-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- **0084363** **-Session-1988-89**
-Superclass- **WH**

-Title- **MAINTENANCE OF AUTOMATIC SHORT CYCLE LOCKSTITCH SEWING MACHINES-BUTTONHOLING ($x^1/_2$)**

-DESCRIPTION-

Purpose

This module is designed to develop essential skills and an in depth understanding of maintenance requirements of industrial automatic short cycle lockstitch buttonhole sewing machinery, producing BS stitch types of the 301 and 304 series.

It is intended that this module is taught in conjunction with other related modules and forms 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
84352 Stitchology and Thread Control
84354 Fabric Feeding Mechanisms

Learning Outcomes

The student should:

1. explain the methods of operation and practical applications of short cycle lockstitch buttonhole sewing machines with fully automatic mechanical control;

2. explain the interaction of stitch forming, clamp feed, fabric cut, thread trim, auto start/stop mechanisms on short cycle lockstitch buttonhole sewing machines;

3. carry out service procedures in accordance with manufacturers' specifications for short cycle lockstitch automatic buttonhole machines;

4. identify the components, fittings and mechanism settings required for machine conversion for a given sewing application on short cycle lockstitch buttonhole sewing machines;

5. diagnose and rectify sewing and mechanical faults and test machines for correct sewing operation.

Content/ Context

Safety and safe working practices should form an integral part of the module activities during investigation of practical machine adjustments and the effects produced in relation to the actual sewing performance of selected automatic short cycle lockstitch sewing machines.

Corresponding to the Learning Outcomes 1-5:

1. Recognition and selection of appropriate machine type from the various buttonhole machine types for given sewing applications.

A Single cycle machines - dual and single speed.

Examples:

(a) Purl stitch buttonhole:

(i) shirts - fronts and cuffs;
(ii) blouses and dresses - fronts, backs and cuffs;
(iii) sport shirts - neck openings

(b) Whipstitch buttonhole:

(i) skirts - waistbands;
(ii) uniforms - fronts and pockets;
(iii) knitwear - gimp inlay - cardigans - undergarments.

(c) Imitation eyelet buttonhole:

(i) workwear - light dust coats;
(ii) sleepwear - pyjamas;
(iii) office uniforms - lightweight.

B Double cycle machines - dual and single speed.

Examples:

(a) Whipstitch buttonhole:

(i) sport shirts - neck opening (tape backing);
(ii) jersey suits - fronts (tape backing);
(iii) cardigans - fronts (gimp inlay);
(iv) heavy sportswear - gimp inlay).

(b) Purl stitch buttonhole:

(i) high grade sweaters - gimp inlay;
(ii) polo shirts - gimp inlay;
(iii) jersey knit suits - tape backing.

C Efficiency rating:

(a) shape of lockstitch buttonhole required by operation;
(b) number of stitches required by buttonhole;
(c) handling time of operation;
(d) quality of threads and materials to be used;
(e) arrangement of work;
(f) skill of operative;
(g) speed of machine.

2. A Recognition of the component assemblies and their function in relation to controlling and handling the thread, gimp and fabric during the sewing cycle.

(a) the needle thread control system:

(i) ink type take-up lever;
(ii) tension assemblies: passive and active controls;
(iii) thread guides and eyelets - pre-tension control;
(iv) auxiliary thread control - barring tension;
(v) gimp tension and inlay finger.

(b) the stitch forming implements:

(i) transverse rotating hook;
(ii) oscillating shuttle.

(c) thread and gimp trimming devices.

(i) needle thread - external scissor trim - clamp incorporated trim;
(ii) spool thread - stationary and moving knives - thread puller;
(iii) gimp - manual and automatic trim.

(d) fabric cutting - buttonhole:

(i) standard knife - one way slitting action;
(ii) triangular knife - two way slitting action;
(iii) straight edge knife - crush cut.

B Recognition of the mechanisms and component assemblies and their function in relation to their control during the total sewing cycle.

(a) start/stop drive mechanism:

(i) direct drive (single pulley) (dual pulley)
(ii) manual start control pedal;
(iii) auto start control - electro-mechanical - pneumatic;
(iv) automatic stop - cam control rebound plunger;
(v) emergency stop: manual, sensor
(vi) speed control - motor-gearing - pulleys;
(vii) braking systems: latch leaver, and cam; shoe and disc; cam and gear.

(b) work holding devices:

(i) tacking clamps (feet);
(ii) buttonhole clamps (feet);
(iii) feed plates;
(iv) needle plate -with and without cutting pad;
(v) tape feed.

(c) work clamp motions and controls:

(i) vertical axis cams -

(a) sliding work clamp motion;

(b) co-ordinated work clamp motion.

(ii) horizontal axis cams.

(a) sliding work clamp motion.

(iii)cam types - drives, motions and characteristics.

(a) intermittent drive - clutch - gear (continuous feed);

(b) direct drive - gear;

(c) indirect drive - clutch gear (continuous feed);

(d) disc or radial - edge or face profile - barring mechanism;

(e) plate or face - sunken or raised track - buttonhole pattern;

(f) cylinder (barrel) sunken track - knife actuation.

(iv) cam followers and functions.

(i) roller-fabric feed;

(ii) knife edge or point-barring lever - stop mechanism;

(iii) spherical - tension release.

3. Interaction and timing relationship of the component assemblies relating to:

(a) stitch formation:

(i) needle vibration - pendulum swing motion -gate swing motion;
(ii) buttonhole stitch pattern - legs, banks, parallels;
(iii) barring stitches-incorporated and independent.

(b) work (fabric) clamp control:

(i) fabric feed - forward and reverse;
(ii) buttonhole pattern - 4 way motion.

(c) thread and gimp trimming;

(d) fabric cutting - knife control;

(e) start/stop mechanisms.

Practice in removal and replacement of component assemblies and the use of gauges, marks and fittings; making adjustment to the synchronisation and relative position of the components to achieve a given buttonhole sewing application.

4. Recognition and selection of appropriate components and fittings to demonstrate the ability to convert the machine for selected sewing operations or production situation.

A operations: e.g.

(a) buttonholes - standard and special - with and without gimp:

(i) standard whip - straight bar - single or double;
(ii) special purl - straight bar - single or double;
(iii) special whip - tapered bar - single or double;
(iv) special purl - purled bar - single or double;

(v) double stitch - purl or whip - gimp inlay-single bar;
(vi) eyelet purl - taper bar - single.

B components and data:

(a) buttonhole pattern cam:

(I) buttonhole track shape;
(ii) number of stitches:
(iii)barring stitches;
(iv) stitch bite;
(v) cutting space;
(vi) trip segments;
(vii) buttonhole knife control;
(viii) thread and gimp trim trip;
(ix) follower type and gauge.

(b) clamp type;
(c) feed plate;
(d) needle place;
(e) stitch ratio gearing;
(f) hand feed system - clutch or ratchet;
(g) knife cam and lever;
(h) knives - shapes and steels;
(I) clamp lift - auto and manual;
(j) thread trim - auto and manual;
(k) special fittings: tape feed; sequential feed.

5. Diagnosis and rectification of faults with particular reference to: vibrating needle bar, fabric clamping and cutting mechanisms, fabric feed and reversing mechanism. Stitch forming implements, stitch ratio gearing assembly. Buttonhole barring mechanism, buttonhole shaping mechanisms, thread and gimp trim devices, start, stop and brake mechanisms, machine speed control and lubrication.

Setting adjustment and testing machine for producing test samples, for sewing operations and production situations in order to demonstrate techniques of safe operation.

Suggested Learning and Teaching Approaches

Safety, safe working practices, care and use of sewing equipment should be an integral part of all module activities.
This module should be presented in the sewing room/workshop where the tutor should carefully explain and demonstrate the various techniques using a programme of exercises related to a theme or vocational bias which will interest the student. The student should follow an activity based learning approach to become familiar with the lockstitch buttonhole sewing machines in question. Students could work singly or in pairs. In the

initial stages the tutor should fully explain and demonstrate

each tool gauge operation or process. Terminology and principles relating to lockstitch buttonhole sewing machines, needle, thread and fabrics should be displayed to assist the students with the exercises. Student activities should be essentially centred on practical exercise assignments and the tutor would be expected to prepare precise briefs for each assignments exercise. A set of complete exercises should be available for the students to relate and compare standards.

Assessment Procedures

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

The following abbreviations are used below:

LO Learning Outcome
IA Instrument of Assessment
PC Performance Criteria

LO1 EXPLAIN THE METHODS OF OPERATION AND PRACTICAL APPLICATIONS OF SHORT CYCLE LOCKSTITCH BUTTONHOLE SEWING MACHINES WITH FULLY AUTOMATIC MECHANICAL CONTROL

PC The student:

(a) lists a variety of sewing operations for which each type of lockstitch buttonhole sewing machine is used;
(b) states all of the materials and fittings and equipment required to perform specified operations on (i) menswear, (ii) ladieswear, (iii) childrenswear, (iv) knitwear and (v) workwear; (c) compiles a list of advantages and disadvantages of lockstitch buttonhole machines for specified sewing activities; (d) states how the number of stitches, bite and cutting space may be altered to suit the given operation.

IA Short Answer Questions

The student should be set questions to test the understanding of the methods of operation and practical applications of the main stitch forming, clamp control, thread trim, fabric cut, auto start/stop mechanisms on short cycle lockstitch buttonhole sewing machines.

The test will consist of 10 questions, allocated as follows:

(a) sewing operations 2 questions;

(b) materials/fittings/equipment 2 questions;
(c) advantages/disadvantages 2 questions;

(d) alteration of stitch number/ bite and cutting space 3 questions;

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing 6 correct responses including one from each of (a), (b), (c) and (d).

LO2 EXPLAIN THE INTERACTION OF STITCH FORMING, CLAMP FEED, FABRIC CUT, THREAD TRIM, AUTO START/STOP MECHANISMS ON SHORT CYCLE LOCKSTITCH BUTTONHOLE SEWING MACHINES

PC The student:

(a) identifies the specific areas related to thread control and stitch forming action of different types of lockstitch buttonhole sewing machines;

(b) turns machine over by hand to demonstrate and describe the action of stitch formation and thread control by the rotating hook or oscillating shuttle;

(c) operates the machines by hand, identifies and notes the differences of the start/stop systems and machine speed control.

IA Practical Exercises.

The student should be set practical exercises to test understanding of the operation of specified mechanisms on short cycle lockstitch buttonhole sewing machines. The exercises will comprise as follows:

(a) identification of 5 component areas, using actual machines for reference by completion of incomplete handout sheets;

(b) operation and description of:

(i) the rotating action of the hook in relation to the motions of the needle bar;

(ii) the oscillating action of the spreaders in relation to the various motions of the needle bar and looper;

(iii) examination and comparison of start/stop mechanism of short cycle machines.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student providing 4 correct answers to (a) and correctly operating the machinery by hand for (b) to provide accurate descriptions of the function of specified components.

LO3 CARRY OUT SERVICE PROCEDURES IN ACCORDANCE WITH MANUFACTURERS' SPECIFICATIONS FOR SHORT CYCLE LOCKSTITCH AUTOMATIC BUTTONHOLE MACHINES

PC The student:

(a) adjusts and sets components in correct timing relationships according to manufacturers' specifications;

(b) adjusts or replaces components to produce correct feeding action to permit machines to feed fabric to form the correct shaped buttonhole with correct number of stitches;

(c) works in a safe manner and wears appropriate safety clothing and equipment.

IA Practical Exercise.

The student should be presented with a practical exercise set under workshop conditions to test the application of knowledge and skills required to remove and replace specified machine components.

The exercise will involve the student in servicing one sewing machine, making the necessary adjustments where appropriate. The service should include synchronisation of components, adjustment of feeding mechanism and examination of lubricating system.

Satisfactory achievement of the Learning Outcomes will be demonstrated by the student meeting all the performance criteria.

LO4 IDENTIFY THE COMPONENTS, FITTINGS AND MECHANISM SETTINGS REQUIRED FOR MACHINE CONVERSION FOR A GIVEN SEWING APPLICATION ON SHORT CYCLE LOCKSTITCH BUTTONHOLE SEWING MACHINES

PC The student:

(a) identifies and removes specified component;
(b) states the function of the removed components;

(c) lists the components to be changed in order to accomplish an alternative operation;
(d) replaces the component with an alternative component stating its function;
(e) works in a safe manner and wears appropriate safety clothing and equipment.

IA Practical Exercise.

The student should be presented with a practical identification exercise set under workshop conditions to test the application of knowledge required for converting a sewing machine for a given sewing application.

The exercise will involve the student removing and replacing specified components (e.g. work clamp assembly) from the machines in order to identify the purpose of the component in relation to machine conversion for a given sewing application.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student meeting all of the performance criteria.

LO5 DIAGNOSE AND RECTIFY SEWING AND MECHANICAL FAULTS AND TEST MACHINES FOR CORRECT SEWING OPERATION

PC The student:

(a) diagnoses faults related to sewing fabric including slipping stitches, incorrect feed, malformed buttonhole, damage to fabric, needle deflection and cutting of stitches;
(b) rectifies the diagnosed faults;
(c) sets up and threads machine correctly for testing and producing samples of stitch type BS:301 and 304 series;
(d) produces test samples which show elimination of fault;
(e) works in a safe manner and wears appropriate safety clothing and equipment.

IA Practical Exercise.

The student should be presented with a practical exercise set under workshop conditions to test application of knowledge and skills required to diagnose and rectify mechanical faults in the machine and test for correct stitch operation.

The exercise will be carried out on one machine containing 5 previously inserted faults.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student meeting all the performance criteria.