learners should be encouraged to develop the most appropriate evidence to demonstrate their achievement of the learning outcomes and assessment criteria.

All evidence must be clearly signposted and made available for the external moderator upon request.

For more information on assessment and evidence collection, please refer to the ABC Awards web site.

Additional Information

All learners must complete a Declaration of Authenticity and include it in their portfolio. The Declaration of Authenticity can be found on the ABC web site www.abcawards.co.uk under Fashion and Textiles.

General Textile Technology

Unit Reference	**R/502/2264**
Level	**3**
Credit Value	**9**
Guided Learning Hours	**80**
Unit Summary	The aim of this unit is to introduce learners to the textile industry and develop a broad based knowledge of the technical aspects of the major textile manufacturing processes. Assessment must be linked to the real work environment
Learning Outcomes (1 to 9) ***The learner will***	**Assessment Criteria (1.1 to 9.1)** ***The learner can***
1. Know about global textile production and trends	**1.1** Identify the yarns and fabrics produced in the following areas • North America • South America • Europe • Asia • Africa • Pacific rim **1.2** Identify the main types of traditional textile production in the UK and the main regional centres for each type of production.
2. Know about fibre types and their properties	**2.1** Identify the major types of natural and manufactured fibres **2.2** Identify the major fibre properties **2.3** For each fibre type identified in 2.1, analyse its physical and chemical properties and the factors affecting these

3. Know about the general principles and production processes of fibre and yarn manufacture	**3.1** Identify the production methods used to produce natural and manufactured fibres **3.2** Explain the general principles of staple fibre yarn manufacture **3.3** Describe the manufacture of manufactured fibre yarns **3.4** Explain yarn count numbering **3.5** Explain yarn twist
4. Know about the post-yarn spinning process	**4.1** Describe the following post-yarn spinning processes • yarn winding • yarn twisting (doubling or plying) • fancy yarn manufacture **4.2** Explain how yarns are prepared for fabric production
5. Know about the different processes of fabric production used in the textile industry	**5.1** Define and explain • woven fabric structures • weaving loom motions **5.2** Define and explain weft knitting **5.3** Define and explain warp knitting **5.4** Define and explain the principles of lace manufacture **5.5** Define and explain narrow fabrics • Raschel-crochet • weaving • braided **5.6** Identify the manufacturing systems used to produce non woven structures and explain their end uses **5.7** Define and explain carpet production • woven - Wilton and Axminster

	• tufted • bonded • knitted
6. Know about finishing and dyeing processes	**6.1** Define and explain the following finishing processes for textiles • wet finishing • dry finishing • chemical / functional finishes **6.2** Define and explain the following areas of dimensional stability • methods used for setting fabrics • dimensional stability **6.3** Define and explain the following areas of textile colouration • dyehouse services • dyeing techniques • dyeing machinery • printing
7. Know about garment production	**7.1** Classify garment production • production sequencing and make-up
8. Know about technical textiles	**8.1** Identify the major technical textiles and explain their uses
9. Know about basic production planning methods	**9.1** Identify the areas where to ensure effective production planning • customer liaison • planning systems
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEXT 27, 31, 32, 33, 34	

Supporting Unit Information

R/502/2264 General textile technology – Level 3

Indicative Content

Learning Outcome 1. Know about global textile production and trends

Yarns and fabrics produced in North America, South America, Europe, Asia, Africa, Pacific rim

Main types of textile production in the UK and main regional centres for each type of production

- worsted
- Woollen
- Cotton
- Knit

Learning Outcome 2. Know about fibre types and their properties

Natural fibres

- Natural protein - Wool, Speciality hairs, Silk
- Natural cellulose - Cotton, Bast fibres

Manufactured fibres

- Regenerated - Viscose, Lyocell and other fibres regenerated from natural polymer sources e.g. soya, corn, bamboo
- Modified Regenerated - Cellulose acetate and triacetate

Manufactured synthetic fibres

- Polyester
- Polyamide
- Acrylic
- Modacrylic
- Polypropylene
- Elastane and Performance Fibres e.g. Kevlar, Nomex and carbon

Compare fibre properties, for example

- Fibre fineness
- Fibre length and continuous filament
- Tensile strength
- Elongation and regain

Fibre morphology, surface structure, molecular structure and chemical structure for each of the fibres in **2.1**.

Learning Outcome 3. Know about the general principles and

production processes of fibre and yarn manufacture

Natural fibres as listed in **2.1**

- Origins / major production areas e.g. major wool and cotton producing countries
- Production methods e.g. cotton growing, sheep rearing and shearing

Manufactured fibres as in **2.1**

- Polymerisation
- Extrusion (wet, dry, melt)
- Spinnerets / fibre cross section
- Drawing / molecular orientation
- Crimp insertion
- Tow cutting to convert continuous filament into staple fibre
- Microfibres
- Bicomponent fibres

Short fibre yarn spinning system e.g. cotton long fibre yarn spinning systems

- Worsted
- Woollen
- Semi worsted
- Flax
- Fibre blending and opening
- Carding
- Combing
- Drawing
- Spinning (ring and open end)

Molecular orientation e.g. POY, FOY

- Texturing
- Stuffer box
- False twist
- KDK and alternatives
- Tow to top converting
- Tape yarns

Yarn count numbering systems

- Direct – Tex, Denier
- Indirect – Metric, cotton, woollen (YSW), worsted

Tarn twist

- S and Z
- Twist factor

Learning Outcome 4. Know about the post-yarn spinning process

Yarn winding / fault clearing

Yarn doubling / twisting / ring twisting and 2 for 1 twisting

- Fancy yarns
- Loop
- Snarl
- Knop
- Slub
- Chenille

Preparations for yarn production
- Warping (direct and sectional)
- Looming
- Sizing
- Waxing and dressing

Learning Outcome 5. Know about the different processes of fabric production used in the textile industry

Weaving

Primary motions
- Shedding – cam, dobby, jacquard
- Picking – shuttle, projectile, rapier, air / water jet

Secondary motions
- Let off
- Take up

Auxiliary motions (including)
- Warp stop
- Weft break

Woven constructions (including)
- Plain
- Twill
- Satin / Sateen

Weft knitting

Bearded and latch needle
- plain
- rib
- purl
- interlock fabrics

Fabric types - single jersey, double jersey
End uses - underwear, outerwear, sports/leisurewear, knitwear, hosiery

Warp knitting
- bearded
- latch
- compound needle machines

- single needle bar
- single guide bar - open lap, closed lap

Raschel nets
End uses - hair nets, lace trims

Tricot – plain knit
End uses - high performance clothes, automotive

Principles of lace manufacture
Leavers (Lace)
Fabric type - heavy figured lace
End uses - wedding gowns, lingerie

Narrow fabrics
Raschel-crochet
- single guide bar
- multi guide bar

End uses – furnishing / upholstery trims, uniform trims

Weaving
- plain weave – cam / dobby / Jacquard

End uses – tapes, webbings, labels, elastics

Braided
- flat
- circular

End uses – elastics, cords, shoelaces

Non wovens
- Fibre web / batt production
- Air laid
- Wet laid
- Carded

Bonding systems
- Felts
- Needle punching
- Hydro-entanglement
- Stitch bonding
- Thermal bonding
- Adhesion bonding
- Spun bonding
- Melt blowing

End uses (including) – Apparel, Household, Technical textiles

Carpets
- Woven
- Wilton
- Face to face
- Gripper Axminster
- Spool Axminster
- Gripper spool Axminster
- Tufting including Patterning
- Knitted carpets
- Bonded carpets
- Carpet structures and performance
- Domestic / contract types

Learning Outcome 6. Know about finishing and dyeing processes

Finishing processes

Preparatory processes for textiles
- Scouring - cleaning, impurities, processing aids, detergents
- Bleaching - types of bleach related to fibres, methods used, FBA'S (Fluorescent Brightening Agents)
- Chemical treatments - shrink resist treatment wool, mercerisation of cotton, water proofing, flame proofing

Handle and surface modification
- Softeners/ lubrication – methods used
- Mechanical finishing – raising, brushing, singeing
- Cropping / shearing – sueding
- Boarding

Dimensional stability
- Methods used for setting fabrics – tenter / stenter, calendaring, compacting
- Reasons for finishing fabrics – appearance, curl, batching, weight per unit length
- Dimensional stability - setting to specification

Textile Colouration
- Organisation of the industry - when to dye, who to dye for
- Dyehouse services – water, steam, effluent
- Dyeing terms - methods of application, types of dyes for which fibres
- Dyeing machinery – fibre, yarn, fabric, articles
- Printing – rotary, padding, screen, transfer- pastes

Learning Outcome 7. Know about garment production

Garment production (including)
- production sequencing and make-up
- clothing, active sportswear

Learning Outcome 8. Know about technical textiles
Geotextiles - civil engineering products, reinforcement products, membrane products
Medical textiles - tapes, gauze, bandages, filters
Automotive or composite textiles - buildings, aerospace, boat products
Smart - Sports performance, electronic apparel

Learning Outcome 9. Know about basic production planning methods
Customer communication - compiling and recording new orders, specifications
Systems - work in progress, stock control, work study, method study
Procedures to support production - listing products, delivery dates, call off dates
Areas of prioritisation - production schedules, changed priorities
Recording and reporting - progress records, stock reports

Teaching Strategies And Learning Activities

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Any teaching activities need to relate to realistic work situations.

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Methods Of Assessment

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Minimum requirements when assessing this unit

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Evidence Of Achievement

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Evidence presented is not prescribed for each learning outcome. It could typically include

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- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
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All evidence must be clearly signposted and made available for the external moderator upon request.

For more information on assessment and evidence collection, please refer to the ABC Awards web site.

Additional Information

All learners must complete a Declaration of Authenticity and include it in their portfolio. The Declaration of Authenticity can be found on the ABC web site www.abcawards.co.uk under Fashion and Textiles.

Managing Quality Standards - Textile Production

Unit Reference	**D/502/2266**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	This unit will enable the learner to understand the functions that go into the quality control process. The work will cover the expected quality requirements, common causes of non-standard or reject work and appropriate remedial action that may be taken. Company procedures for quality monitoring and recording information and dealing with rejects. Also covered will be the importance of suitable ways of communicating with other employees over issues of quality. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.4)** ***The learner can***
1. Understand the requirements of quality control systems	**1.1** Explain quality management systems and relevant procedures **1.2** Interpret and apply relevant Quality Standards **1.3** Explain a company's methods of monitoring product or process quality and taking corrective action
2. Know about quality testing	**2.1** Explain the reasons for performing quality tests **2.2** Identify standard test methods
3. Know how to	**3.1** Calibrate equipment for testing

perform quality tests	**3.2** Select appropriate textile products, prepare samples and perform the following tests safely • fibre ID and regain tests • fibre diameter and fibre length tests • yarn tests – count, twist and strength • fabric tests – fabric analysis • tensile, pilling, abrasion, crease resistance and colour fastness tests **3.3** Identify test methods for flammability **3.4** Record and analyse test results
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 27, 28, 35	

Supporting Unit Information

D/502/2266 Managing quality standards - textile production – Level 3

Indicative Content

Learning Outcome 1. Understand the requirements of quality control systems
Areas of responsibility, examples of documentation, recording and analyzing information as a way of identifying problem areas

Learning Outcome 2. Know about quality testing
To include
- Process Control
- Product testing
- Research and Design

Specifications
Fitness for purpose

Learning Outcome 3. Know how to perform quality tests
Comparison and traceability to National Standards

Conditioning
Fibre microscopy, Burning behaviour, staining and solubility
Fibre Fineness - Protection microscope and airflow
Fibre length - WIRA single fibre and comb sorter
Yarn count, Twist (turns per metre), Yarn Tensile strength and elongation
Fibre analysis and notation to determine manufacturing details and physical structure
- Woven (weave, ends/picks per cm, G/m²)
- Knitted (structure, Wales/courses per cm, G/m²)
- Non woven (structure, G/m²)

Fabric tensile strength and elongation
Fabric abrasion
Fabric pilling
Crease resistance
Colour fastness to washing, rubbing and light
Tests for apparel and furnishing fabrics

Control charts
Statistical analysis including
- Standard deviation
- Coefficient of variation

Teaching Strategies And Learning Activities

Centres should adopt a delivery approach which supports the development of their particular learners. The aims and aspirations of all learners, including those with identified special needs, should be considered and appropriate support mechanisms put in place.

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If learners are undergoing an induction programme within an organisation, this should be the teaching and learning vehicle which is used to deliver the unit.

Learners could be encouraged to discuss their experiences. This could involve exchanging information about different businesses if learners are in work situations.

Methods Of Assessment

This unit will be internally assessed, internally and externally moderated via a learner's portfolio and other related evidence, against the unit outcomes and assessment criteria.

Minimum requirements when assessing this unit
ABC expects that staff will be appropriately qualified to assess learners against the outcomes and criteria within the units. Generally teaching staff should be qualified and/or vocationally experienced to at least a level above that which they are teaching.

Evidence Of Achievement

All learners must complete a portfolio of evidence that shows achievement of all the relevant learning outcomes and assessment criteria

Centres will need to devise assessment tasks which should be practical wherever possible. These tasks could be put together into one overarching assignment for the unit, or be a series of smaller separate tasks.

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- Observation reports
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- Reports / notes
- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
- Interview / discussion

This is not an exhaustive list and learners should be encouraged to develop the most appropriate evidence to demonstrate their achievement of the learning outcomes and assessment criteria.

To achieve the learning outcomes, the learner must demonstrate the ability to satisfactorily
complete the following

- A quality specification for a product within the learner's chosen sector.
- For the same product as above, an illustrated portfolio describing defects which may occur at different stages in its production, and how they may be caused. If the defect may be rectified, if so how, or will the work have to be rejected.
- A report on a company's methods of implementing quality control, to include areas of responsibility and examples of documentation.

All evidence must be clearly signposted and made available for the external moderator upon request.

For more information on assessment and evidence collection, please refer to the ABC Awards web site.

Additional Information

All learners must complete a Declaration of Authenticity and include it in their portfolio. The Declaration of Authenticity can be found on the ABC web site www.abcawards.co.uk under Fashion and Textiles.

Fibre and Yarn Processing

Unit Reference	**H/502/2267**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of the techniques used in all stages of fibre preparation and methods of yarn production. Assessment must be linked to the real work environment
Learning Outcomes (1 to 5) ***The learner will***	**Assessment Criteria (1.1 to 5.5)** ***The learner can***
1. Understand the properties of a textile yarn	**1.1** Classify natural and manufactured textile yarn types, to include • singles • folded • fancy yarns • continuous filament **1.2** Identify the main characteristics of natural and manufactured fibres
2. Know about yarn production systems	**2.1** Explain the production systems for the staple fibre yarns listed below to include preliminary processes, cleaning of fibres, blending, carding, combing, preparation for spinning • cotton • worsted • semi-worsted • flax and jute • silk • speciality hair fibres

	2.2 Describe fibre and yarn production for major manufactured fibres • regenerated • synthetic **2.3** Explain the reasons for blending fibres of the same type and those of different origin and type
3. Be able to identify and analyse faults	**3.1** Describe and explain fault finding principles **3.2** Describe sample analysis techniques used in the industry **3.3** Undertake tests on natural and manufactured fibre yarns for • strength • twist • count **3.4** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy
4. Understand the electrical and pneumatic requirements of machinery used in textile production	**4.1** Identify machine components and explain their functions
5. Understand how to maintain machines used in textile production	**5.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **5.2** Explain the planned maintenance processes for machinery **5.3** Analyse the advantages and disadvantages of these processes **5.4** Describe and explain machine fault finding

	principles and techniques **5.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

H/502/2267 Fibre and yarn processing – Level 3

Indicative Content

Learning Outcome 1. Understand the properties of a textile yarn

- Staple fibre yarns - worsted, woollen, semi-worsted, flax, cotton
- Filament yarns - natural - silk
- Manufactured - flat filament, textured, tape
- Single yarns
- Folded yarns
- Fancy yarns

Identify the main physical and structural fibre properties of the natural and manufactured fibres as in unit 1, 2.1 - length, fineness, crimp, tenacity, elongation, cross sectional shape and surface structure.

Learning Outcome 2. Know about yarn production systems

Describe how staple fibre yarns are manufactured by these systems

- Long staple fibre - worsted, woollen, semi-worsted, flax
- Short staple fibre - cotton
- Fibre preparation - wool scouring
- Chemical treatments - carbonising, chlorination, bleaching, mothproofing, mildew proofing
- Removal of impurities in natural fibres - grease, suint, wax, lignin, vegetable matter, trash, natural waste by scouring, washing, bleaching and during carding, combing
- Fibre blending - opening, cleaning, mixing, fibre lubrication
- Carding - principles and actions of roller cards / flat cards
- Parts and functions of carding machines - hoppers, card clothing, working width, single/double/multiple cylinders, working power, intermediate feeds, delivery systems, can delivery, condenser, cleaning fettling, grinding
- Combing - principles, preparation for combing, rectilinear comb, top finishing
- Drawing - Principles of different drawing, systems, drafting and doubling to give alignment and regularity, auto-regulating devices, fibre control in drafting, ratch, floating fibres, sliver reversal
- Spinning - principles, drafting systems, twist insertion systems, false twist. Ring spinning, OE / rotor spinning, friction, wrap and air jet spinning. Temperature and humidity control
- Post spinning processes – twisting / folding / doubling / plying
    - principles
    - ring twisting
    - down twisting

- up twisting
- two for one twisting
- two stage twisting
- fancy yarns
- loop
- boucle
- gimp
- snarl
- knop
- marl
- slub
- nep
- chenille

Describe fibre and yarn production of the main manufactured fibres (as unit 1, 2.1)
Polymer types, polymerisation, extrusion (wet, dry, melt), drawing, crimp insertion, tow cutting (staple fibre), flat filament production, molecular orientation, poy, foy, textured yarn production (false twist / heat set), knit de knit (KDK), airjet, stuffer box.

Tape yarns (production from film)
Tow to top conversion principles

Explain the reasons for blending fibres
Fibre / product profiling, performance requirements, colour blending, commercial blending.

Explain the reasons for blending fibres of
- the same type – strength, appearance, performance
- different origin and type – strength, appearance, elasticity, fluidity, performance

Learning Outcome 3. Be able to identify and analyse faults
Fault finding principles
- Type and name of fault - mixed yarn, short term variation, long term variation, neps, slubs, contamination
- Appearance of fault
- Cause of fault
- Effect of fault
- Corrective action
- Preventative action
- Fault records

Sample analysis techniques
- Fibre type - use of microscope, burning tests, solubility tests, staining tests

- Types of equipment - magnifying/piece glass, scissors, dissecting needles, ruler, laboratory balances, equipment for weighing and measuring

Yarn analysis
Blackboard examination, regularity testing, count testing, twist testing, hairiness testing, tensile/elongation testing.

Test natural and manufactured yarn types to compare their structure and properties
Appearance, structure, evenness, regularity, tensile strength, elongation, twist (turns per metre), twist direction, twist factor.
Count, count variations.

Examine and test natural manufactured yarn types to explain causes and effects of
Count variation, periodic variation, neps, slubs, weak yarns, snarling.
- Yarn type and count - natural and man made yarns, singles or folded, long/ short staple and continuous filament (CF), fancy yarns, estimated yarn count, calculations for equivalent counts
- Type of spinning system – ring, mule, open end/friction, repco, siro, wrap, airjet

Learning Outcome 4. Understand the electrical and pneumatic requirements of machinery used in textile production
Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 5. Understand how to maintain machines used in textile production
Type of lubricants and tools
Lubricants
- synthetic
- organic
- mineral
- application systems - mechanical, compressed air, drip feed, recycling

systems

Tools and their functions
- types of tools
- functions - dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Machine fault finding principles and techniques
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, to include
- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

Teaching Strategies And Learning Activities

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This qualification is designed to provide underpinning knowledge to the competence based units in the apprenticeship framework.

Any teaching activities need to relate to realistic work situations.

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this should be the teaching and learning vehicle which is used to deliver the unit.

Learners could be encouraged to discuss their experiences. This could involve exchanging information about different businesses if learners are in work situations.

Methods Of Assessment

This unit will be internally assessed, internally and externally moderated via a learner's portfolio and other related evidence, against the unit outcomes and assessment criteria.

Minimum requirements when assessing this unit
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Evidence Of Achievement

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Evidence presented is not prescribed for each learning outcome. It could typically include

- Product evidence
- Observation reports
- Oral / written questions and answers
- Reports / notes
- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
- Interview / discussion

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Additional Information

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Weft Knitting

Unit Reference	**M/502/2269**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of weft knitting. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes for weft knitting production	**1.1** Explain the manufacturing process and production cycle to include • preparation of yarn for knitting • basic knitting and control elements • basic operating procedures • basic knitting systems • variations to basic knitting **1.2** Identify and explain the production sequences from yarn to finished product for • fine gauge hosiery • coarse gauge hosiery • circular knitwear • flat bed knitwear **1.3** Explain the yarn path from yarn supply to fabric take off for • double jersey fabric machines • fine gauge hosiery machines • flat bed knitwear machines **1.4** Explain factors influencing handling characteristics of materials during processing

2. Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles **2.2** Describe sample analysis techniques used in the industry **2.3** Undertake tests on at least 2 natural and 2 manufactured yarns for • strength • twist • count **2.4** Analyse two weft knitted structures and for each • produce fabric notations • measure fabric parameters • carry out calculations **2.5** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy
3. Understand the electrical and pneumatic requirements of machinery used in weft knitting	**3.1** Identify machine components and explain their functions
4. Understand how to maintain weft knitting machines	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes **4.4** Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault

	analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

M/502/2269 Weft knitting – Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes for weft knitting production

Preparation of yarn for knitting – winding, dressing
Basic knitting and control elements – needles, sinkers, jacks
Basic operating procedures - set up machine, re-start machine, thread up machine, adjust machine, set stop motions, replace guards, change needles, sinkers, jacks

Basic knitting systems

- plain or single jersey knitting – knitting action and element control
- rib knitting – knitting action and element control
- purl knitting – knitting action and element control
- interlock knitting – knitting action and element control

Variations to basic knitting

- held stitch knitting – knitting action and element control
- tuck stitch knitting – knitting action and element control
- fancy fabrics - knitting action and element control
    - patterns
    - plating
    - loop transfer
    - terry
    - inlay

Product Specification

- Design Specification, Customer needs, sample specification
- Production Specification; yarn, knitting requirements, dyeing and finishing requirements
- Production Resource Planning
    - yarn types and availability
    - machine types and availability
    - machine change overs and timings
    - calculation of yarn requirements, production calculations and costings

Machine capabilities and processes

Fine gauge hosiery - single cylinder – stockings/tights

- plain
- tuck
- inlay fabrics

Coarse gauge hosiery - double and single cylinder – half hose/socks
- plain
- rib
- purl
- patterned
- terry
- motif

Circular knitwear – rib / purl
- links / links
- jacquards

Flat knitwear, V-bed wear and whole garment - rib / purl
- links / links
- jacquards
- intarsia
- cable
- racked ribs

Straight bar knitwear
- plain
- open work

Special purpose and Medical textiles
- support garments
- bandages

Production process – from yarn to fabric
Double jersey fabric – ribs / interlock
- variations - interlock, single pique, double pique, Ponte di roma, Swiss pique, French pique
- patterns - two colour, three colour, four colour, backings

Fine gauge hosiery - single cylinder – stockings / tights
- plain
- tuck
- inlay fabrics

Flat knitwear and V-bed wear – rib / purl
- links / links
- jacquards
- intarsia
- cable
- racked ribs

Factors influencing handling characteristics of materials during processing

- fibre content
- types of yarn
- types and quality of fabric
- types of machine
- temperature
- humidity

Learning Outcome 2. Be able to identify and analyse faults

Fault finding principles

- type and name of fault - mixed yarn, short term variation, long term variation, neps, slubs, contamination
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault records

Sample analysis

Fibre type - use of microscope, burning, solubility tests, staining tests

Yarn type and count - natural and man-made yarns, singles or folded, long / short staple and Continuous Filament (CF), fancy yarns, estimate yarn counts or complete count test, calculations for equivalent counts

Type of fabric - basic fabric, plain, rib, purl, interlock

Variations to basic fabric – held, tuck, 2 and 3 coloured patterned, jacquard backings, plated, transfer, interlock, variations, inlay

Measure fabric quality - courses per cm, wales per cm, stitch density (SD), course length, yarn count

Type of knitting system - machine details, machine gauging systems, yarn count/machine gauge relationships

Types of equipment - magnifying/piece glass, scissors, dissecting needles, ruler, laboratory balances and equipment for weighing and measuring

Carry out tests on 2 natural and 2 manufactured yarns. Know how results would be analysed and presented.

- strength
- twist
- count

Carry out analysis of two weft knitted structures.

- produce Fabric Notations

- measure Fabric parameters
- carry out calculations

Identify faults and explain reasons for yarn faults
- yarn type and count - natural and man made yarns, singles or folded, long/short staple and continuous filament (CF), fancy yarns, estimated yarn count, calculations for equivalent counts
- natural, manufactured and blended fibres
- type of spinning system – ring, mule, open end/friction, repco, siro, wrap, airjet

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in weft knitting

Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain weft knitting machines

Type and use of lubricants and tools

Lubricants
- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions
- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages

- disadvantages

Machine fault finding principles and techniques
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including
- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

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Additional Information

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Warp Knitting and Lace

Unit Reference	**H/502/2270**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of warp knitting and lace production. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes of warp knitting production and lace manufacture	**1.1** Explain the manufacturing process and production cycle to include • preparation of yarn for knitting • basic knitting and control elements • basic operating skills • basic production systems • variations to basic knitting **1.2** Identify and explain the production sequences from yarn to finished product for • tricot warp knitting • Raschel warp knitting • Leavers lace **1.3** Explain the yarn path from yarn supply to fabric take off for • tricot warp knitting machines • Raschel warp knitting machines • compound warp knitting machines • leavers lace machines **1.4** Explain factors influencing handling characteristics of materials during processing

	1.5 Describe how production resource requirements are calculated
2. Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles **2.2** Describe sample analysis techniques used in the industry **2.3** Undertake tests on at least 2 natural and 2 manufactured yarns for • strength • twist • count **2.4** Analyse two weft knitted structures and for each • produce fabric notations • measure fabric parameters • carry out calculations **2.5** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy
3. Understand the electrical and pneumatic requirements of machinery used in warp knitting and lace	**3.1** Identify machine components and explain their functions
4. Understand how to maintain warp knitting machines	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes

	4.4 Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

H/502/2270 Warp knitting and lace – Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes of warp knitting production and lace manufacture
Manufacturing process and production cycle, to include
Preparation of yarn for knitting - warping/beaming, creels and bobbins, yarn dressing

Basic knitting and control elements – needles, sinkers, guides, jacks

Basic operating skills - set up machine, re-start machine, thread up machine, adjust machine, set stop motions, replace guards, change knitting elements, tying in, knotting

Basic production systems
- single bar
- full set threading
- bearded needle knitting – knitting action and guide bar movements
- latch needle knitting – knitting action and guide bar movements
- compound needle knitting – knitting action and guide bar movements
- Leavers lace production – bobbin actions and movements

Variations to basic knitting
- single needle bar – open and closed lap – guide bar arrangements
- double needle bar – open and closed lap – guide bar arrangements
- part set threading – open and closed lap – guide bar arrangements
- fall plate – open and closed lap – guide bar arrangements
- lace production – stitch structure – bobbin arrangements

Product Specification
- design Specification, customer needs, sample specification
- production specification; yarn, knitting requirements, dyeing and finishing requirements
- production resource planning
    - yarn types and availability
    - machine types and availability
    - machine change overs and timings
    - calculation of yarn requirements, production calculations and costings

Production Sequences – Yarn to finished product
Yarn Path to Fabric Take off

Both 1.2 and 1.3 for each of the following

- Tricot - lapping systems, 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, plain, locknit fabrics, atlas lapping Milanese fabrics, multi guide bar fabrics
- Raschel - lapping systems , 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, raschel lace fabrics, atlas lapping Milanese fabrics, fall plate fabrics, multi guide bar fabrics, Jacquard fabrics
- Compound machines - lapping systems, 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, atlas lapping Milanese fabrics
- Leavers lace – nets, grounds

Factors influencing handling characteristics of materials during processing

- fibre content
- types of yarn
- types and quality of fabric
- types of machine
- temperature
- humidity

Calculation of production resource requirements

- yarn type and availability
- machine type and availability
- machine changing and timings
- amount of yarn per unit area
- mass per unit area
- production efficiency calculations
- labour costs

Learning Outcome 2. Be able to identify and analyse faults

Fault finding principles

- Type and name of fault
- Appearance of fault
- Cause of fault
- Effect of fault
- Corrective action
- Preventative action
- Fault records

Sample analysis techniques

Fibre type - use of microscope, burning tests, solubility tests, staining tests

Yarn type and count - natural and man-made yarns, singles or folded, long/ short staple and Continuous Filament (CF), fancy yarns, estimate yarn count or complete a count test, calculations for equivalent counts

Type of fabric - basic fabric, plain, open and closed lap, full and part set

threading, locknit, nets, grounds

Variations to basic fabric - different lapping actions, velvet, atlas, pile, lace, patterned, Jacquards, inlay

Measure fabric quality - courses per cm, wales per cm, stitch density (SD), course length, sett, yarn count

Type of knitting system - machine details, gauge

Types of equipment - magnifying/piece glass, scissors, dissecting needles, ruler, laboratory balances, equipment for weighing and measuring

Carry out tests on 2 natural and 2 manufactured yarns. Know how results would be analysed and presented
- strength
- twist
- count

Carry out analysis of two warp knitted structures
- produce Fabric Notations
- measure Fabric parameters
- carry out calculations

Identify faults and explain reasons for yarn faults
- yarn type and count - natural and man made yarns, singles or folded, long/short staple and continuous filament (CF), fancy yarns, estimated yarn count, calculations for equivalent counts
- natural, manufactured and blended fibres

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in warp knitting and lace

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain warp knitting

machines

Type and use of lubricants and tools

Lubricants

- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions

- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance

- procedures
- recording systems

Compare different approaches to maintenance

- advantages
- disadvantages

Machine fault finding principles and techniques

- type and name of fault
- appearance of fault

- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including

- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

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Weaving

Unit Reference	**K/502/2271**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to enable learners to expand their knowledge about weaving systems and processes. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes of weaving	**1.1** Explain the manufacturing process and production cycle of woven fabrics to include • preparation of yarn for weaving • setting up to specification • basic operating skills • basic production systems • variations to basic weaving **1.2** Explain machine capabilities and their characteristics **1.3** Describe the compatibility of machines and materials **1.4** Explain factors influencing handling characteristics of materials during production **1.5** Describe how production resource requirements are calculated
2. Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles

	2.2 Describe sample analysis techniques used in the industry **2.3** Undertake tests on natural and manufactured fibre yarns for • strength • twist • count **2.4** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy **2.5** Analyse two woven fabrics and for each • produce fabric notations • measure fabric parameters • carry out calculations
3. Understand the electrical and pneumatic requirements of machinery used in weaving	**3.1** Identify machine components and explain their functions
4. Understand how to maintain weaving machines	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes **4.4** Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010)
TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

K/502/2271 Weaving – Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes of weaving

The manufacturing processes and production cycle of woven fabrics

Raw material supply

- warp beams for man-made fibres
- warp beams for natural fibres
- weft delivery – cones, bobbins, spools

Setting up to specification - warp let-off devices, friction control, automatic control, weft tension equipment, mechanical, electrical, maintenance

Running of machines - optimum speed for highest efficiency, compatibility with product specification

Shed set up

Different types of shed - V shed, front/rear shed, open, semi-open, closed sheds, healds, shafts, shuttles, rapiers, needles, jets, Jacquard hooks, harness ties / mountings

Mechanisms for setting up the shed

- cam / tappets
- dobbies - control chains, pulleys, treadle devices
- shuttles
- shuttleless machines
- Jacquards - types and sizes of hooks, harness mountings

Principles of machine adjustment - early and late timing, allowable tolerances

Connection between shed mechanisms and paper designs - reading of point / graph / squared paper, computer design, transfer to cams / tappets, dobbies, control chains, Jacquard cards, electronic devices

Machine capabilities and their characteristics

Machine capacity

- healds / shafts
- Jacquard hooks
- harness ties

Speeds of machines compatible with efficiency

Design
- cams / tappets
- control chains
- drafts / drawing in / entering
- healds / shafts
- Jacquard hooks and harness ties

Weft insertion / picking
- weft insertion – shuttles, rapiers, projectiles, nozzles (air/water), multi-coloured weft insertion, multi phase weaving
- construction of machine frame - going part, reed

Woven fabric take-off
Woven fabric take-off mechanisms

Construction and purpose of the following
- take off rollers and coverings
- take-off gears
- batching, rolling up and sorting
- adjusting and changing fabric density
- control and maintenance of take-off equipment

Machine and material compatibilities
Shaft / healds capacity of machine
Reed types - spring soldered, pitch baulk, dents per unit space
Jacquard hooks and harness ties

Types and counts of yarn – natural and man made fibres
- compatibility with machine type
- compatibility with machine speed

Factors influencing handling characteristics of materials during production
- fibre content
- type of yarn
- types and quality of fabric
- types of machine
- temperature
- humidity

Calculating production resource requirements
- yarn type and availability
- machine type and availability
- machine changing and timings
- amount of yarn per unit area
- mass per unit area
- production efficiency calculations
- labour costs

Learning Outcome 2. Be able to identify and analyse faults

Fault finding principles

- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault records

Sample analysis techniques

Fibre type

Yarn type and count - natural and man made yarns, singles and folded, long/ short staple and continuous filament (CF), fancy yarns, estimate yarn counts or complete count test, calculations for equivalent counts

Type of fabric - plain and derivatives, twill and derivatives, satin / sateen and derivatives

Type of weaving system - cam, dobby, Jacquard

Types of equipment - magnifying / piece glass, scissors, dissecting needles, ruler, laboratory balances and equipment for weighing and measuring

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in weaving

Electrical and pneumatic requirements

Control systems

Motor drives

Machine components and their functions

- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain weaving machines

Type and use of lubricants and tools

Lubricants

- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions
- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Machine fault finding principles and techniques
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault

- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including
- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

Teaching Strategies And Learning Activities

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Methods Of Assessment

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- Reports / notes
- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)

- Photographic evidence
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- Interview/discussion

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Additional Information

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Narrow Fabric Manufacture

Unit Reference	**M/502/2272**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding about narrow fabric manufacture. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes involved in narrow fabric manufacture	**1.1** Identify and explain the production sequences from yarn to finished product for • woven narrow fabric • Raschel-crochet knitted narrow fabric • braided narrow fabric **1.2** Explain machine capabilities and their characteristics **1.3** Describe the compatibility of machines and materials **1.4** Explain factors influencing handling characteristics of materials during production **1.5** Describe how production resource requirements are calculated
2 Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles **2.2** Describe sample analysis techniques used in the industry

	2.3 Undertake tests on at least two natural and two manufactured yarns for • strength • twist • count **2.4** Analyse two narrow fabrics and for each • produce fabric notations • measure fabric parameters • carry out calculations **2.5** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy
3. Understand the electrical and pneumatic requirements of machinery used in the production of narrow fabrics	**3.1** Identify machine components and explain their functions
4. Understand how to maintain machines used to produce narrow fabrics	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes **4.4** Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault analysis safely
Mapping to National Occupational Standards	

This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

M/502/2272 Narrow fabric manufacture - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes involved in narrow fabric manufacture

The manufacturing processes and production cycle

Raw material supply

- warp beams - man-made fibres, elastic / elastomerics, natural fibres
- weft insertion – cones, bobbins, spools

Set up to specification - warp let-off devices, hand / friction controlled, automatic controls, thread tension equipment, mechanical, electrical, maintenance

Running of machines - optimum speed for highest efficiency, compatibility with product specification

Shed set up

Different types of shed - V shed, front / rear shed, open, semi-open, closed sheds, healds, shafts, shuttles, rapiers, needles, jets, Jacquard hooks, harness ties / mountings,

Mechanisms for setting up the shed

- cam / tappets
- dobbies - control chains, pulleys, treadle devices
- shuttles
- shuttleless machines
- Jacquards - types and sizes of hooks, harness mountings

Principles of machine adjustment - early and late timing, allowable tolerances

Connection between shed mechanisms and paper designs - reading of point /graph / squared paper, computer design, transfer to cams/tappets, dobbies, control chains, Jacquard cards, electronic devices

Woven fabric take-off

Woven fabric take-off mechanisms

Construction and purpose of the following

- take off rollers and coverings
- take-off gears
- batching, rolling up and sorting

- adjusting and changing fabric density
- control and maintenance of take-off equipment

The construction of Raschel-crochet knitted narrow fabric products
Principles of loop formation - mechanical controlled, computer controlled

Arrangement of needles and yarn guides for - simple single guide bar fabrics, multi guide bar fabrics

Yarn tension for - warp yarns, weft inlay yarns

Incorrect settings and fabric faults

Yarn supply and fabric take off - functions of mechanisms

Fabric qualities/quality - appreciation of effect of machine settings on fabric properties and quality

Machine modifications - peg and star wheel linkages, control chains and linkages, electric/ electronic

Special attachments to produce - mirror images, cut, loop, twisted fringes, snail shell, marabou, curl, picot edging

The construction of braided narrow fabric products
Principles of fabric formation and mechanisms for producing - flat braids, tubular braids, special braids

Use of different yarn package types and carriers

Drives / gears / relative settings

Thread tensioning arrangements

Effect of incorrect machine settings on fabric properties

Complex / fancy braid production - special carrier and tracking arrangements

Elastic braids - incorporation of elastic / elastomeric threads in braids, special attachments

Maypole braids - operation and use of maypole braiders

High speed braiders - principles of high speed machines, modern developments in braiding machines

Machine capabilities and their characteristics

Sett / gauge / carrier set up

Speeds of machines compatible with efficiency

Design

- cams / tappets
- control chains
- healds / shafts
- Jacquard hooks and harness
- carriers
- inlay bars

Yarn insertion

- shuttles
- rapiers
- projectiles
- nozzles (air/water)
- needles
- inlay bars
- carriers
- multi-coloured yarn insertion

Machines and materials compatibilities

Gauges

- fine
- medium
- coarse
- missed needle layouts

Reeds

- spring
- soldered
- pitch baulk
- dents per unit space

Jacquard hooks and harness ties

Types and counts of yarn

- compatibility with machine type
- compatibility with machine speed

Braiding machine size / type

- Soutache
- flat
- circular

Factors influencing handling characteristics of materials during processing

- temperature
- humidity
- fibre content
- type of yarn

- machine settings
- fabric specification

Calculating production resource requirements
- yarn type and availability
- machine type and availability
- machine changing and timings
- amount of yarn per unit area
- mass per unit area
- production efficiency calculations
- labour costs
- design specification, customer needs, sample specification
- product specification; yarn, fabric requirements, dyeing and finishing requirement

Learning Outcome 2. Be able to identify and analyse faults

Fault finding principles
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- Fault records

Sample analysis techniques

Fibre type - use of microscope, burning tests, solubility tests, staining tests

Yarn type and count - natural and man made yarns, singles or folded, long / short staple and Continuous Filament (CF), fancy yarns, estimate yarn count, calculations for equivalent counts

Type of fabric - woven fabric, Raschel-crochet knitted fabric, braided fabric

Type of equipment – magnifying / piece glass, scissors, dissecting needles, ruler, laboratory balances and other equipment for weighing and measuring

Carry out tests on two natural and two manufactured yarns. Know how results would be analysed and presented.
- Strength
- Twist
- Count

Carry out analysis of two narrow fabrics and for each
- produce fabric notations
- measure fabric parameters

- carry out calculations

Identify faults and explain reasons for yarn faults
- yarn type and count - natural and man made yarns, singles or folded, long/short staple and continuous filament (CF), fancy yarns, estimated yarn count, calculations for equivalent counts
- natural, manufactured and blended fibres

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in the production of narrow fabrics

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain machines used to produce narrow fabrics

Type and use of lubricants and tools

Lubricants
- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions
- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Machine fault finding principles and techniques

- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including

- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

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- Oral / written questions and answers
- Reports / notes
- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
- Interview / discussion

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Carpet Manufacturing Processes

Unit Reference	**A/502/2274**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to enable learners to gain a sound understanding of carpet manufacturing processes, systems and operations. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes involved in carpet manufacture	**1.1** Identify and explain the production sequences from yarn to finished product for • Wilton woven carpet production • Axminster woven carpet production • tufted carpet production **1.2** Explain factors influencing handling characteristics of materials during production **1.3** Explain quality control procedures **1.4** Describe how production resource requirements are calculated
2. Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles **2.2** Describe sample analysis techniques used in the industry **2.3** Undertake tests on at least two natural and two manufactured yarns for • strength

	• twist • count **2.4** Examine the following yarns in a natural, manufactured fibre and blended fibre form to identify faults and provide explanations for the causes of each of them • single • folded • fancy **2.5** Analyse two carpet structures and for each • produce fabric notations • measure fabric parameters • carry out calculations
3. Understand the electrical and pneumatic requirements of machinery used in the production of carpets	**3.1** Identify machine components and explain their functions
4. Understand how to maintain machines used to produce narrow fabrics	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes **4.4** Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault analysis safely
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36	

Supporting Unit Information

A/502/2274 Carpet manufacturing processes - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes involved in carpet manufacture

The manufacturing processes and production cycle

Preparation of yarn for carpet manufacture - warping/beaming for man made fibres and natural fibres, creels / bobbins / spools, weft insertion – shuttles, yarn dressing

Basic carpet machine parts and functions - weft insertion, needles, loopers, knives, reeds and reed fingers, healds, guides, jacks

Basic machine operating procedures - set up machine, re-start machine, thread up machine, adjust machine, set stop motions, replace guards, change parts

Basic production systems

Woven carpets - principles of production, cut pile, uncut pile

Tufted carpets - principles of production, loop, cut pile

Variations to basic carpet production

Wilton - cut pile, wire loom, face to face

Axminster - gripper axminster, spool axminster, gripper spool

Tufted – plain, stippled, high and low pile, textured and printed, bonded

Machine capabilities and their characteristics

Woven carpets

Wilton - pile yarn, pitch, wires, wire height, cut pile production process, shedding, warp let off, pile mechanism, wire loom production process, face to face production process rows, pile height

Axminster - pile yarn, pitch, wires, wire height, rows, pile height

Gripper axminster production process – shedding, warp let-off, pile mechanism

Spool axminster production process

Gripper spool production process

Tufted carpets
- pile yarn
- gauge
- stitches
- pile height
- backing fabrics/double backings
- plain production process
- stippled production process
- high pile – textured and printed production process
- low pile – textured and printed production process
- bonded production process

Special purpose hand knotted production process

Backing processes and materials

Tufted carpet manufacture – backing processes and materials
- backing materials - primary backing materials – polypropylene, secondary backing materials – hessian, polypropylene, felt and foam
- process - yarn tufts stitched into backing material, rubber latex layered onto primary backing material, secondary backing added for strength and stability, latex dried/ cured at high temperatures, carpet surface sheared

Woven carpet manufacture – backing processes and materials
- backing materials - polyester, cotton, polypropylene, jute and latex
- process - woven carpet fed into backing plant, layer of latex applied to back, air or chalk used to improve application of latex, steam applied to 'burst' yarn pile, latex cured and dried on heated drum, carpet surface cropped / sheared

Factors influencing the handling characteristics of materials during processing
- fibre content
- types of yarn
- type and quality of product
- type of machine
- temperature
- humidity

Quality control procedures
- weight checks
- surface checks
- stitch rate
- pile height
- colour checks

- waste control

Calculating production resource requirements
Yarn type and availability
- amount of yarn per unit area
- mass per unit area
- production efficiency

Machine type and availability

Machine changing and timings

Labour costs

Learning Outcome 2. Be able to identify and analyse faults
Fault finding principles
Name and type of fault
- lines
- drags
- broken looper
- ends out
- backing faults
- yarn faults – thick/thin

Appearance of fault
Cause of fault
Effect of fault
Corrective action
Preventative action
Fault records

Sample analysis techniques
Fibre type - use of microscope, burning, solubility tests, staining tests

Yarn type and count - natural and man-made yarns, singles or folded, long /short staple and Continuous Filament (CF), fancy yarns, estimate yarn counts, calculations for equivalent counts

Type of carpet
- woven - Wilton, Axminster, spool Axminster
- tufted

Measure fabric quality - tuft/loop density, yarn count, pile, backing

Type of carpet production system - machine details, yarn count/machine relationships

Types of equipment – magnifying / piece glass, scissors, dissecting

needles, ruler, laboratory balances and equipment for weighing and measuring

Carry out practical tests on a range of carpet yarns to assess their properties and suitability

- tensile strength/elongation at break
- twist and twist factor
- count and count conversions

Examine a range of carpet yarns to identify faults. Assess the causes and effect on carpet quality

- regularity and evenness
- count variation
- thick / thin places, negs and slubs
- tensile strength / elongation variation

Analyse carpet structures to assess

- pile yarns
- tacking structure
- carpet construction and finish
- yarn counts
- carpet weight
- pile weight
- pile height
- tuft density
- pile thickness
- pile density (P/t and P^2/t)
- pile fibre volume ratio
- appearance retention
- durability factor

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in the production of carpets

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions

- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain machines used to produce narrow fabrics

Type and use of lubricants and tools

Lubricants

- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions

- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance

- procedures
- recording systems

Compare different approaches to maintenance

- advantages
- disadvantages

Machine fault finding principles and techniques

- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including

- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

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Non Woven Fabric Production

Unit Reference	**F/502/2275**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of the processing and technological factors that affect non-woven fabric production, performance and manufacturing techniques. Assessment must be linked to the real work environment
Learning Outcomes (1 to 4) ***The learner will***	**Assessment Criteria (1.1 to 4.5)** ***The learner can***
1. Understand the principles and processes involved in producing non-wovens	**1.1** Identify the four main methods of non-woven fabric production and explain the advantages and disadvantages of each method **1.2** Explain the production processes from fibre/yarn to non-woven structure for the following • needle punch non-wovens production • hydro-entanglement non-wovens production • stitch bonded non-wovens production • thermal bonded non-wovens production **1.3** Explain factors influencing handling characteristics of materials during production
2. Be able to identify and analyse faults	**2.1** Describe and explain fault finding principles **2.2** Describe sample analysis techniques used in the industry **2.3** Undertake tests on natural and manufactured

	fibre yarns for • strength • twist • count **2.4** Analyse a minimum of three non woven fabrics and for each • produce fabric notations • measure fabric parameters • carry out calculations
3. Understand the electrical and pneumatic requirements of machinery used in the production of non-wovens	**3.1** Identify machine components and explain their functions
4. Understand how to maintain machines used to produce non-wovens	**4.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **4.2** Explain the planned maintenance processes for machinery **4.3** Analyse the advantages and disadvantages of these processes **4.4** Describe and explain machine fault finding principles and techniques **4.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36

Supporting Unit Information

F/502/2275 Non woven fabric production - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes involved in producing non-wovens

Web / batt formation
- air laid
- wet laid
- carded
- spin bonded

Bonding
- mechanical - felted, needle punched

Hydroentanglement, stitch bonded
- chemical / adhesive
- thermal
- spun bonding / melt blowing

The principles and processes involved in producing non- wovens
Manufacturing process and production cycle

Preparation of webs - web area density, dry laid webs, wet laid webs, air laid webs

Web composition
- staple fibre - wet laid
- dry laid parallel
- cross laid
- random laid
- continuous filament
- spun laid
- melt blown
- properties of webs
- fibre / web combinations

Basic operating procedures - set-up machine, re-start machine, thread up machine, adjust machine, set stop motions, replace guards, change parts

Preparatory operations and machine control elements

Preparatory operations
- intimate and pre-card blending

- card feeding methods and the effects of variables on web quality
- carding
- card configurations related to product type
- card wire types – maintenance and settings
- card production rates
- drafting
- spreading

Basic machine control elements - needle types, cross lap variables and control, guides, adhesives

Fabric forming and web construction with the following
Needle punching
Needle punching systems - effects of punching, density, needle types

End uses - home furnishings, footwear, technical textiles, automotive, geotextiles

Hydro-entanglement
Hydro-entanglements – mechanical, conditions

End uses – household, automotive

Stitch bonding – fabric forming systems
Stitch bonding – Aracne, Malimo, Maliprop

End uses - interlinings

Thermal, adhesive and chemical bonding
Thermal bonding - fibre types, bi-component fibres, temperature control

Adhesive and chemical bonding - adhesive type fibres

End uses – blankets, outerwear, household uses

Variations to basic non-wovens
Composite/compound fabrics – quilts, flocking, coating, laminates, foam/fibre combinations

Factors influencing handling characteristics of materials during processing
- fibre content
- type and quality of fabric
- type of machine
- temperature
- humidity

Learning Outcome 2. Be able to identify and analyse faults

Fault finding principles

- type and name of fault
- appearance of fault
- cause and effect of fault
- corrective action
- preventative action
- fault records

Sample analysis techniques used in narrow fabrics production
Fibre type - use of microscope, burning tests, solubility tests, staining tests

Fibre and yarn type and count - natural and man made yarns

Type of non-woven structure - needle punched, thermal bonded, adhesive and chemical bonded, hydroentanglement, stitch bonded

Type of equipment – magnifying / piece glass, scissors, dissecting needles, ruler, laboratory balances and other equipment for weighing and measuring

Carry out practical tests on an range of fibres, scrims and yarns as used in non woven fabrics

- fabric length, diameter, tensile strength and elongation
- yarns as used in stitch bonded and scrim structures - count, tensile stretch and twist

Analyse non woven structures to assess

- weight (g/m^2)
- structure - method of fibre web/ batt production, bonding technique
- direction of fibre lay
- directional strength and elongation
- durability
- porosity
- count of yarn if used (stitch bonded fabrics)
- stitches per cm (stitch bonded fabrics)
- scrim structure and weight (if used)

Learning Outcome 3. Understand the electrical and pneumatic requirements of machinery used in the production of non-wovens

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions

- machine drives
- dial drives
- yarn cutting

- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 4. Understand how to maintain machines used to produce non-wovens

Type and use of lubricants and tools

Lubricants

- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions

- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance

- procedures
- recording systems

Compare different approaches to maintenance

- advantages
- disadvantages

Machine fault finding principles and techniques

- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including

- changing machines - styles and qualities
- safe working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches

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Textiles Dyeing and Printing

Unit Reference	**J/502/2276**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding about textile colouration. Assessment must be linked to the real work environment
Learning Outcomes (1 to 6) ***The learner will***	**Assessment Criteria (1.1 to 6.5)** ***The learner can***
1. Understand the principles and processes involved in the textile colouration processes	**1.1** Explain the basic principles of dyeing, including after-treatments where applicable for two natural and two manufactured fibres **1.2** Explain the processing sequences from substrate preparation to dyed textiles products for the following • winch dyeing • jig dyeing • pad-steam dyeing • cone yarn dyeing • hank dyeing • fibre dyeing **1.3** Create recipes and carry out dyeing for two textile products made of different fibre types
2.Understand the principles and processes involved in textile printing processes	**2.1** Explain the processes and methods involved in printing **2.2** Explain the processing sequences from substrate preparation to printed textiles products for the

	following • rotary screen printing • transfer printing • block printing • roller printing • digital printing **2.3** Create recipes and carry out printing for two textile products made of different fibre types
3. Understand how to prevent faults when printing and dyeing textiles	**3.1** Identify and explain dyeing and printing faults in • fabric • fibres • garment • hosiery **3.2** Explain how to prevent dyeing and printing faults
4.Understand environmental issues when dyeing and printing textiles	**4.1** Outline the possible environmental contamination that may occur from dyeing and printing textiles **4.2** Identify the current legislation designed to protect the environment from contamination from these processes and analyse what this means for the industry
5. Understand the electrical and pneumatic requirements of machinery used in dyeing and printing	**5.1** Identify machine components and explain their functions
6. Understand how to maintain machines used in dyeing and printing	**6.1** Identify and explain the type and use of the main lubricants and tools used to maintain machinery **6.2** Explain the planned maintenance processes for machinery **6.3** Analyse the advantages and disadvantages of these processes

	6.4 Describe and explain machine fault finding principles and techniques **6.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 28, 29, 30, 35, 36

Supporting Unit Information

J/502/2276 Textiles dyeing and printing - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes involved in the textile colouration processes

Basic principles of dyeing, including after-treatments where applicable

- wool and polyester – acid, neutral, mordant, reactive dyes
- cellulosics – direct, reactive, azoic, vat, sulphur dyes
- acrylics with basic dyes
- polyester with disperse dyes
- dyeing of fibre blends
- dyeing auxiliaries and surfactants

The principles and processes involved in the textile colouration processes

Colouration

The science underpinning textile dyeing and printing

- chemical and physical structure - properties of natural, synthetic, man-made fibre polymers
- main types of interaction between dyes and fibres
- water management and treatments - concepts and effects of hard water, pH, buffers, pollutants, effluent
- colour vision and defects
- light - electromagnetic spectrum, illuminants, light sources
- colour mixing - additive/subtractive colour mixing, instrumental colour matching
- classification of dyestuffs related to the main fibres involved and method of application.
- essential structural features of main types of dyes – azo, anthraquinonoid, benzodifuranone, indigoid, chromafares and auxochromes
- the functions of
  - chlorination
  - nitration
  - sulphonation
  - diazotization and coupling
  - leuco forms
- basic mechanisms of dye uptake
  - hydrogen bonding and ionic bonding - weak chemical bonds between dye and fibre molecules
  - reactive dyes - strong chemical bonds between dye and fibre

molecules
    - disperse dyes - hydrophobic forces of attraction
    - disperse dyes and vat dyes - physical entrapment of dye molecules within fibre voids

Familiarisation with calculation of depth of shade and recipe formulations **-** amounts of dye required on mass of fibre basis, percentage depth of shade, typical dye recipes including all necessary auxiliaries

Washing and drying processing methods
Washing operations - washing off, special effect washing systems

Drying machines
- hydro extractor
- centrifugal – whizzer
- stenters
- radio frequency drying

Dyeing machinery and processing methods
Fabric / piece goods – winch, jig

Loose stock / fibres and yarns – package, hank, cone

Products - pad-batch, pad-steam, pad-thermosol

Learning Outcome 2. Understand the principles and processes involved in textile printing processes
The processes and methods involved in printing
- printing methods
- printing Machinery
- ancillary Equipment
- print styles – direct, resist, discharge, duplex
- print pastes and inks - rheological properties, criteria for selection

Processing Sequences from Substrate to printed textiles
- flat screen
- rotary screen
- copper roller
- block
- transfer

Learning Outcome 3. Understand how to prevent faults when printing and dyeing textiles
Faults and environmental issues when printing and dyeing textiles

Dyeing and printing faults with
Printing faults -out of register, printed on wrong side, harsh handle, colour

fastness

Dyeing faults
- shading
- baking
- colour fastness to – light, water, perspiration
- rubbing – wet, dry

Fault finding principles
type and name of fault
appearance of fault
cause of fault
effect of fault
corrective action
preventative action
fault records

Preventing dyeing and printing faults
Maintenance of machines

Operating conditions – temperature, dyeing time

Laboratory procedures

Operations - accurate scaling up (correct proportions), correct pH, correct dye recipe, correct registration of screens

Learning Outcome 4. Understand environmental issues when dyeing and printing textiles
Main environmental issues that occur from wet processing
Dyeing fibres, yarns, fabrics and garments and printing textiles chemical additives
- dyestuffs
- inks
- auxiliaries
- acids
- alkalis
- salts

Possible environmental contamination from processing
- water pollution - caused by residual colour (unfixed dyestuffs) and persistent organic pollutants
- air pollution - caused by emissions of dust and steam plumes
- waste - from packaging, wastage of water
- energy - dyeing carried out at high temperatures
- noise - from mechanical handling

Control measures
- water – inorganic clays used to remove colour and allow re-use of water

primary effluent treatment – pumping, clarifying and chemical closing
- energy – temperature control
- air – control emissions

Legislation and best practice
- IPPC – Integrated Pollution Prevention Control
- BAT – Best Available Techniques
- EQS – Environmental Quality Standards

Learning Outcome 5. Understand the electrical and pneumatic requirements of machinery used in dyeing and printing

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 6. Understand how to maintain machines used in dyeing and printing

Type and use of lubricants and tools

Lubricants
- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling systems

Tools and their functions
- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Machine fault finding principles and techniques
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

Select four machine faults and carry out fault analysis safely, including
- changing machines - styles and qualities
- safe working and lone working practices
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches
- pneumatics – water, piping, applications

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Textile Finishing

Unit Reference	**R/502/2278**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding about textile finishing. Assessment must be linked to the real work environment
Learning Outcomes (1 to 5) ***The learner will***	**Assessment Criteria (1.1 to 5.5)** ***The learner can***
1. Understand the principles and processes involved in textile finishing	**1.1** Describe the following preparatory processes to finishing and explain their purposes • perching • measuring; weighing and numbering fabric • burling and mending **1.2** Explain the production cycles and purposes of the following finishing processes • crabbing • scouring • hydro-extracting • milling • blowing • decatising • potting • stentering and heat setting • raising • cropping **1.3** Explain the processing sequences from substrate preparation to finished textile products for the following • dry / mechanical finishing • wet / chemical finishing

	1.4 Explain the path for materials to be finished from feeder source to finished textile products for the following • wet processing including proofing, softening, resin treatments • dry processes including raising, cropping, singeing, calandering **1.5** Select and justify the most appropriate finishes for the following textile products • woven woollen fabric • woven cotton fabric • cotton yarn • polyester warp knitted • weft knitted product
2. Understand how to prevent faults when carrying out textile finishing processes	**2.1** Identify and explain finishing faults in • woven products • knitted products • non-woven products **2.2** Explain how to prevent faults in textile finishing processes
3.Understand environmental issues when carrying out textile finishing processes	**3.1** Outline the possible environmental contamination that may occur from textile finishing processes **3.2** Identify the current legislation designed to protect the environment from contamination from these processes and analyse what this means for the industry
4. Understand the electrical and pneumatic requirements of machinery used in textile finishing processes	**4.1** Identify machine components and explain their functions
5. Understand how to	**5.1** Identify and explain the type and use of the main

maintain machines used in textile finishing processes	lubricants and tools used to maintain machinery **5.2** Explain the planned maintenance processes for machinery **5.3** Analyse the advantages and disadvantages of these processes **5.4** Describe and explain machine fault finding principles and techniques **5.5** Select four machine faults and carry out a fault analysis safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 28, 29, 30, 31, 36

Supporting Unit Information

R/502/2278 Textile finishing – Level 3

Indicative Content

Learning Outcome 1. Understand the principles and processes involved in textile finishing

The preparatory processes to finishing and their purposes

Perching

- examination of fabric
- marking and correcting faults

Measuring; weighing and numbering fabric

- record keeping of weight and length
- tracking fabric through processing

Burling and mending

- removal of imperfections
- repair faults

Production cycles and purposes of the following finishing processes

Crabbing - fabric setting to avoid distortion

Scouring - washing fabric to remove impurities

Hydro-extracting - water removal by squeezing, suction and /or centrifugal means

Milling - felting fabric

Blowing to dry fabric

Decatising to dry, press and relax fabric

Potting to dry wool fabric

Stentering and Heat setting to finish fabrics to required widths

Include Chemical finishes and special finishing processes in reference to 1.3 and 1.4.

Chemical finishes and their purpose

Crease-resist treatments
Starch and associated substances
Thermoplastic resins
Thermosetting resins
Willesden finish

Shower / water proofing
Flame-proofing
Moth-proofing
Anti-bacterial treatments
Anti-static / anti-soiling treatments
Softening

Special finishing processes
'London' shrinking

Relaxation shrinkage
Felting shrinkage
Compressive shrinkage Sanforising and Rigmel process
Chlorination
De-sizing

Processing Sequences from substrate preparation to finished textile products for

- dry / mechanical finishing
- wet / chemical finishing

Path for materials to be finished from feeder source to finished textile product for

- wet processing including proofing, softening, resin treatments
- dry processing including

Finishing processes and the effects produced
Raising

- production of a nap on the fabric

Cutting / cropping / shearing

- removal of surface fibres – face cloths

Napping

- production of a part or full pile surface – pile fabrics such as velvet and velour

Singeing

- burning of surface fibres – removal of surface hairs

Steaming and brushing

- lifting of surface fibres prior to cutting/cropping - raised surface

Blowing

- use of steam to straighten distortions

Pressing

- flattening of fabric
- improvement of design outline and shape
- fabric consolidation and improvement of fabric handle

Damping/dewing

- adding of condition

Calandering

- glazing – adding sheen/ shiny surface
- embossing – pattern effect in relief
- Schreinering – water marked effect

Mercerising
- chemical treatment to give shine to cotton fibres/yarns

Learning Outcome 2. Understand how to prevent faults when carrying out textile finishing processes

Finishing faults in the following
- woven fabrics
- knitted fabrics
- non-woven fabrics

Factors influencing handling characteristics of fabrics during processing
- fibre content
- yarn type
- fabric type
- finish treatment type
- temperature
- humidity

Fault finding principles
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- fault records

The causes of finishing faults

Effects on shade of dyed materials
- heat – temperature
- pressure – tensions
- steam
- machine settings

Effects of preparatory processes to finishing
- knitting - tensions, widths and weights
- weaving – widths and weights

Preventative action

Corrective actions

Learning Outcome 3. Understand environmental issues when carrying out textile finishing processes

The main environmental issues that occur from finishing

Wet finishing and chemical treatments
- finishing agents
- auxiliaries

- chemical additives - moth proofing, crease resist agents

Environmental contamination resulting from processing
- water pollution - caused by residual finishing agents (resins and retardants) spillages and wash down stages during finishing plus detergents and surfactants from washing
- air pollution - from Volatile Organic Chemicals (VOCs) plus odour and fumes from heat singeing and setting
- energy - high use of energy by stenters
- waste - from packaging
- noise - from mechanical handling

Control measures
- water – primary effluent treatment, pumping, clarifying and chemical closing
- energy – temperature control
- air - emission control

Legislation and best practice
- IPPC - Integrated Pollution Prevention Control
- BAT - Best Available Techniques
- EQS - Environmental Quality Standards
- VOCs – Volatile Organic Chemicals

Learning Outcome 4. Understand the electrical and pneumatic requirements of machinery used in textile finishing processes

Electrical and pneumatic requirements
Control systems
Motor drives
Machine components and their functions
- machine drives
- dial drives
- yarn cutting
- control and feeding systems
- fabric take down assemblies
- cam systems
- gears and gear boxes
- bearings, shafts, seals
- variable speed drives

Learning Outcome 5. Understand how to maintain machines used in textile finishing processes

Type and use of lubricants and tools

Lubricants
- synthetic
- organic
- mineral
- application systems – mechanical, compressed air, drip feed, recycling

systems

Tools and their functions
- types of tools
- functions – dismantling, assembling, adjusting parts of machines and equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Machine fault finding principles and techniques
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

For four machine faults carry out fault analysis safely
- changing machines - styles and qualities
- isolation requirements - closing plant down, stopping machines
- replacement of major parts – fitting, purchase of parts
- limits to access for electrics - fault diagnosis, replacement of parts, correct items, contractors, replacement of fuses and ratings, isolation switches
- pneumatics – water, piping, applications
- safe working and lone working practices

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Knitted Fabric Design

Unit Reference	**Y/502/2279**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of warp and weft knitted fabric design. Assessment must be linked to the real work environment
Learning Outcomes (1 to 5) ***The learner will***	**Assessment Criteria (1.1 to 5.2)** ***The learner can***
1. Understand the process of knitted fabric design and development from initial idea to finished product	**1.1** Analyse the trends and influences impacting on design development **1.2** Describe the different types of design repeat and their application **1.3** Explain the processes of design from initial idea to finished product to include • research • interpretation of design brief • customer requirements • costings • design specification • sample requirements • sample production • production specification
2. Understand the principles of technical drafting	**2.1** Explain the principles of technical drafting for each of the following • weft knitting • warp knitting • lace

	2.2 Draw a technical draft for two designs to be knitted on two different types of machine
3. Be able to use CAD techniques in knitted fabric design processes	**3.1** Describe CAD–Computer Aided Design techniques and processes **3.2** Produce a design for a knitted fabric using CAD–Computer Aided Design
4. Understand fabric analysis techniques	**4.1** Describe sample analysis techniques for • fibre type • yarn type and count • type of fabric **4.2** Analyse two knitted fabrics of different construction and for each of the following • produce fabric notations • measure fabric parameters • carry out calculations
5. Understand the processes involved in lace, weft and warp knitting production	**5.1** Explain the production sequences from yarn supply to fabric take-off for the following • tricot warp knit fabrics • Raschel warp knit fabrics • leavers lace • circular weft knit fabrics • flat weft knit fabrics **5.2** Identify the types of faults which can occur in • yarns • machines • fabrics and explain what causes them
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 26, 29, 30, 36	

Supporting Unit Information

Y/502/2279 Knitted fabric design - Level 3

Indicative Content

Learning Outcome 1. Understand the process of knitted fabric design and development from initial idea to finished product

Factors influencing design development

Trends and influences

- lifestyle
- films
- theatre
- music
- world events

Visual appreciation

- fashion
- architecture
- vegetation
- animal skins
- photography

Colours and texture

End use(s)

- fashion outerwear
- leisure and sportswear
- coated protective wear
- specialist uses such as automotive and medical

Different types of repeat and their application

- square
- diamond
- circular
- block
- mirror
- half drop
- free design/ all-over

Researching trends and developing design images

Research

- design trends
- competitor markets and market developments
- sources of records / archives / sample libraries

Interpretation

- design brief
- customer requirements

- customer pricing structures and policies
- fitness for purpose

Initial stages of development

- line drawing / coloured sketch / visual interpretation (computer)
- selection of yarns and colours
- story / theme board
- presentation to customer
- design brief

The steps for producing a prototype design and evaluating it

Design specification and sample production

- method of transferring paper design to machine
- design specification – product dimension
- machine type and setting up procedures
- manufacturing instructions
- yarn type

Describe how to evaluate a prototype

- viability
- fitness for purpose
- cost
- production methods
- customer requirements

Sample production

- sample / design specification
- sample production
- pre-production trials
- critical path for product
- evaluation of trial results
- production rates
- materials usage
- production specification

The components of a product specification

Design specification

- customer requirements
- sample specification

Production specification

- yarn type(s) and count
- production requirements
- making up requirements (as applicable)
- finishing requirements

Describe how production resource requirements are calculated

- yarn type and availability
- machine types and availability
- machine changing and timings
- amount of yarn and mass per unit area
- production calculations

- labour costings

Learning Outcome 2. Understand the principles of technical drafting

The process of technical drafting

Describe a design-layout as a technical working graph on graph/point paper for

- weft knitted fabrics - plain fabric, rib, interlock, Jacquard, purl
- warp knit and lace - plain fabric, locknit, inlay, open and closed lap, Jacquards

Explain yarn and colour selection - type and count of yarn, colours

The principles of technical drafting for

Weft knitting

- garment length V-bed structures
- Jacquards 2 / 3 / 4 with backings
- single jersey structures
- float stitch
- fancy yarns to enhance fabric effects
- double jersey structures
- interlock structures
- Jacquards 2 / 3 / 4 with backing
- coarse gauge hosiery (double and single cylinder) links
- Jacquard
- float and open-work
- plated designs
- fine gauge hosiery structures
- Jacquard or float plated designs
- illustrated pattern areas with calculations

Warp knitting

- tricot fabrics
- plain fabrics
- fancy yarns enhancement
- locknit
- part set
- shark skin
- mesh
- velour
- lace and patterned
- Raschel fabrics
- plain fabrics
- fancy yarns enhancement
- part set threading
- lace
- mesh
- tubular

Lace

- Leavers lace fabrics
- nets
- grounds
- needle points kat stitch
- use of gimps
- tapes
- illustrates pattern areas with calculations

Draw a technical draft for two designs to be knitted on two different types of machine.

Learning Outcome 3. Be able to use CAD techniques in knitted fabric design processes

CAD –Computer Aided Design techniques and processes

Computer design hardware

- modems
- scanners
- draft readers
- eproms
- card cutters
- optical discs

Computer design software

- discs
- drawing
- painting
- image manipulation
- file formats
- libraries
- transfer image to - CAM (Computer Aided Manufacture)
  - mechanical system
- produce fabric swatches

Networking

Prepare a design for a knitted fabric using CAD – Computer Aided Design

Learning Outcome 4. Understand fabric analysis techniques

Sample analysis techniques

Fibre type - use of microscope, burning, solubility tests, staining tests

Yarn type and count - natural and man-made yarns, singles and folded, long/ short staple or Continuous Filament (CF), fancy yarns, estimate yarn counts, calculations for equivalent counts

Type of fabric

- basic fabric (weft knitted) - plain, rib, purl, interlock,

- variations to basic fabric (weft knitted) - held stitch, tuck stitch, 2 and 3 coloured patterned, Jacquard backings, plated, transfer, interlock, inlay
- basic fabric (warp knitted and lace) – Tricot, Raschel, Leavers lace
- variations to basic fabric (warp knitted and lace)

Measurement of fabric quality - courses per cm, wales per cm, stitch density (SD), course length, yarn count

Type of knitting system - machine details, machine gauging systems, yarn count / machine gauge relations

Types of equipment – magnifying / piece glass, scissors, dissecting needles, ruler, laboratory balances and equipment for weighing and measuring

Analysis of two different types of knitted fabric.
- produce fabric notations
- measure fabric parameters
- carry out calculations

Learning Outcome 5. Understand the processes involved in lace, weft and warp knitting production

The manufacturing process and production cycle

Preparation of yarn for knitting – winding, dressing, creels and bobbins, warping/beaming

Basic knitting and control elements – needles, sinkers, jacks, guides

Basic operating procedures - setting up machine, re-starting machine, threading up machine, adjusting machine, setting up stop motions, replacing guards, changing knitting elements, tying in, knotting

Basic production systems - Weft Knitting

Basic knitting systems
- plain or single jersey knitting – knitting action and element control
- rib knitting – knitting action and element control
- purl knitting – knitting action and element control
- interlock knitting – knitting action and element control

Variations to basic knitting
- held stitch knitting – knitting action and element control
- tuck stitch knitting – knitting action and element control
- fancy fabrics - knitting action and element control
  - patterns
  - plating
  - loop transfer

- terry
- inlay

Machine capabilities and their characteristics

Fine gauge hosiery - single cylinder – stockings / tights

- plain
- tuck
- inlay fabrics

Coarse gauge hosiery - double and single cylinder – half hose / socks

- plain
- rib
- purl
- patterned
- terry
- motif

Single cylinder jersey fabric - fabric production – underwear and outerwear

- plain
- patterned
- fleecy

Double jersey fabric - ribs / interlock

- single pique
- double pique
- Ponte di Roma
- Swiss pique
- French pique

Basic production systems – warp knitting and lace

Basic production systems

- single bar
- full set threading
- bearded needle knitting – knitting action and guide bar movements
- latch needle knitting – knitting action and guide bar movements
- compound needle knitting – knitting action and guide bar movements
- Leavers lace production – bobbin actions and movements

Variations to basic knitting

- single needle bar – open and closed lap – guide bar arrangements
- double needle bar - open and closed lap – guide bar arrangements
- part set threading – open and closed lap – guide bar arrangements
- fall plate – open and closed lap – guide bar arrangements
- lace production – stitch structure – bobbin arrangements

Further production methods and characteristics

Tricot - lapping systems, 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, plain, locknit, atlas lapping Milanese, multi guide bar fabrics

Raschel - lapping systems, 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, Raschel lace, atlas lapping Milanese fabrics, fall plate fabrics, multi guide

bar fabrics, Jacquard fabrics

Compound machines - lapping systems, 2x1 cord lap, 3x1 satin lap, 4x1 velvet lap, atlas lapping Milanese fabrics

Leavers lace – nets, grounds, patterns

Identify yarn, machine and fabric faults
- type and name of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action

Teaching Strategies And Learning Activities

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Woven Fabric Design

Unit Reference	**R502/2281**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding about the technical aspects of design. Assessment must be linked to the real work environment
Learning Outcomes (1 to 5) ***The learner will***	**Assessment Criteria (1.1 to 5.3)** ***The learner can***
1. Understand the process of woven fabric design and development from initial idea to finished product	**1.1** Analyse the factors impacting on design development **1.2** Describe the different types of repeat and their application **1.3** Explain the processes of design from initial idea to finished product to include • research • interpretation of design brief • customer requirements • costings • design specification, • sample requirements • sample production • production Specification
2. Understand the principles of technical drafting	**2.1** Explain the principles of technical drafting for each of the following • plain fabric • twill • satin and sateen weaves

	2.2 Draw a technical draft for two designs to be woven on two different types of machine
3. Be able to use CAD techniques in woven fabric design processes	**3.1** Describe CAD–Computer Aided Design techniques and processes **3.2** Produce a design for a woven fabric using CAD–Computer Aided Design
4. Understand fabric analysis techniques	**4.1** Describe sample analysis techniques for • fibre type • yarn type and count • type of fabric **4.2** Analyse two woven fabrics of different construction and for each of the following • produce fabric notations • measure fabric parameters • carry out calculations
5. Understand the principles and processes of weaving	**5.1** Describe the primary motions of weaving **5.2** Explain the manufacturing processes and production cycle of woven fabrics **5.3** Explain factors influencing handling characteristics of materials during processing

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 25, 26, 29, 30

Supporting Unit Information

R502/2281 Woven fabric design - Level 3

Indicative Content

Learning Outcome 1. Understand the process of woven fabric design and development from initial idea to finished product

Factors influencing design development

Trends and influences

- lifestyle
- films
- theatre
- music
- world events

Visual appreciation

- fashion
- architecture
- vegetation
- animal skins
- photography

Colours and texture

End use(s)

- fashion outerwear
- leisure and sportswear
- coated protective wear
- specialist uses such as automotive and medical

The different types of repeat and their application

- square
- diamond
- circular
- block
- mirror
- half drop
- free design/all-over

Researching trends and developing design images

Research - design trends, competitor markets and market developments, sources of records / archives / sample libraries

Interpretation - design brief, customer requirements, customer pricing structures and policies, fitness for purpose

Initial stages of development - line drawing/ coloured sketch/visual interpretation (computer), selection of yarns and colours, story / theme board, presentation to customer, design brief

Producing a prototype design and evaluating it
Design specification and sample production - method of transferring paper design to machine, design specification – product dimensions, machine type and setting up procedures, manufacturing instructions, yarn type

Evaluating a prototype - viability, fitness for purpose, cost, production methods, customer requirements

Sample production – sample / design specification, sample production, pre-production trials, critical path for product, evaluation of trials results, production rates, materials usage, production specification

Process of carrying out production calculations - production efficiency, machine gauge/yarn count relationship, amount of yarn per unit area, mass per unit area, raw materials, labour costings

Components of a product specification
Design specification - customer requirements, sample specification

Production specification - yarn type(s) and count, production requirements, making up requirements, finishing requirements

Learning Outcome 2. Understand the principles of technical drafting
The process of producing technical working drafts on design paper
Producing graph paper designs - weave repeat, design norms, abbreviations, sizes, interlacing points

Describe a technical working graph for the following - plain weave, twill - warp faced, weft faced, satin and sateen

Preparing designs for machines
Producing plans – drafts / enterings / drawing in plans, harness mountings, reeding / sleying-in plans, lifting / peg plans

Fabric alterations
Plain fabric - warp ribs, weft cords, patterned ribs and cords, matt / basket / hopsack weaves

Satin and sateen weaves - re-arrangement on a sateen base, shaded satin and sateen weaves

Body weave fabrics - skipped shaft drafts, sateen re-arrangements

Special edge weaves for broad and narrow fabrics - round and half-round, long and tubular long edge, use of binder and stuffer threads

Designs using coloured warp and weft - colour and weave effects, horizontal and vertical stripes, puppy tooth and houndstooth, bird's eye

Jacquard design reproduction - mechanical machines, electronic machines

Learning Outcome 3. Be able to use CAD techniques in woven fabric design processes

Computer aided Design techniques and processes

Computer design hardware – modems, scanners, draft readers, eproms, card cutters, optical discs

Computer design software – discs, drawing, painting, image manipulation, file formats, libraries, transfer image to CAM (Computer Aided Manufacture) or mechanical system
Networking

Learning Outcome 4. Understand fabric analysis techniques

Sample analysis techniques

Fibre type - use of microscope, burning, solubility tests, staining tests

Yarn type and count - natural and man made yarns, singles and folded, long / short staple or Continuous Filament (CF), fancy yarns, estimate yarn counts, calculations for equivalent counts

Type of fabric
basic fabric (woven)

- plain - basket and hopsack weaves
- twill
- satin and sateen

variations to basic fabric (woven)

- coloured warp and weft
- horizontal and vertical stripes
- houndstooth
- birdseye
- Jacquard design

Measure fabric quality - ends per cm, picks per cm, fabric density (FD), yarn count

Type of weaving system - machine details, yarn count/machine gauge relationship

Types of equipment - magnifying/piece glass, scissors, dissecting needles, ruler, laboratory balances and equipment for weighing and measuring

Analyse two woven fabrics of different construction

Learning Outcome 5. Understand the principles and processes of weaving

The primary motions of weaving

Shedding – raising and lowering of the warp
Picking – weft insertion
Beating up – methods of compacting weft/ picks

The manufacturing processes and production cycle of woven fabrics

Raw materials supply - warp beams for natural and man made fibres, weft delivery using cones, bobbins and spools

Setting up to specification

- warp let-off devices - friction, automatic control
- weft tension equipment – mechanical, electrical

Running machines - efficiency and speed, compatibility with product specification

Shed set up

Different types of shed - V shed, front/rear shed, open/closed sheds, healds, shafts

Mechanisms for setting up sheds - cam/tappets, dobbies, shuttles/shuttleless machines, Jacquards

Connection between shed mechanisms and paper designs - reading point / graph paper, computer design, transfer to cams/tappets, dobbies, control chains, Jacquard cards, electronic devices

Weaving mechanisms

Weft insertion methods – shuttles, rapiers, projectiles, nozzles(air/water), multi-coloured weft insertion

Machine frame - going part, reed

Fabric take-off - take-off rollers and coverings, take-off gears, batching and rolling, adjusting fabric density, control and maintenance of take-off equipment

Reed types - spring soldered, pitch baulk, dents per unit space

Jacquard hooks and harness ties

Types and counts of yarn compatible with machine type

Factors influencing handling characteristics of materials during processing

- fibre content
- types of yarns
- types and quality
- types of machines
- temperature
- humidity

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Knitwear and Hosiery Design and Make-Up

Unit Reference	**Y/502/2282**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of the technical skills and procedures required when designing knitwear and of the processes involved in the making up of knitwear, tights and socks including the operation of machines. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.3)** ***The learner can***
1. Understand the process of design for knitwear and hosiery	**1.1** Analyse the factors and processes involved in design development for knitwear and hosiery **1.2** Explain how to research trends and develop design images **1.3** Explain the steps involved in producing a prototype design and evaluating it **1.4** Describe the components of a product specification
2. Understand the principles and processes of developing knitted products	**2.1** Describe the process of developing knitted garments and products **2.2** Describe the processes involved in knitwear design development **2.3** Explain and demonstrate the use of CAD –

	Computer Aided Design in the knitwear and hosiery design process **2.4** Analyse two knitted fabrics of different construction and for each • produce fabric notations • measure fabric parameters • carry out calculations
3. Understand the processes involved in knitwear and knitted product manufacture	**3.1** Describe product / garment production sequences for the following • fully fashioned / shaped knitwear • cut and sew knitwear • whole garment knitting • dress wear from piece goods knitted fabric • underwear • fine gauge hosiery • coarse gauge hosiery • socks **3.2** Describe knitting machine capabilities, characteristics and mechanisms **3.3** Produce calculations and costings for two knitted products
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 25, 26, 29, 30	

Supporting Unit Information

Y/502/2282 Knitwear and hosiery design and make-up - Level 3

Indicative Content

Learning Outcome 1. Understand the process of design for knitwear and hosiery

Factors and processes involved in design development

Trends and influences

- lifestyle
- films
- theatre
- music
- world events

Visual appreciation

- fashion architecture
- vegetation
- animal skins
- photography

Colours and textures

End uses

- fashion indoor / outerwear
- sport / leisurewear
- childrenswear
- underwear
- stockings and tights
- socks

Design specification and sample production

- design specification
- product dimensions
- machine type and setting up procedures
- manufacturing instructions
- yarn types - S or Z twist, flat Continuous Filament (CF), textured Continuous Filament, core spun , long or short staple, fancy yarns
- processed threads/yarns - mercerised cotton, gassed threads, polished threads
- yarn counting systems - direct, indirect, estimating yarn counts, calculating for equivalent counts

Interpretation

- design brief
- customer requirements
- customer pricing structures and policies
- fitness for purpose

Initial stages of development
- line drawing / coloured sketch / visual interpretation (computer)
- selection of yarns and colours
- story / theme board
- presentation to customer
- design brief

Steps involved in producing a prototype design and evaluating it
Production factors
- machine type / method of production
- machine set-up
- yarn type
- knitting instructions
- product dimensions

Evaluation
- viability
- cost
- production methods
- customer requirements
- fitness for purpose

Components of a product specification
Design specification
- customer requirements
- sample specification

Production specification
- yarn type(s) and count
- production requirements
- making up requirements
- finishing requirements

Describe how production resource requirements are calculated
- yarn type and availability
- machine type and availability
- machine changing and timings
- amount of yarn per unit area
- mass per unit area
- production efficiency calculations
- labour costs

Learning Outcome 2. Understand the principles and processes of developing knitted products

Process of developing knitted garments and products

- specification sheets and recording information
- calculating wales and courses per cm
- machine utilization, calculations and production sequences
- cutting and weighing knitted fabric blanks
- customer procedures and requirements
- costs sheets

Processes involved in knitwear design development

Fabric design for weft knitted products

- plain
- rib
- purl
- interlock
- held and tuck stitch
- patterned
- Jacquard
- float
- plated
- loop transfer
- inlay

Selection of yarns

- count related to gauge
- fancy effect yarns to enhance design

Produce design ideas for development – sketches / drawings

Production of machine drafts/ technical working graphs for knitting machine. programming

Production of product specification

Production of knitted shaped products ready for make-up or knitted fabric / garment blanks

Cutting of patterns (as applicable)

CAD – Computer Aided Design techniques and processes

Computer design hardware

- modems
- scanners
- draft readers
- eproms
- card cutters

- optical discs

Computer design software
- discs
- drawing
- painting
- image manipulation
- file formats
- libraries

Uses of CAD
- input designs
- adjust and amend designs
- programme knitting machines
- knit swatches
- transfer image to CAM Computer Aided Manufacture or mechanical systems
- develop a commercial product

Analysis of two knitted fabrics of different construction and for each
- produce fabric notations
- measure fabric parameters
- carry out calculations

Learning Outcome 3. Understand the processes involved in knitwear and knitted product manufacture

Pattern cutting
- tools and equipment used for pattern cutting
- importance of accurate measurements
- different cutting media
- how to produce a basic block to sample size
- cutting a basic knitwear pattern
- style development – necks / sleeves and shoulder styles, gathers / tucks / pleat features, principles of seam allowance in making-up

Grading and sizing
- size charts
- sizing for different agencies / customers – BSI / MandS / Euro
- computer pattern grading and drafting
- manual pattern grading – basic blocks and nests of grades
- calculating grade increments

The processes involved in garment/product construction
- cutting room techniques
- lay planning for optimum fabric usage
- marker making
- identifying cut / shaped garment pieces

- handling knitted fabrics and structures
- interpreting working drawings and specification sheets
- procedures for making up garments - sewing, linking, mock linking
- production methods
- seam types and tolerances
- presentation and finishing of garments / products - pressing, ironing, get-up

The processes involved in cut and sew knitwear, outerwear and construction

Processes

- cutting room techniques
- lay planning for maximum fabric usage
- marker making
- identifying cut / shaped garment pieces
- sewing and handling a range of knitted fabrics and structures
- interpreting a working drawing and specification sheets
- procedures for making-up garments – machine types,
- production methods / seam types and tolerances
- presenting and finishing garments / products – pressing / ironing / get up

Quality control procedures for knitted products

- monitoring procedures - quality checks
- fabric variations
- make-up faults – defective work / seconds / waste control
- quality control production charts

Product / garment production sequences

Fully fashioned / shaped knitwear

- style - man's crew neck sweater - cable pattern
- fibre / yarn - Botany wool
- type of production - fully fashioned / shaped knitwear
- method of production - straight bar knitting machine - fine gauge 21,18
- make up - mock linked

Cut and sew knitwear

- style - child's striped jumper
- fibre / yarn – acrylic / wool blend
- type of production - cut and sew knitwear
- method of production - V bed machine or circular garment length machine - 5, 8 and 10 gauge
- make up - cut and sew

Whole garment knitting

- style - woman's round neck jumper

- fibre/yarn - 100% cashmere
- type of production - integral knitting/ shaped whole garment
- method of production - V bed knitting – 5, 8 and 10 gauge
- make up – linking

Dress wear from piece goods knitted fabric
- style - woman's two piece suit
- fibre / yarn - wool
- type of production - Jacquard patterned double jersey from a circular double cylinder knitting machine
- make up - cut and sewn

Underwear
- style - woman's vest
- fibre / yarn - thermal wool
- type of production - tubular light weight fabric from a single cylinder circular knitting machine (small diameter)
- make up - cut and sewn

Fine gauge hosiery
- style - women's tights
- fibre / yarn -10 denier nylon with elastane
- type of production - Individual legs knitted on single cylinder machines and toes closed

Coarse gauge hosiery
- style - patterned men's socks
- fibre / yarn – wool / nylon blend
- type of production - Individual items knitted on double cylinder machines, toes closed and socks paired

Making-up machines

Sewing / finishing machines
- lockstitch
- overlock
- flatlock
- button hole / button sew / bartack
- cup seam
- line closing
- toe closing

Linking machines
- point to point linking
- mock linking
- random linking

Miscellaneous / finishing operations

- embroidery
- hand operations
- heat setting
- pressing / boarding

Knitting machine capabilities and characteristics

Basic operating procedures
- threading up machines
- setting up machines
- changing parts – needles/knitting elements
- adjusting machine
- setting stop motions
- selecting and setting machines appropriate for fabric and product

Preparation of yarn for knitting
- winding
- dressing

Circular knitting machines – rib / purl – V bed and circular cut and sew knitwear
- links / links
- Jacquards

Flat bed and V bed knitting machines – rib / purl – shaped / fully fashioned knitwear – see Stitch effects below
- links / links
- Jacquards
- intarsia
- cable
- racked ribs

Whole garment knitting – shaped whole garments – integral knitting

Straight bar knitting machines – fully fashioned / shaped knitwear
- plain
- shaped
- openwork

Knitting action for bearded needles
- loop transfers for bearded needle knitting

Fine and coarse gauge hosiery machines – tights, stockings and socks
- plain
- patterned
- openwork

Stitch effects – knitted texture and pattern

- Jacquards – 2, 3 and 4 colour patterns
- intarsia – transfer stitch designs such as Argyle checks
- cable – design effects with two/three dimensional effects
- racked ribs – variable rib effects formed by movement of one knitting bed against the other

The mechanisms of knitting machines
- machine protection devices
- machine drives
- positive yarn feeding devices
- fabric take down assemblies
- needle selection systems
- fabric quality systems
- stop motions
- computer controlled actions
- mechanical control systems

Calculations and costings production for knitted products
- specification sheets
- measurements of wales per cm and courses per cm
- stitch density (SD)
- weight of cut knitted fabric blanks or body lengths
- amount of yarn per unit area
- mass (wt) per unit area
- mass(wt) per running metre
- production efficiency calculations - costings, timings
- efficiency downtime calculations
- percentage composition by length
- customer requirements and pricing policy

Produce calculations and costings for two knitted products

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Textile Testing

Unit Reference	**D/502/2283**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding about textile testing. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.6)** ***The learner can***
1. Understand the principles and methods of textile testing	**1.1** Describe basic procedures for textile testing **1.2** Explain the different systems for calculating and presenting test results **1.3** Identify the tests required for four products. Prepare samples and carry out tests on them **1.4** Record and validate the data produced from the tests **1.5** Carry out calculations
2. Understand the procedures for calibrating testing equipment	**2 1** Explain the procedures and routines for calibrating equipment **2.2** Describe the methods of calibration for three types of testing equipment **2.3** Carry out calibration procedures on two pieces of testing equipment complying with health and safety requirements

	2.4 Maintain records of calibration activities
3. Understand how to maintain equipment	**3.1** Identify and explain the type and use of the main lubricants and tools used to maintain equipment **3.2** Explain the planned maintenance processes for equipment **3.3** Analyse the advantages and disadvantages of these processes **3.4** Produce a checklist for a planned equipment maintenance routine **3.5** Describe and explain fault finding principles and techniques **3.6** Select a minimum of four equipment faults in testing equipment. Identify the causes and carry out methods of rectification safely

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, 22, 23, 24, 25, 29, 34, 35, 36

Supporting Unit Information

D/502/2283 Textile testing - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and methods of textile testing

Basic procedures for textile testing
Preparation
- preparation of the sample to SOPs (Standard Operating Procedures)
- identification of the sample
- selecting appropriate test methods
- selecting appropriate testing equipment
- checking that equipment is fit for purpose and in calibration

Controlled conditions and variables
- standard atmosphere
- appropriate controlled conditions
- acceptable limits of test variables
- approved tolerance limits
- controlling variables
- methods of dealing with deviations

Recording and validating data systems
- methods of collecting data
- methods of recording data
- completing and maintaining records
- validating results and data

Presenting test results
- difference between normal and non-normal frequency distribution
- how to plot histograms
- cumulative frequency curves
- frequency polygons from data
- presentation of data using manual and electronic methods
- effect of objective/subjective testing on results

Calculating test results
- statistical and mathematical techniques applicable to data

Testing equipment and conditions
Equipment
types of testing equipment
servicing equipment

faults that occur in equipment
corrective action regarding faults

Health and safety and environmental issues
- control factors
- types of waste
- waste disposal
- types of hazards and risks

Controlled conditions
- temperature
- humidity
- light source
- sample storage and logging
- calibration of equipment

Types of tests – physical and chemical
Yields
- oil extraction
- moisture content

Air
- air permeability
- air porosity

Fabric properties
- tearing
- strength
- rubbing
- snagging
- ballistics
- bursting
- seam slippage

Colour fastness
- grey scales
- fastness to
  - washing
  - light
  - rubbing
  - perspiration
  - dry cleaning
  - carpet shampooing

Wearing properties
- abrasion
- pilling

- snagging
- laboratory trials
- user trials

Stiffness, handle and drape in relation to
- bending length
- flexural rigidity
- bending modulus
- crease recovery

Fibre and yarn testing - slivers and yarns
Classify natural and man-made fibres
- vegetable fibres
  - chemical construction
  - fine and gross structure
  - source
- animal fibres
  - chemical construction
  - fine and gross structure
  - source
- man-made fibres
  - chemical construction
  - fine structure
  - source

Slivers
- neps
- trash/vegetable matter
- solvent soluble material

Fibre identification - physical and chemical tests
- properties of fibres
  - length
  - fineness
  - strength
  - impurities
  - colour
- fibre identification using physical tests
  - microscopy
  - burning
  - staining
  - melting
- solvent testing
  - acids
  - alkalis
- Identification of Textiles fibres – Textile Institute

Classify yarns

- staple fibre yarns
  - short
  - long
- worsted and semi-worsted
  - cotton
  - flax
  - silk
  - wool and hairs
- continuous filament yarns
  - viscose
  - acetate and tri-acetate
  - polyamide
  - polyester
  - acrylic
- fancy yarns
  - metallic
  - special purpose and effect

Yarn counting systems

- direct
- indirect

Yarn parameters

- twist
- strength
- regularity
- yarn friction
- yarn irregularity
- Martindale's theory
- index of irregularity
- levelness

Testing fibres / yarns

- classification and analysis of variation
- relaxation of fibres / yarns
- Crimp testing
- ballistics
- constant tension winding tests

Properties of fibres

- length
- fineness
- strength
- trash

Wool

- medulation / lumen
- coloured fibres
- skin wools

Man made fibres

- married fibres
- fused fibres

Standard testing procedures for the following
International quality standards

- BSI - British Standards
- ASTM - American Standards Testing
- ISO - International Standards Organisation
- EN - European Standard (European Committee for Standardisation)

Standard Atmosphere Testing in relation to temperature and humidity

Customer standards and trademarks

- Woolmark
- Sanforize
- Lycra

Properties of water and water / fabric relationships
Effects of moisture

- **forces of attraction**
  - primary water
  - secondary water
- **effect on textiles**
  - increase in strength
  - decrease in strength
- **official regain and effect on yarn count**
  - measurement of regain
  - conditioning oven
  - electronic methods
  - calculation of regain
  - calculation of correct invoice weight (mass)

Water and fabric relationships

- water resistance
- absorption
- shrinkage

Water properties

- water hardness
- metallic impurities
- pH

Methods of sampling

- small selection from a large source
- random sampling
- sample number calculations
- sample size
- frequency of testing – length of intervals

Different systems for calculating and presenting test results

- Normal and non-normal frequency distribution
- Quality control charts
- Sample procedures
- Sample size and interval between tests
- Significance (t and F test)
- Confidence limits and accuracy

Learning Outcome 2. Understand the procedures for calibrating testing equipment

Calibration equipment and methods

- standard units of measurement
- marking requirement
- integrity of equipment and materials against standards
- storage and handling conditions
- repair and disposal of faulty equipment

Procedures and routines for calibrating equipment

- Standard Operating Procedures - equipment set up
- health and safety requirements
- controlled conditions – standard atmosphere
- specified intervals
- integrity of standards
- labelling systems – PAT testing
- calibration records – internal and external
- traceability / verification / valid certification
- abnormal occurrences and non-calibration
- acceptable tolerances – adherence to specification

Principles and importance of calibration

- correct set up of equipment
- traceability of tests
- impact of non-conformance
- referral to internal and external standards
- referral to Internal Standards Organisation
- verification
- valid certification

Calibrate two pieces of testing equipment
- Comply with health and safety requirements
- Apply applicable quality standards

Methods of recording results
- Record results for two pieces of testing equipment
- Select appropriate recording methods

Learning Outcome 3. Understand how to maintain equipment

Types and uses of lubricants and tools
Lubricants
- synthetic
- organic
- mineral
- application systems

Tools and their functions
- types of tools
- Functions – dismantling, assembling, adjusting parts of machines and equipment

Processes involved in maintaining equipment

Planned preventative maintenance
- procedures
- recording systems

Compare different approaches to maintenance
- advantages
- disadvantages

Prepare a checklist of planned preventative maintenance

Fault finding principles and techniques
- name and type of fault
- appearance of fault
- cause of fault
- effect of fault
- corrective action
- preventative action
- fault analysis records

For a minimum of four equipment faults in testing equipment identify causes and carry out methods of rectification safely
- setting up test equipment
- preparing the test sample

- isolation requirements
- safe working practices
- isolation procedures
- identifying defective equipment
- stopping use of defective equipment
- replacement of faulty equipment/parts
- fitting
- purchase of parts

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Managing Own Relationships within Textile Production

Unit Reference	**M/502/6399**
Level	**3**
Credit Value	**9**
Guided Learning Hours	**60**
Unit Summary	This unit will enable the learner to develop skills in managing their own time in the workplace. It will assist the learner to understand and deal with their peer group and managers above their own level of responsibility. They will explore the positive aspects of the role an individual and manager can play within a team. Assessment must be linked to the real work environment
Learning Outcomes (1 to 6) ***The learner will***	**Assessment Criteria (1.1 to 6.1)** ***The learner can***
1. Understand how to communicate with their colleagues within the workplace	**1.1** Demonstrate the benefits of effective communication in the workplace, which may include • verbal • non-verbal • internal media • external media
2. Be able to minimise disruption in the workplace and deal with any problems	**2.1** Discuss and deal with problems as they arise to minimise disruption in the workplace
3. Understand the role of an individual in	**3.1** Provide evidence of workplace organisation that demonstrates their own responsibility for

fulfilling the aims of an organisation	maintaining health, safe and productive work conditions that comply with company procedures
4. Be able to undertake professional self-development	**4.1** Provide examples of own CPD and action plan to achieve objectives **4.2** Discuss and verify action plan with a senior manager
5. Be able to make decisions, manage their objectives and activities efficiently	**5.1** Produce a document detailing a typical working week, to show evidence of effective time management. This may include reference to • agreeing and prioritising own objectives • planning own time • decision making • rescheduling own activities as appropriate
6. Be able to manage their resources in the workplace	**6.1** Manage and maintain their resources in the workplace

Mapping to National Occupational Standards
B6 – Provide leadership in your area of responsibility
D2 – Develop productive working relationships with colleagues and stakeholders
A2 (SK1) – Manage your own resources and professional development

Supporting Unit Information

M/502/6399 Managing own relationships within textile production – Level 3

Indicative Content

Learning Outcome 1. Understand how to communicate with their colleagues within the workplace
Could explore paths of communication. Use of a variety of media, verbal/non-verbal, written and feedback. Respect for peer group and managers. Accurate records.
Need to identify most appropriate methods

Learning Outcome 2. Be able to minimise disruption in the workplace and deal with any problems
Identify aims of the organisation. Own responsibility.

Employ range of problem solving techniques. Contingencies that may occur. Selection of most appropriate for situations.

Also need to take into account organisations policies and procedures

Learning Outcome 3. Understand the role of an individual in fulfilling the aims of an organisation
Knowledge of responsibilities in relation to Health and Safety. Could be responsibility for self and others.

Need also to have knowledge of company policies and procedures

Learning Outcome 4. Be able to undertake professional self-development
Gather feedback on own performance. Assess own level of performance.
Recognise importance of self-development.
Set objectives.

Learning Outcome 5. Be able to make decisions, manage their objectives and activities efficiently
Recognise the importance of time management and time estimation
Learn how to prioritise own work.
Be able to consider contingencies and have plans in place

Learning Outcome 6. Be able to manage their resources in the workplace
Resources are not just physical, but human resources

Importance of the workstation. Health and Safety. Personal organisation at work. Setting examples to others.

Teaching Strategies And Learning Activities

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Methods Of Assessment

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Leading Teams within Textile Technologies

Unit Reference	**A/502/2291**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to develop potential team leaders' underpinning knowledge of effective team leading methods and practices. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.4)** ***The learner can***
1. Understand the team leadership role	**1.1** Explain the role of the team leader **1.2** Analyse the characteristics of different leadership styles and approaches **1.3** Analyse effective team leader communication procedures
2. Understand the importance and principles of team development	**2.1** Explain the importance of team development for the business and the individual **2.2** Evaluate the monitoring systems used in a chosen organisation to enhance team and individual performance
3. Understand the role of meetings within an organisation	**3.1** Analyse the types of meetings that a textile company holds, looking at • their purpose • whether formal or informal • the types of papers are produced • the effectiveness of the meetings

	3.2 Evaluate the communication strategies needed by a chairperson to achieve the meeting's objectives **3.3** Plan and conduct a production meeting **3.4** Review the effectiveness of the meeting in relation to its objectives achieved
Mapping to National Occupational Standards This unit has been mapped to Manufacturing Textile Products NOS (2010) TEX 21, MSC B5, D5	

Supporting Unit Information

A/502/2291 Leading teams within textile technologies - Level 3

Indicative Content

Learning Outcome 1. Understand the team leadership role
Role of the team leader
Leadership qualities
- decision making
- integrity
- credibility
- flexibility
- listening skills
- accessibility

Responsibilities and accountability
- personalities
- attitude
- experience

Principles, procedures and practices of decision making

Motivating and involving team members

Different leadership styles and approaches
Autocratic team leader
- direct
- tell

Laissez-faire team leader
- delegate

Democratic team leader
- advise
- sell
- consult

Participative team leader
- coach
- share

Effective team leader communication procedures
Verbal
- formal
    - team briefings
    - interviews - selection, disciplinary, counselling, welfare
    - meetings

- presentations
- informal
  - team meetings
  - one to one communications
  - giving instructions

Written
- formal - reports, memos, instructions, presentations, notice board
- informal - e mails, memos, notes

Visual
- products
- specifications
- work manuals
- flow charts
- performance charts

Learning Outcome 2. Understand the importance and principles of team development

Methods for monitoring and evaluation

Monitoring
- performance records
- attendance records
- assessments
- self assessment

Evaluating
- against agreed outcomes
- against agreed targets
- benchmarking
- against company norms
- against industry norms

Methods for appraisal
- appraising
- performance development
- 360º appraisal

Methods of effective feedback

Providing effective feedback to team members
- praising
- reprimanding
- positive feedback/negative feedback - on-going, informal, formal
- confidentiality when carrying out and reporting assessments
- right time and place
- encouragement
- respect
- constructive suggestions on how performance can be improved

- clear and accurate feedback
- reporting and recording

Learning Outcome 3. Understand the role of meetings within an organisation

Describe the communications needed to set-up a meeting

- setting of agendas
- identifying who should attend
- distribution of papers
- pre meeting information

Identify different sorts of meeting

- formal
- informal

Explain the roles of people in a meeting

Chairperson

- lead
- guide
- control
- summarise

Secretary

- distribution of pre meeting papers
- circulation of agenda
- advising attendees of date, venue and arrangements
- minute taking
- distribution of minutes

Attendees

- prepare for meeting
- listen
- contribute
- follow-up actions

The values and limitations of meetings

- effective way of communications information
- the opportunity to discuss issues
- an effective form of consultation
- decision making
- time consuming
- unhelpful arguments and digressions

Communication strategies for meetings

- presenting information clearly
- avoiding unhelpful interruptions
- giving feedback on activities
- suggesting alternatives
- clarifying objectives of the meeting

- ensuring decisions are within the authority of the meeting

Teaching Strategies And Learning Activities

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Aspects of Design within the Textile Industry

Unit Reference	**Y/502/6400**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**40**
Unit Summary	This unit covers the various stages in the design process. Learners will learn how mood boards, market research and customer profiling can be used to help develop designs. They will also learn how to communicate their ideas through a variety of drawing and other techniques, and will have the opportunity to develop a number of designs based on the analysis of their own research. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.1)** ***The learner can***
1. Understand the sector market and how trends are predicted	**1.1** Demonstrate how to predict trends of the sector's market, including • seasonal trends • design functions
2. Be able to communicate ideas and technical information through different media	**2.1** Use different media to communicate ideas and technical information, including • a research sketch book • mood/story boards • design development sheets • information technology
3. Be able to select and use a wide range of media to produce a range of fashion	**3.1** Present final designs, including • presentation drawings • working drawings

illustrations	

Mapping to National Occupational Standards
Manufacturing Textile Products NOS (2010):
Text 30

Supporting Unit Information

Y/502/6400 Aspects of design within the textile industry – Level 3

Indicative Content

Learning Outcome 1. Understand the sector market and how trends are predicted
How to research design trends, competitor markets and market developments
Sources of records, archives and sample libraries and how to make effective use of them
Identifying relevant data and how to use them
Sources of information regarding legislative requirements

Learning Outcome 2. Be able to communicate ideas and technical information through different media
Identify and assess customer requirements
Research alternatives for realising customer requirements
Select suitable materials and components
Develop the initial design concept
Consider cost constraints on the design
Produce a visual interpretation of the design using a variety of formats
Would expect use of I.T.

Could also consider
Production processes and machine capabilities
Materials and their characteristics
Customer pricing structures and policies
How to establish the fitness for purpose of the textile product
The construction of textile products
Types of visual interpretation
How to maintain records
Customer sampling procedures
Customer approval procedures

Learning Outcome 3. Be able to select and use a wide range of media to produce a range of fashion illustrations
Could consider the following
Identifying customer requirements and assessing how they can be met
Conducting research and gather relevant information to enable customer requirements to be met
Interpreting and incorporating customer requirements into the initial design and selecting an appropriate method to visually present it
Producing a visual interpretation of the design for presentation to the

customer and obtaining customer approval to proceed with development
Gathering and collating relevant information for design development from appropriate people
Recording customer requirements accurately and fully
Identifying and selecting appropriate materials and components to meet requirements
Providing information on sources of supply of materials and components to the appropriate people
Developing designs which take into account customer cost constraints
Providing accurate information and prototype design specification for sample production

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Professional Practice / Preparation for Employment within the Textile Industry

Unit Reference	**D/502/6401**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**40**
Unit Summary	This unit is designed to help prepare learners for a role within the textile industry. The work will cover current professional practices and the uses of computer-based technology to produce high quality paper based personal presentations. The work will cover the production of detailed reports and the methods used to present oneself in a business situation. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.1)** ***The learner can***
1. Understand the workings of a company specific to the sector the learner is working/intends to work in	**1.1** Produce a report giving an overview of their chosen company
2. Be able to produce a report to meet a specific task	**2.1** Produce a report which • details an item of professional practice in the specific area of expertise investigated by the learner • includes any suggested opportunities for improvement which could be made
3. Be able to produce	**3.1** Produce a range of paper based items to be

business contextualised paperwork, giving information about oneself	used in a business context, including • computer generated CV • business card • letter of application for a real of fictional position
Mapping to National Occupational Standards Manufacturing Textile Products NOS (2010): MSC B1	

Supporting Unit Information

D/502/6401 Professional practice / preparation for employment within the textile industry – Level 3

Indicative Content

Learning Outcome 1. Understand the workings of a company specific to the sector the learner is working/intends to work in

Need to look at
What the business does – the market it operates in
The type/size of the business, e.g. sole trader, partnership, private/public limited, franchise, national/multinational etc
It's organisational structure - various departments, how they link together, the communication systems in place, how the individual's role fits into the overall
Links with other companies, e.g. suppliers, customers
Profile of work force

Learning Outcome 2. Be able to produce a report to meet a specific task

Learner needs to be given a real/simulated report to complete which should provide opportunities for extended research
Production of report should be in line with company policies and procedures
Presentation should take into account professional protocols and practices
Report can be written or as an oral presentation. If oral presentation learners should have written evidence to support their research, findings and recommendations in line with company policies and procedures, professional protocols and practices

Learning Outcome 3. Be able to produce business contextualised paperwork, giving information about oneself

Learner needs to be given a real/simulated tasks to produce paper work appropriate for the tasks, and in line with company policies and procedures, professional protocols and practices
The list in the assessment criteria is not exclusive, but any evidence produced should include the documents listed

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Buying Including Import/Export within the Textile Industry

Unit Reference	**H/502/6402**
Level	**3**
Credit Value	**9**
Guided Learning Hours	**60**
Unit Summary	This unit will enable the learner to understand the principles of buying external goods and services particularly related to outsourced products and production. Assessment must be linked to the real work environment
Learning Outcomes (1 to 6) ***The learner will***	**Assessment Criteria (1.1 to 6.1)** ***The learner can***
1. Understand cost principles and its application to the textile industry	**1.1** Define cost principles and its application to textile manufacture
2. Know how to research outsourced manufacturing capabilities using various methods	**2.1** Identify methods of finding outsourced manufacturing capabilities
3. Be able to evaluate the costs and logistics of outsourced production	**3.1** Demonstrate how to outsource a product as if it were being outsourced to another country for manufacture
4. Know about social and cultural diversity	**4.1** Identify the cultural issues that could surround the manufacturing of the product in this country

of differing locations	
5. Understand the legal requirements of importing and exporting products	**5.1** Describe the legal requirements of • importing products • exporting products
6. Know how to maintain quality control procedures for outsourced products and services	**6.1** Describe how to maintain quality control procedures for outsourced products and services
Mapping to National Occupational Standards Manufacturing Textile Products NOS (2010): MSC B8 – Ensure compliance with legal, regulatory, ethical and social requirements	

Supporting Unit Information

H/502/6402 Buying including import/export within the textile industry – Level 3

Indicative Content

Learning Outcome 1. Understand cost principles and its application to the textile industry

Cost principles e.g.

- direct/indirect
- fixed/variable
- view in relation to Sales and Profit
- allowable/unallowable
- reasonable/unreasonable
- necessary/unnecessary

Learning Outcome 2. Know how to research outsourced manufacturing capabilities using various methods

Use various sources such as internet, recommendation, employer organisations, trade associations, etc.
Need to have clear ideas of what want, what prepared to pay etc.
Clear idea about why outsourcing e.g.

- cost savings
- enable focus on Core Business
- cost restructuring
- improving quality
- accessing Operational expertise/talent
- capacity management
- catalyst for change
- enhance capacity for innovation
- reduce time to market

Learning Outcome 3. Be able to evaluate the costs and logistics of outsourced production

Learners need to be presented with a scenario to complete the exercise as laid out in the assessment criteria.
Consider all the issues above and apply to situation

Have to consider
Quality issues, cost, security, regulation etc

Learning Outcome* 4. *Know about social and cultural diversity of differing locations

Need to be aware of these issues and how these might impact on practices, use of materials etc

Moral and Ethical issues

Learning Outcome* 5. *Understand the legal requirements of importing and exporting products

Trade tariffs. Legal aspects of labels and descriptions – importing.

As an exporter –

- Check any export restrictions, such as whether an export licence is required
- Check the legal requirements in the destination country. These include whether an import licence is needed, local product standards, labelling requirements, restrictions on marketing and so on.
- May also want to take steps to protect your intellectual property - for example, with an overseas patent or trade mark registration.
- The export contract should make it clear what your responsibilities for delivery are, including who will handle overseas taxes and customs clearance.
- Essential to confirm what customs tariffs are payable and who is responsible for payment. Negotiating the right payment method is vital. Enforcing contracts overseas can be difficult and expensive, particularly in countries outside the EU. Unless you know and trust the customer, you may want to insist on a payment method such as a letter of credit.

As an importer

- Check UK import regulations which may impose bans or licensing requirements on some products.
- Check that any import meets UK requirements in terms of product safety, labelling and so on. Check whether you are likely to be affected by any overseas regulations in the country where you are sourcing the supplies - for example, any local export taxes or requirements for an export licence.
- Check requirements for customs clearance
- Check if import duty and VAT may be payable; customs duty rates depend on the product and country of origin.

Learning Outcome* 6*. Know how to maintain quality control procedures for outsourced products and services

Check have the following questions been answered

- Is this really value for money?
- How much will it cost in the longer term, i.e. more than say 3-5 years?
- Is there a likelihood of regular increases in charges thus reducing any possible
- projected savings?
- What do we do if costs escalate? Are there other providers of similar services?
- Can we really afford to lose control of certain areas of our business

and more
- importantly those connected to databases and communication networks?
- Have we assessed the likely effects on our customers?
- What is the fallback position should the outsourcing not be successful?
- Can we trust the chosen company to deliver to our standards?
- How quickly could we bring services back 'in-house' if there is a problem?
- Is this really in the best interests of all the company stakeholders?

Could establish an 'inhouse' manager and support team, drawn together from the various outsourced specialist areas, to scrutinize the contracts and the level of services that are provided by the company with the outsourced contract. This team should be tasked to liaise and negotiate directly with the providers to ensure that quality, timing, standards, delivery schedules, and most of all costs, are meeting demands.
Outsourcing requires managerial and financial control fro success.
Any quality checking needs to be costed.

Teaching Strategies And Learning Activities

Centres should adopt a delivery approach which supports the development of their particular learners. The aims and aspirations of all learners, including those with identified special needs, should be considered and appropriate support mechanisms put in place.

This qualification is designed to provide underpinning knowledge to the competence based units in the apprenticeship framework.

Any teaching activities need to relate to realistic work situations.

If learners are undergoing an induction programme within an organisation, this should be the teaching and learning vehicle which is used to deliver the unit.

Learners could be encouraged to discuss their experiences. This could involve exchanging information about different businesses if learners are in work situations.

Methods Of Assessment

This unit will be internally assessed, internally and externally moderated via a learner's portfolio and other related evidence, against the unit outcomes and assessment criteria.

Minimum requirements when assessing this unit
ABC expects that staff will be appropriately qualified to assess learners against the outcomes and criteria within the units. Generally teaching staff should be qualified and/or vocationally experienced to at least a level above that which they are teaching.

Evidence Of Achievement

All learners must complete a portfolio of evidence that shows achievement of all the relevant learning outcomes and assessment criteria

Centres will need to devise assessment tasks which should be practical wherever possible. These tasks could be put together into one overarching assignment for the unit, or be a series of smaller separate tasks.

Evidence presented is not prescribed for each learning outcome. It could typically include

- Product evidence
- Observation reports
- Oral / written questions and answers
- Reports / notes
- Worksheets / workbooks
- Witness statements
- Taped evidence (video or audio)
- Photographic evidence
- Case studies / assignments
- Interview / discussion

This is not an exhaustive list and learners should be encouraged to develop the most appropriate evidence to demonstrate their achievement of the learning outcomes and assessment criteria.

All evidence must be clearly signposted and made available for the external moderator upon request.

For more information on assessment and evidence collection, please refer to the ABC Awards web site.

Additional Information

All learners must complete a Declaration of Authenticity and include it in their portfolio. The Declaration of Authenticity can be found on the ABC web site www.abcawards.co.uk under Fashion and Textiles.

Manage Information for Action within the Textile Industry

Unit Reference	**K/502/6403**
Level	**3**
Credit Value	**8**
Guided Learning Hours	**50**
Unit Summary	This unit will enable the learner to understand the efficient management of information within a given area of responsibility. It covers the gathering of information needed, providing information needed by a team leader, advice to others and the holding of meetings. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.3)** ***The learner can***
1. Understand the importance to a team leader of gathering all types of valid information	**1.1** For a given situation, detail the information that would need to be gathered before any action is taken. This should include • the location • type • validity • any problems envisaged in obtaining the documentation
2. Understand the importance of effectively communicating the types of information and advice which other people may require	**2.1** Demonstrate to employees the principles involved in effective communication to be used in a workplace (shop-floor or office)

3. Understand the factors to be considered when organising, leading and recording the outcomes of meetings	**3.1** Set up, organise and chair a meeting **3.2** Produce details of the meeting, including • notice of meeting • agenda • minutes • actions **3.3** Produce a critical self-appraisal as to the choice of the leadership style used and the effectiveness of the meeting
Mapping to National Occupational Standards Manufacturing Textile Production NOS (2010): MSC B5 , D2	

Supporting Unit Information

K/502/6403 Manage information for action within the textile industry – Level 3

Indicative Content

Learning Outcome 1. Understand the importance to a team leader of gathering all types of valid information

Consider

- Information handling – the importance of gathering, validating, and analysing information to the team and organisational effectiveness and the team leader's role and responsibility in relation to this.
- Types of information – both qualitative and quantitative that are essential to the role and responsibilities of a team leader.
- How to gather the information needed for the role of a team leader and the types of problems that may occur when gathering the information, and how to overcome them.
- How to store and record the information a team leader may need

Learning Outcome 2. Understand the importance of effectively communicating the types of information and advice which other people may require

Consider

- How to give information and advice effectively both orally and in writing.
- The importance of confirming the recipient's understanding of the information and advice provided, and how to do this.
- The importance of seeking feedback on the quality and relevance on the information provided and how to encourage and enable feedback.
- The types of information and advice that other people may require.
- The principles of confidentiality when handling information and advice; the types of information and advice, which may be provided to different people within the policies, procedures, and resource constraints of the organisation.

Learning Outcome 3. Understand the factors to be considered when organising, leading and recording the outcomes of meetings

Consider

- Leadership styles which can be used to run meetings and how to mange discussions
  so that the objectives of the meeting are met.
- How to determine if a meeting is the most effective way of exchanging information and making decisions and possible other alternatives that may be used.
- Recording outcomes and actions

Teaching Strategies And Learning Activities

Centres should adopt a delivery approach which supports the development of their particular learners. The aims and aspirations of all learners, including those with identified special needs, should be considered and appropriate support mechanisms put in place.

This qualification is designed to provide underpinning knowledge to the competence based units in the apprenticeship framework.

Any teaching activities need to relate to realistic work situations.

If learners are undergoing an induction programme within an organisation, this should be the teaching and learning vehicle which is used to deliver the unit.

Learners could be encouraged to discuss their experiences. This could involve exchanging information about different businesses if learners are in work situations.

Methods Of Assessment

This unit will be internally assessed, internally and externally moderated via a learner's portfolio and other related evidence, against the unit outcomes and assessment criteria.

Minimum requirements when assessing this unit
ABC expects that staff will be appropriately qualified to assess learners against the outcomes and criteria within the units. Generally teaching staff should be qualified and/or vocationally experienced to at least a level above that which they are teaching.

Evidence Of Achievement

All learners must complete a portfolio of evidence that shows achievement of all the relevant learning outcomes and assessment criteria

Centres will need to devise assessment tasks which should be practical wherever possible. These tasks could be put together into one overarching assignment for the unit, or be a series of smaller separate tasks.

Evidence presented is not prescribed for each learning outcome. It could typically include

- Product evidence

- Observation reports
- Oral / written questions and answers
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- Photographic evidence
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Additional Information

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Planning for Textile Production

Unit Reference	**F/502/2292**
Level	**3**
Credit Value	**7**
Guided Learning Hours	**60**
Unit Summary	The aim of this unit is to expand the learner's knowledge and understanding of the production planning process. Assessment must be linked to the real work environment
Learning Outcomes (1 to 3) ***The learner will***	**Assessment Criteria (1.1 to 3.4)** ***The learner can***
1. Understand the principles and functions of production planning	**1.1** Explain the importance of specifications and scheduling **1.2** Describe the principles of production planning **1.3** Explain the processes involved in production planning **1.4** Develop a specification to cover customer and production requirements
2. Understand the resource requirements of production planning	**2.1** Describe the process of carrying out production planning calculations **2.2** Calculate the machine capacity for a given textile machine **2.3** Evaluate the advantages and disadvantages of JIT, KANBAN and OPT **2.4** Produce a production plan for a given textile

	product / order
3. Understand the management systems required for production planning	**3.1** Identify the production planning systems used in textile companies **3.2** Assess the advantages and disadvantages of the various production systems **3.3** Identify any potential problems that can occur in planning and the possible solutions **3.4** Identify the financial implications involved in production planning and the control systems needed

Mapping to National Occupational Standards
This unit has been mapped to Manufacturing Textile Products NOS MTP11, MTP18, MTP27, MTP33, MTP40, MTP41, MTP44, MTP45, MTP46

Supporting Unit Information

F/502/2292 Planning for textile production - Level 3

Indicative Content

Learning Outcome 1. Understand the principles and functions of production planning

Importance of specifications and scheduling

Establishing specifications to describe

- customer requirements
- production requirements

Maintaining production to schedule

Amending production schedules to accommodate altered priorities

Principles of production planning

Control and manipulation of materials, human resources, machines and information

- materials – raw materials and component parts
  - lead times
  - availability
- human resources
  - trained and available labour
  - overtime
  - work methods – shift systems / patterns
  - additional labour as required
- production capacity
  - machine types
  - technical capability of machinery
  - performance characteristics / speeds
  - availability of machines
  - change / set-up times
  - additional capacity
- information
  - availability of resources
  - customer requirements
  - delivery dates
  - priority orders
  - lead times for materials
  - delays
  - production / quality problems
  - costings
  - additional production sourcing
  - customer requirements

- methods of transportation / logistics
- warehousing / storage
- payment arrangements

Processes involved in production planning

Production planning calculations

- loading calculations
- calculation of total production time

Monitoring and evaluating processes

- work on an on-going basis
- existing orders and work in progress
- surplus and short fall of finished goods stock
- customer / order priorities
- re-defining priorities
- plant and labour priorities
- stock levels of materials
- remedial action to be taken

Learning Outcome 2. Understand the resource requirements of production planning

Production planning calculations

Calculation of total production time (how much by when)

- manufacturing specification - type of machinery and availability
- production specification - work study methods, timings, costings
- production capacity - labour force, machinery, work in progress, batch / order sizes
- stock control – electronic / manual methods of stock control, minimum / maximum levels, ordering methods, lead times

Production methods

JIT, KANBAN and OPT relate to business production models

Procedures for processing orders

- production capacity
- prioritising orders
- delivery dates
- stock levels
- raw materials and component availability

Throughput and delivery data calculations

- production calculations
- lead times / lag times
- re-define priorities

Planning systems

- balancing production capacity with customer requirements

- load control – availability of materials, labour and machines
- set up times for new lines – changing / preparing machines
- balancing production lines and departmental production

Learning Outcome 3. Understand the management systems required for production planning

System requirements for production planning

Factors involving management of planning

- labour
- materials
- orders
- quality control

Procedures

Control system requirements for production planning

Production control systems

- computerised control
- location and storage of goods and materials
- progress of work
- methods of payment
- quality control
- delivery records

Ledger controlled systems and delayed access systems

Visual control systems

- semi delayed access systems
- semi visual control panel

Progress control systems – immediate access system

Teaching Strategies And Learning Activities

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This qualification is designed to provide underpinning knowledge to the work based situations and teaching activities need to relate to realistic work situations.

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Recognition of Prior Learning (RPL), Exemption and Credit Transfer

ABC Awards policy enables learners to avoid duplication of learning and assessment in a number of ways:

- Recognition of Prior Learning (RPL) – a method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and do not need to develop through a course of learning.
- Exemption - Exemption applies to any certificated achievement which is deemed to be of equivalent value to a unit within ABC qualification but which does not necessarily share the exact learning outcomes and assessment criteria. It is the assessor's responsibility, in conjunction with the Internal Moderator, to map this previous achievement against the assessment requirements of the ABC qualification to be achieved in order to determine its equivalence.
  Any queries about the relevance of any certificated evidence, should be referred in the first instance to your centre's internal moderator and then to ABC.
  It is important to note that there may be restrictions upon a learner's ability to claim exemption or credit transfer which will be dependent upon the currency of the unit/qualification and a learner's existing levels of skill or knowledge.
  Where past certification only provides evidence that could be considered for exemption of part of a unit, learners must be able to offer additional evidence of previous or recent learning to supplement their evidence of achievement.
- Credit Transfer – ABC may attach credit to a qualification, a unit or a component. Credit transfer is the process of using certificated credits achieved in one qualification and transferring that achievement as a valid contribution to the award of another qualification. Units/Components transferred must share the same learning outcomes and assessment criteria along with the same unit number. Assessors must ensure that they review and verify the evidence through sight of:
  - original certificates OR
  - copies of certificates that have been signed and dated by the internal moderator confirming the photocopy is a real copy and make these available for scrutiny by the External Moderator.

- Equivalencies – opportunities to count credits from the unit(s) from other qualifications or from unit(s) submitted by other recognised organisations towards the place of mandatory or optional unit(s) specified in the rule of combination. The unit must have the same credit value or greater than the unit(s) in question and be at the same level or higher.

ABC encourages its centres to recognise the previous achievements of learners through Recognition of Prior Learning (RPL), Exemption, Credit Transfer and Equivalencies. Prior achievements may have resulted from past or present employment, previous study or voluntary activities. Centres should provide advice and guidance to the learner on what is appropriate evidence and present that evidence to the external moderator in the usual way.

Further guidance can be found in 'Delivering and Assessing ABC Awards Qualifications' which can be downloaded from http://www.abcawards.co.uk/centres-grid-page-move/policies-procedures/

Exemptions

There are no identified exemptions for these qualifications.

Equivalencies

There are no identified equivalencies for these qualifications.

Certification

Learners will be certificated for all units and qualifications that are achieved and claimed.

ABC's policies and procedures are available on the ABC website.

Appendices

Glossary of Terms

GLH (Guided Learning Hours)

GLH is where the learner participates in education or training under the immediate guidance or supervision of a tutor (or other appropriate provider of education or training). It may be helpful to think – 'Would I need to plan for a member of staff to be present to give guidance or supervision?'
GLH is calculated at qualification level and not unit/component level.

Examples of Guided Learning include:

- Face-to-face meeting with a tutor
- Telephone conversation with a tutor
- Instant messaging with a tutor
- Taking part in a live webinar
- Classroom-based instruction
- Supervised work
- Taking part in a supervised or invigilated assessment
- The learner is being observed.

TQT (Total Qualification Time)

'The number of notional hours which represents an estimate of the total amount of time that could reasonably be expected to be required, in order for a learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification.' The size of a qualification is determined by the TQT.

TQT is made up of the Guided Learning Hours (GLH) plus all other time taken in preparation, study or any other form of participation in education or training but not under the direct supervision of a lecturer, supervisor or tutor.

TQT is calculated at qualification level and not unit/component level.

Examples of unsupervised activities that could contribute to TQT include:

- Researching a topic and writing a report
- Watching an instructional online video at home/e-learning
- Watching a recorded webinar
- Compiling a portfolio in preparation for assessment
- Completing an unsupervised practical activity or work

- Rehearsing a presentation away from the classroom
- Practising skills unsupervised
- Requesting guidance via email – will not guarantee an immediate response.