

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number-	2140050	-Session-1990-91
-Superclass-	XS	

-Title-	NEEDLE POSITIONING DEVICES AND MECHANISMS (x¹/₂)
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-DESCRIPTION-

Purpose

This module is designed to provide students with an understanding of and the skills associated with the maintenance and operating procedures of needle positioning devices and mechanisms.

It is intended that this module is taught in conjunction with other related modules to form part of a programme of study which should include complementary industrial experience.

It is aimed at those following a career in clothing machine engineering.

Preferred Entry Level	84350 Maintenance of Lockstitch Machines (x 1.1/2)
	84351 Maintenance of Chainstitch Machines - Single and Two Thread (x 1/2)
	84352 Stitchology and Thread Control
	2140040 Fabric Feeding Mechanisms (x 1/2)
	2140010 Clothing Machining: Manufacturing Technology 1
	64002 Fundamentals of Technology: Mechanical
	64003 Fundamentals of Technology: Electrical

Outcomes	The student should:
	1. outline the use of the automatic positioning of the needle at defined stages of the sewing cycle;
	2. outline the design features of needle positioning devices and mechanisms;

3. outline the importance of accurate synchronisation of the needle down and needle up position in relation to the stitch forming implement and thread take up/pull-off mechanism;
4. rectify faults directly attributed to inaccurate positioning of the needle.

Assessment
Procedures

Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified for each Outcome.

The following abbreviations are used below:

PC Performance Criteria
IA Instrument of Assessment

Note: The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory.)

OUTCOME 1

OUTLINE THE USE OF AUTOMATIC NEEDLE POSITIONING AT DEFINED STAGES OF THE SEWING CYCLE

PCs

- (a) The identification of operative skills and motions which would be improved by the introduction of automatic needle positioning is correct in terms of de-skilling of the operation.
- (b) The identification of operations which can be adapted to automatic needle positioning device/mechanism is correct in terms of a reduction in fatigue and time.
- (c) The outline of benefits derived from the free removal of work at the end of the sewing operation is correct in terms of production and operational factors.
- (d) The identification of benefits derived from the use of machines with needle positioning devices/mechanisms is correct in terms of improved efficiency.
- (e) The identification of the advantages of automatic needle positioning is correct for a range of machines, ancillary equipment and sewing operations.

IA Objective Test

The student will be presented with an exercise consisting of objective items to test the recall of knowledge relating to the use of automatic needle positioning.

The test could take the form of oral or written short answer questions, multiple choice questions or matching exercise.

The test will consist of 12 items based on the Performance Criteria and allocated as follows:

- | | | |
|-----|--------------------------------------------------------------------------------------------------------------|---|
| (a) | identification of operative skills and motions improved by the introduction of automatic needle positioning; | 2 |
| (b) | identification of operations which can be adapted to automatic needle positioning devices/mechanisms; | 2 |
| (c) | benefits derived from the free removal of work at the end of the sewing operation; | 2 |
| (d) | identification of benefits derived from the use of machines with needle positioning; | 2 |
| (e) | identification of the advantages of automatic needle positioning. | 4 |

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student providing at least one correct response for each of (a), (b), (c) and (d) and at least 3 correct responses from (e).

OUTCOME 2

OUTLINE THE DESIGN FEATURES OF NEEDLE POSITIONING DEVICES AND MECHANISMS

PCs

- | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) | The outline of the inter-relationship of components which activate and control needle position is correct in terms of accuracy. |
| (b) | Description of the function of components which affect needle positioning is correct in terms relating to: <ul style="list-style-type: none"> (i) mechanical; (ii) electrical; (iii) pneumatic. |
| (c) | Identification of factors which influence the adaptability of the needle positioning device is correct in terms relating to power machines. |
| (d) | Identification of the service requirements which will arise from the fitting of a needle positioning mechanism to a sewing machine is correct in terms relating to manufacturers specification. |

- (e) Identification of investment factors which effect productivity is correct in terms of cost effectiveness.

IA Objective Test

The student will be presented with an objective test to test the recall of knowledge relating to the design features of needle positioning devices.

The test could take the form of oral or written short answer questions, multiple choice questions or completion exercise.

The test will consist of 14 questions based on the Performance Criteria and allocated as follows:

- | | | | |
|-----|--------------------------------------------------------------------------------------------------|---|---|
| (a) | inter-relationship of components which activate and control needle position | 2 | |
| (b) | function of components which effect needle positioning | 2 | |
| (c) | advantages and disadvantages of the various methods of needle positioning | | 4 |
| (d) | factors which influence the adaptability of the needle positioning device/mechanism; | 2 | |
| (e) | service requirements which will arise from the fitting of a needle positioning device/mechanism; | 2 | |
| (f) | investment factors which effect productivity | 2 | |

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student providing one correct response from each of (a), (b), (d), (e) and (f) and at least 2 correct responses from (c).

OUTCOME 3

OUTLINE THE IMPORTANCE OF ACCURATE SYNCHRONISATION OF THE NEEDLE DOWN AND NEEDLE UP POSITION IN RELATION TO THE STITCH FORMING IMPLEMENT AND THREAD TAKE UP/PULL-OFF MECHANISM

PCs

- (a) Explanation of the term 'needle up' is correct.
- (b) Explanation of the term 'needle down' is correct.
- (c) Identification of the function of the needle positioner is correct in relation to:
- (i) take-up, pull-off mechanism positions;
 - (ii) mounting of synchroniser (position transmitter) on machine pulley;
 - (iii) loop taking position of implements;

(iv) thread trim mechanism.

IA Objective Test

The student will be presented with an objective test to test the recall of knowledge relating to the importance of accurate synchronisation of the needle up and needle down position in relation to the stitch forming implement and take up/pull-off mechanism.

The test could take the form of oral or written short answer questions, multiple choice questions or completion exercise.

The test will consist of 6 questions based on the Performance Criteria and allocated as follows:

- | | | |
|-----|----------------------------------------|---|
| (a) | explanation of the term
needle up | 1 |
| (b) | explanation of the term
needle down | 1 |
| (c) | function of needle
positioner | 4 |

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student providing one correct response from each of (a) and (b) and at least 3 correct responses from (c).

OUTCOME 4

RECTIFY FAULTS DIRECTLY ATTRIBUTED TO INACCURATE POSITIONING OF THE NEEDLE

PCs

- (a) Removal and replacement of the components of needle positioning devices/mechanisms ensure effective operation.
- (b) Adjustment and setting of components ensures correct timing relationship to specification.
- (c) Use of tools is appropriate to the given task.
- (d) Working practices and procedures followed are safe.

IA Practical Exercise

The student will be presented with a practical exercise to test the application of knowledge and skills required to rectify faults directly attributed to inaccurate positioning of the needle.

The student will be required to identify and rectify 4 previously inserted faults relating to inaccurate position of the needle.

The student will be required to remove and replace each specified component and adjust and set each in accordance with the given specification.

Satisfactory achievement of the Outcome will be based on all Performance Criteria being met. This will be demonstrated by the student rectifying at least 3 faults.

The following sections of the descriptor are offered as guidance. They are not mandatory.

CONTENT/CONTEXT

Safety and safe working practices should form an integral part of the module activities during investigation of practical machine operation and the effects produced in relation to the actual sewing/thread trimming performance of the selected machine types.

Corresponding to the Outcomes 1-4:

1. Recognition of the operative skills and motions which are enhanced, simplified or eliminated and the appropriate sewing processes that constitute the use of needle positioning devices/mechanisms:
 - (a) Manual positioning of the sewing machine needle
 - (b) turning of work during specific short seaming tasks eg, pockets, collars, cuffs, zips, and labels etc.
 - (c) removal of work at end of sewing operation
 - (d) economic factors related to production
 - (e) benefits of machines with needle positioning control in relation to:
 - (i) lockstitch machines
 - (ii) chainstitch machines
 - (iii) ancillary equipment
 - (iv) sewing operations

2. Recognition and determination in the choices of design method of needle positioning devices/mechanisms to suit the needs of specific machine type for production requirements in order to evaluate.
 - (a) the mechanical methods used for positioning the needle
 - (b) the electrical methods used for positioning the needle
 - (c) the pneumatic methods used for positioning the needle
 - (d) adaptability of device/mechanism
 - (e) service requirements
 - (f) investment return

3. Importance of the synchronisation between components concerning the needle down/up position with relation to:
 - (a) take-up lever position - lockstitch
 - (b) pull-off position - chainstitch
 - (c) synchroniser (transmitter) position on machine

- (d) stitch forming implements
 - (e) thread trim mechanism
 - (f) position and cutting speed control
 - (g) foot lift
4. Interaction and timing relationship of the different component assemblies; practice in removal and replacement of the components and the use of special tools, gauges and meters to make adjustment to the synchronisation and relative position of components required to control machine speed and auxiliary functions with specific reference to:
- (a) Electrical controls eg, power pack, printed circuit board, transformer, primary fuses etc.
 - (b) Clutch and brake discs
 - (i) setting of clutch - air gap
 - (ii) setting of brake - fly wheel
 - (iii) checking magnetic clutch
 - (iv) electro-mechanical clutch
 - (c) Synchroniser setting - needle position
 - (i) contact sensing
 - (ii) high frequency sensing
 - (iii) light sensing
 - (d) Speed range control setting
 - (i) speed steps - 1 to 12
 - (ii) inching speed
 - (iii) cutting speed
 - (e) Additional functions
 - (i) presser foot lift
 - (ii) back tack
 - (iii) thread wipe
5. Diagnosis, identification and rectification of faults related to the positioning of the needle with particular reference to:
- (a) needle down
 - (b) needle up
 - (c) running speeds
 - (d) trimming speed
 - (e) clutch-brake defects
 - (f) control box defects
 - (g) power supply unit defects
 - (h) adjustment of control system
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SUGGESTED LEARNING AND TEACHING APPROACHES

This module should be presented in the sewing room/workshop where the tutor would carefully explain and demonstrate the various techniques using a programme of exercises related to a theme for vocational bias which will interest the student.

The student would follow an activity based learning approach to become familiar with the machines and positioning device/mechanism in question. Students could work singly or in pairs.

In the initial stages the tutor would fully explain and demonstrate each positioning mechanism, tool, gauge, operation or process. Terminology and principles should be introduced in the context of the exercises.

Information charts, posters, and mechanics manuals relating to machines and positioning devices/mechanisms should be displayed to assist the students with the exercises.

Student activities would be essentially centred on practical exercise assignments and the tutor would be expected to prepare precise briefs for each assignment exercises.

A set of completed exercises should be available for the students to relate and compare standards.

Safety, safe working practices, care and use of sewing equipment should be an integral part of all module activities.

02/09/98 JH/CD

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