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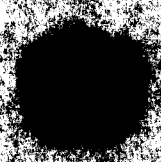
**LEATHER GOODS
DEVELOPMENT
CUM
DEMONSTRATION
CENTRE,
MADRAS,**

SPINELAND

INDIA.

GENERAL REPORT:
ANNUAL REPORT

REPORT ON THE WORK OF THE
LEATHER GOODS DEVELOPMENT
CUM DEMONSTRATION CENTRE,
MADRAS, FOR THE YEAR
1951-52



United Nations Development Programme

LEATHER GOODS DEVELOPMENT CUM DEMONSTRATION CENTRE, MADRAS

IP/IND/71/613

INDIA

Technical report: Mechanical engineering

Prepared for the Government of India
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of D. Piligian, expert in mechanical engineering

United Nations Industrial Development Organization
Vienna, 1976

Explanatory notes

The following abbreviations of organizations are used in this report:

CLRI	Central Leather Research Institute
CTA	Chief Technical Adviser
LGDDC	Leather Goods Development <u>own</u> Demonstration Centre
SSI	Department of Small-Scale Industry
ILO	International Labour Organisation

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ABSTRACT

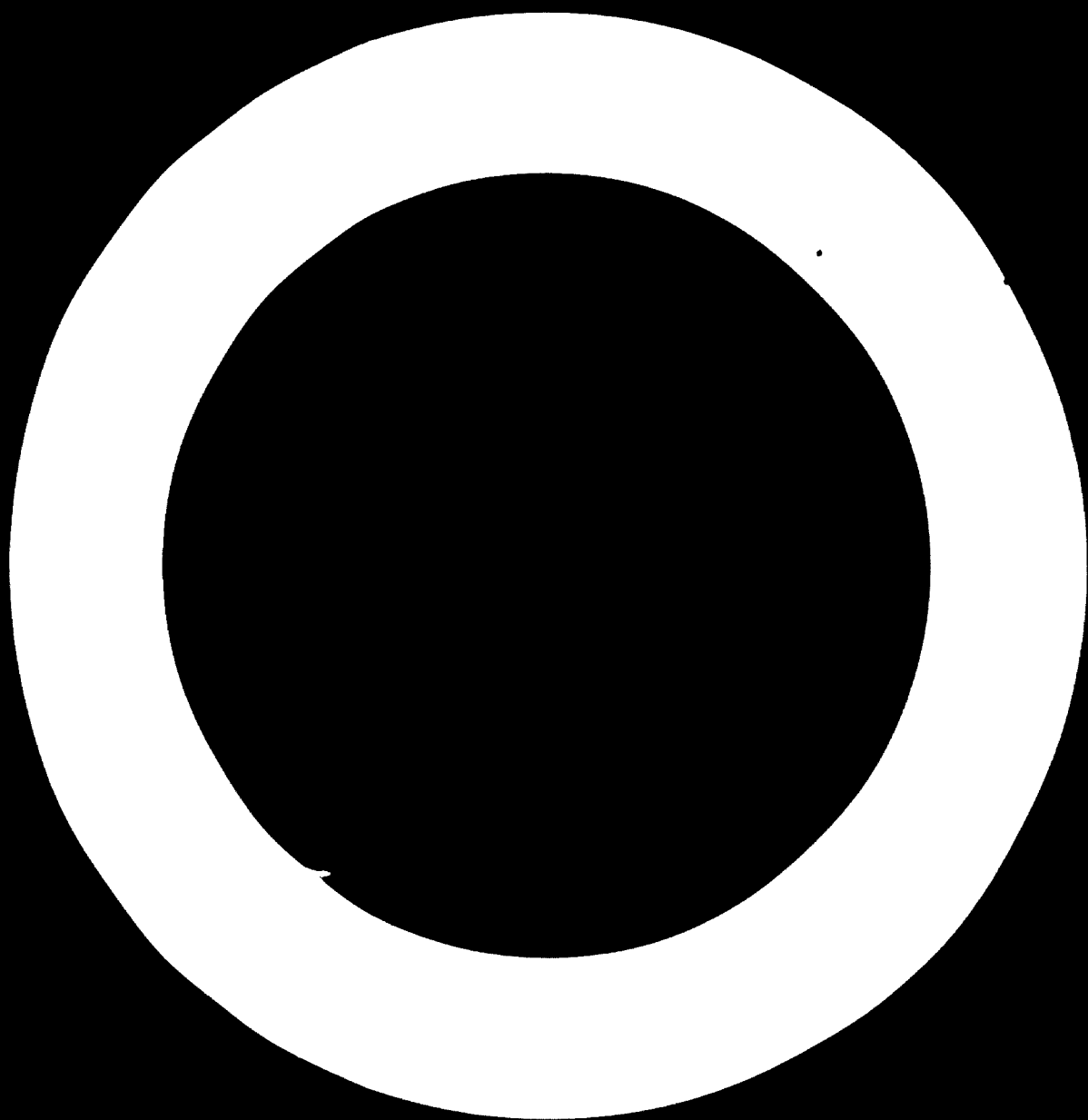
The present report concerns the work performed by an expert in mechanical engineering while he was attached, during the period from 4 November 1974 to 25 June 1976, to the Leather Goods Development oun Demonstration Centre (LGDCC) at the Central Leather Research Institute (CLRI) at Madras. This institution is a project (DP/IND/71/613) of the United Nations Development Programme (UNDP); the executing agency is the United Nations Industrial Development Organization (UNIDO).

Before beginning his work in Madras, the expert surveyed the leather goods industry in Bombay and found it very badly outdated and its products unsuitable for export. On his arrival at LGLDC, he found that its building had not yet been completed. He and the two local experts assigned to him supervised the installation of the machinery, which was Indian-made, that was to be used in the machine shop course he was to conduct.

While the twelve students completed the 48-week course successfully in the main, it was not possible to give them proper grounding in machine maintenance, since the leather fabrication facilities were not ready in time. At latest reports, all of the graduates are gainfully employed. It is to be regretted that there are no present plans to continue this training programme. Failure to do so would not only impede the development of the industry but would be a waste of the funds and equipment provided by UNDP and the Government of India.

The expert found the local experts who were assigned to him to be responsible and mature in outlook. They should be provided with further training in die making and in machine maintenance.

The beginning that was made in the development of the production of fittings for leather articles should be developed into a separate programme. There is great potential for India to become self sufficient in this area, provided that proper guidance is received.



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INTRODUCTION

Objectives of the project

Long-range objectives

The project has two long-range objectives: first, to effect a substantial increase in productive employment in the small-scale and cottage industrial sectors, both of which are considered to be particularly suitable for the manufacture of leather goods, and second, to preserve and, if possible, to increase the traditional importance of the leather industry in the export sector, in particular by encouraging it to export leather in more highly finished and thus more valuable forms than in the past.

Immediate objectives

The six immediate objectives of the project are the following:

- (a) To investigate and develop the market potential, particularly for export, of leather goods that would combine the artistic traditions of India with modern requirements of function and fashion;
- (b) To develop and demonstrate methods for the production of high-quality leather goods and their components that would be suitable for the small-scale and cottage industrial sectors, including the selection of quality materials and the operation of simple machinery;
- (c) To provide, for leather manufacturers in these two industrial sectors, facilities relating to the functional adaptation of designs; the testing of products; the improvement and maintenance of quality and the establishment of standards; the operation and maintenance of simple machinery used in leather processing; and the financial, managerial, productivity and marketing aspects of the small-scale production of leather goods;
- (d) To plan and execute training programmes relevant to the improvement and increasing productivity of small-scale and cottage producers of leather goods;
- (e) To establish a basis for promoting the production of marketable leather goods and their components by such enterprises, with special reference to export markets;
- (f) To secure, in conjunction with the Ministry of Industrial Development and the Development Commissioner, Small-Scale Industries (SSI), the ready availability to these producers of high-quality machinery and equipment auxiliaries and fittings required for the production of leather goods.

I. PROGRESS OF THE MISSION

The object of the present report is to relate the work that the expert was able to accomplish to the duties to which he was assigned. These duties were:

To assist the Chief Technical Adviser (CTA) in organizing LGDDC and in the performance of his duties

To assist in the installation and layout of the machinery and equipment of LGDDC

To assist in training the LGDDC staff in the operation and maintenance of its machinery

To organize courses on the purposes, use and maintenance of machinery and equipment in the manufacture of leather goods

To develop and make equipment such as jigs, dies, templates (patterns), tools and metal fittings in the machine shop which is to be established in LGDDC

To work with local experts on specific aspects of machine maintenance, the development of tools etc.

To work, in close collaboration with other international and local experts, to co-ordinate all efforts to develop LGDDC.

Situation at the arrival of the expert

Before he arrived in Madras in November 1974, the expert spent a few days in Bombay visiting the local leather goods industry and some enterprises that make fittings for it. He found the industry to be very much out of date and its products not really acceptable to overseas buyers. When he reported for duty at Madras, he found that the building for LGDDC had not yet been completed, although the project had begun more than a year earlier. Even such basic facilities as water and electrical power had not yet been provided. It was therefore necessary to improvise the facilities for machine shop training.

The machines that had been selected for training purposes were Indian made, since it was considered advisable to train mechanics for the leather goods industry on them rather than on more sophisticated imported ones. Also, Indian-made machines are used in many local factories, and graduates of the course would probably encounter them there. Since the machines had not yet been installed, this was the first task that had to be accomplished. As noted, even the electrical wiring had to be improvised.

The machine shop training course

The course began in November 1974, under the improvised conditions described. Despite these and some other difficulties, mostly owing to the administrative procedures of CLRI, which has administrative responsibility for LGDDC, training proceeded without major impediments.

To assist the international expert, the Government of India assigned him two local experts with engineering degrees. They came from outside CLRI. They were qualified and had some previous experience. The international expert found them to be responsible and mature in outlook. They relayed to the students, in many instances in the local language, theoretical material that he had prepared. The staff of the machine shop training course is shown in annex I.

The twelve students had been selected by the project administration. They were all more or less fresh from school. Consequently, training had to begin with the basic principles of machine shop work, but a more comprehensive programme was developed as the course progressed and the students gained experience. The training programme is outlined in annex II. The first course was completed in November 1975. According to the most recent information, all of the students who participated were gainfully employed.

Within 48 weeks of training the students learned to work and make jigs, tools, small dies and the like, as well as to operate and maintain such machines as lathes, milling machines, drill presses and surface grinders. However, while they acquired adequate skills in bench work, one important phase of training, namely maintenance of machinery for leather goods manufacture, was covered only partially, owing to the regrettable fact that the main components of LGDDC, namely the fabrication facilities, were not ready in time. It is to be hoped that the graduated students will have the opportunity to return for further training in machine maintenance.

More recent developments

The international expert, the two local experts and two CLRI staff members who had been trained at LGDDC have installed, during the last three months, the equipment provided by UNDP for the fabrication section. Basic air-operated units for making jigs, dies etc. were adapted for the fabrication

of leather goods, as well as aluminium templates for hand outting. In the near future machines for forming and outting metal shells for making handles for the leather goods industry are expected to be installed. The material for the dies was provided from the funds of this project; the dies are being completed at the Advance Vocational Training Institute, Madras, a project of the International Labour Organisation (ILO).

On his return from leave and after the two local experts had completed training (one in tool and die design, the other in hydraulics and pneumatics), the international expert had expected to conduct a second course with a new group of students. However, there is no present intention to conduct any further training courses although ample facilities and large amounts of equipment have been provided by funds from UNDP and the Government of India.

II. CONCLUSIONS AND RECOMMENDATIONS

Not only in India but even in some more highly industrialized countries, the leather goods industry needs trained and experienced mechanics. Unfortunately, however, the administration of CLRI appears to be unable to recognize the basic requirements of this industry, which should be able, according to the planning of the Indian Government, to provide a sizable source of income in foreign currency.

During the course of training, in addition to developing tools and basic machines for such operations as creasing, eyeletting and button setting, a start was made towards producing prototype buckles, looks and other fittings for leather articles. This good beginning should be developed into a separate programme involving research and the making of prototypes and, above all, the finishing of metal fittings of a quality suitable for export. There are great potentials for India to become self sufficient in this area if proper guidance is given. It is understood that CLRI, after collecting specific reports from the industry, is now preparing a mini project for the development of such fittings. This development could also result in earning foreign currency from the export of such fittings to some of the more-developed countries.

The two local experts should receive further training at the Advanced Training Centre of the ILO at Hyderabad, one in die making, the other in machine maintenance. The training programme for the students should be restarted as soon as possible. Facilities and equipment have been provided by UNDP and the Government of India; if it is not effectively used and maintained, it will rust and otherwise deteriorate.

Annex I

STAFF OF THE MACHINE SHOP TRAINING COURSE

<u>Position</u>	<u>Name</u>	<u>Dates of service</u>
International expert in mechanical engineering	D. Piligian	4 November 1974 to 25 June 1976
Counterpart	S. Ramakrishnan	February 1975 to date
Counterpart	S. Subbaraman	February 1975 to date

Annex II

OUTLINE OF THE MACHINE SHOP TRAINING COURSE

Weeks 1 and 2

Designs: Fundamental geometric constructions. Layout work, machine shop mechanical drawing.

Free-hand sketching: Two-dimensional figures, simple and sectional views of machine blocks.

Week 3

Recording blueprints, mechanical drawings: Outline drawings - two views of an object. Mechanical drawing - two diameters. Two views combined. Side view of conical object. View of square, tapering object. Objects that are U-shaped, counterbored or enlarged at one end.

Week 4

Materials, profiles and tests: Metals (ferrous and non-ferrous) and their definitions. Plastics and other non-metallic materials.

Week 5

Shop measuring tools: Care of measuring tools. Use of the steel rule and combination square. Correct positions for inside and outside use of calipers. Transferring caliper measurements. The tapping method of setting firm joint calipers. Setting hermaphrodite calipers and dividers. Setting surface gauges. Correct use of inside and outside micrometers.

Week 6

Benchwork and equipment: Laying out, chipping, filing and scraping. Marking metal. Use of the scribe, centre punch and hammers. Laying out a hole for drilling.

Week 7

Measuring from the rule: Kinds of rules. Accuracy of the rule. Reading a scale measurement. Setting a surface gauge from the rule. Taking measurements from the rule with calipers.

Week 8

Files and their uses: Kinds of files: simple-cut, double-cut, rasp-cut, curved-tooth. Forms of files. Methods of holding files. Scrapers, degrees of coarseness.

Week 9

Filing, draw-filing and scraping: The file handle. Fitting the handle. Filing thin metal. Draw-filing, fitting keys and pinning. Height of work. Filing to a corner. Scraping.

The hacksaw: Uses of the hacksaw. Number of teeth per inch. The set of the saw. Why blades break.

Week 10

Metal bending: Flat stock, simple bending, simple forming dies, pressing metal in a vise, bending jigs, bending eyes, heavy bending. Straightening wire.

Dies and taps: Assembling dies in the collet, adjustment of the dies. The set of taps - tapered, plug and bottoming taps. The adjustable tap wrench. Tap drill sizes and their determination.

Weeks 11-16

Making jigs and fixtures and forming dies: Practice in filing, dowelling and marking of components for jigs, fixtures, patterns and forming dies for the leather goods industry.

Week 17

Cutting: Shapes of cutting edges. The chisel and its uses. Shear cutting. How to make a smooth, continuous cut. Chipping with the chisel.

Week 18

The lathe: Mechanical features, chief functions and types. Starting and stopping the headstock spindle. Regulation of lathe speed to suit the turning operation. The rate of tool-feeding movement. Operation of the controls and checking the accuracy of the machine. Maintenance of the lathe.

Week 19

Lathe tools and tool-holders: Solid or one-piece turning tools. Tool-holders and tool bits. Right-, left- and end-cut tools. Boring, threading, cutting off, carbide and knurling tools.

Tool position and performance: To elevate the tool. Rigidity of the tool. Position of the tool in relation to the machine. Angle of tool position. Rakes for different metals.

Week 20

Callipers and micrometers: Types of callipers - spring, outside and inside, transfer, hermaphrodite. Adjusting callipers to size. Use of inside, outside and depth micrometers.

Cutting speeds: Hardness and machinability of metals. Steels used for cutting tools. The shape of the tool and the quality of its heat treatment. Variation of speed to cut.

Cutting fluids: Classifications, mixtures, soluble oils, mineral oils, base oils, lard oil.

Week 21

Drilling and boring with the lathe: Usual method for drilling holes. Hole finishing by reaming. Drilling, boring end holes; supporting the end.

Turning to diameter and knurling: Cutting speeds, diameter of work for threading. Knurling. cutting off, finish facing. Sequence of operations.

Weeks 22 and 23

General procedures for turning a part held between the centres: How to locate shaft centres for turning. Centre holes formed in the ends of the shaft. The bell centre punch. Centering work in a lathe. Rules for centre drilling. Surface gauge methods. Types of dogs or drivers commonly used in connexion with lathe work. Alignment of the lathe centre. The position of a turning rod held relative to the work. Roughing and finishing tools. Turned surfaces finished by grinding. Use of supports for slender rods and shafts. Application of steady rest and follow rest.

Weeks 24 and 25

Turning to a shoulder: Making the work. Squaring a shoulder. Reducing slender stock with a side tool. Various types of shoulders.

Turning spherical surfaces - concave turning: Turning a ball-shaped end. Turning a concave surface.

Use of chucks and face-plates: Chucks used to hold parts for turning. Classes of chucks used on lathes. The lathe face-plate. Work held on an angle-plate. Counterbalance on face-plate. Attachment of chucks and face-plates to the spindle.

Week 26

Single-point tool forms and tool grinding: Usual nomenclature of tool parts. Proper grinding of tools: single-point tool, tools formed to suit various kinds of work, carbide tips brazed to steel shanks. Grinding wheels and how to use them. The use of high-speed and carbide tools in grinding.

Week 27

Screw threads and their applications: Screw thread systems: British Standard Whitworth. American standard. American standard fine thread, square thread. international metric screw thread system. Counting the number of threads per inch. Cutting screw threads on the lathe. Gears for cutting screw threads.

Weeks 28-31

Practice in making parts on the lathe: Mandrels, punches, bolts, dies, pulleys, tapered shafts etc. for the needs of leather goods manufacturers.

Week 32

Grinding and the grindstone: Mechanical features of grindstones. Sections of grinding wheel. Mounting a grinding wheel on a spindle. The wheel dresser. Safety (eye protection). Maintenance.

Week 33

Metal-cutting band-saw: Functions and mechanical features. Regulation of speed to suit material being cut. Manipulation of controls. Selection of saw blades. Cutting fluids. Safety precautions. Maintenance.

Power hack-saw: Functions and mechanical features. Selection of blades. Cutting fluids. Sawing lubricant. Manipulation of controls. Safety precautions. Maintenance.

Week 34

Drill press: Mechanical features of a drill press. Types of drilling machines. Functions of a drill press. Regulation of drill speed. Manipulation of controls. Maintenance.

Week 35

Types of drills: Straight and tapered-shank twist drills, drill shanks, different numbers of shanks. Grinding drills - angles to be considered, methods of measuring lip angle and clearance. Types of grindstones, hand and machine grinding.

Drilling: Chucks used. True location of the drill hole. Use of the centre drill. Correcting a drill when it cuts off centre. The use of large drills. Safety.

Weeks 36-38

Making parts on the milling machine: Various milling operations. Clamping and setting work with vise and fixtures. Practice on various items used in leather goods manufacture. Theoretical lectures, demonstrations, sketching, calculations, intensive practice, preparation of short reports, practical tests.

Week 39

Portable grinders: Use of small machines. Wheels and mounted points for grinding dies and finishing metal patterns. Shapes of grinding wheels. Manipulation. Speed.

Week 40

Pneumatic presses: Properties of pneumatic power systems. Conditions of air compression. Pneumatic cylinders, filters, regulators and lubricators, Speed controls and valves.

Practical work: Inspection, dismantling, trouble-shooting, repair procedures, assembly and testing. Repair kits and tools. Safety precautions.

Week 41

Milling machines and their uses: Functions and mechanical features. Rate of work-table feeding movement. Manipulation of controls. Cheeking accuracy. Kinds of milling machines. Attachments: headstock, tailstock, chucks, various clamping devices. Maintenance.

Week 42

Milling arbors and cutters: The milling machine arbor: plain milling cutters, angular cutters, side-milling cutters, formed cutters, inserted-tooth cutters, gang cutters, fly cutters, end millers.

Operation of milling machines: Preliminary operations: cleaning, oiling. Machining operations: mounting the work, selecting the cutter and mounting, positioning the work. Speeds for cutters, spindle and feed. Coolants. Starting and finishing the cut. Rapid indexing. How to set a cutter held on arbor central. Safety precautions.

Weeks 43 and 44

Surface grinding: Types of machines used. Functions and mechanical features. Rate of work-table feeding movement. Manipulation of controls and checking accuracy. Types of grinding machines used. Types of grinding wheels used. Use of cylindrical faces. Disk grinding. Wheel dressing and form-wheel dressing. Magnetic chucks. Maintenance.

Shop practice: Grinding two opposite sides flat and parallel. Grinding shoulders. Grinding angular surface. Use of the formed wheel. V-blocks. Templates with shoulder die-plates.

Weeks 45 and 46

Tool steels and the heat-treatment of steels: Classification of steels. Furnaces. Temperatures required to harden various steel types. Heating and soaking times. Methods of hardening, tempering and quenching. Heat treatment of various tool steels. Temperature indicators and controllers. Different heating rates.

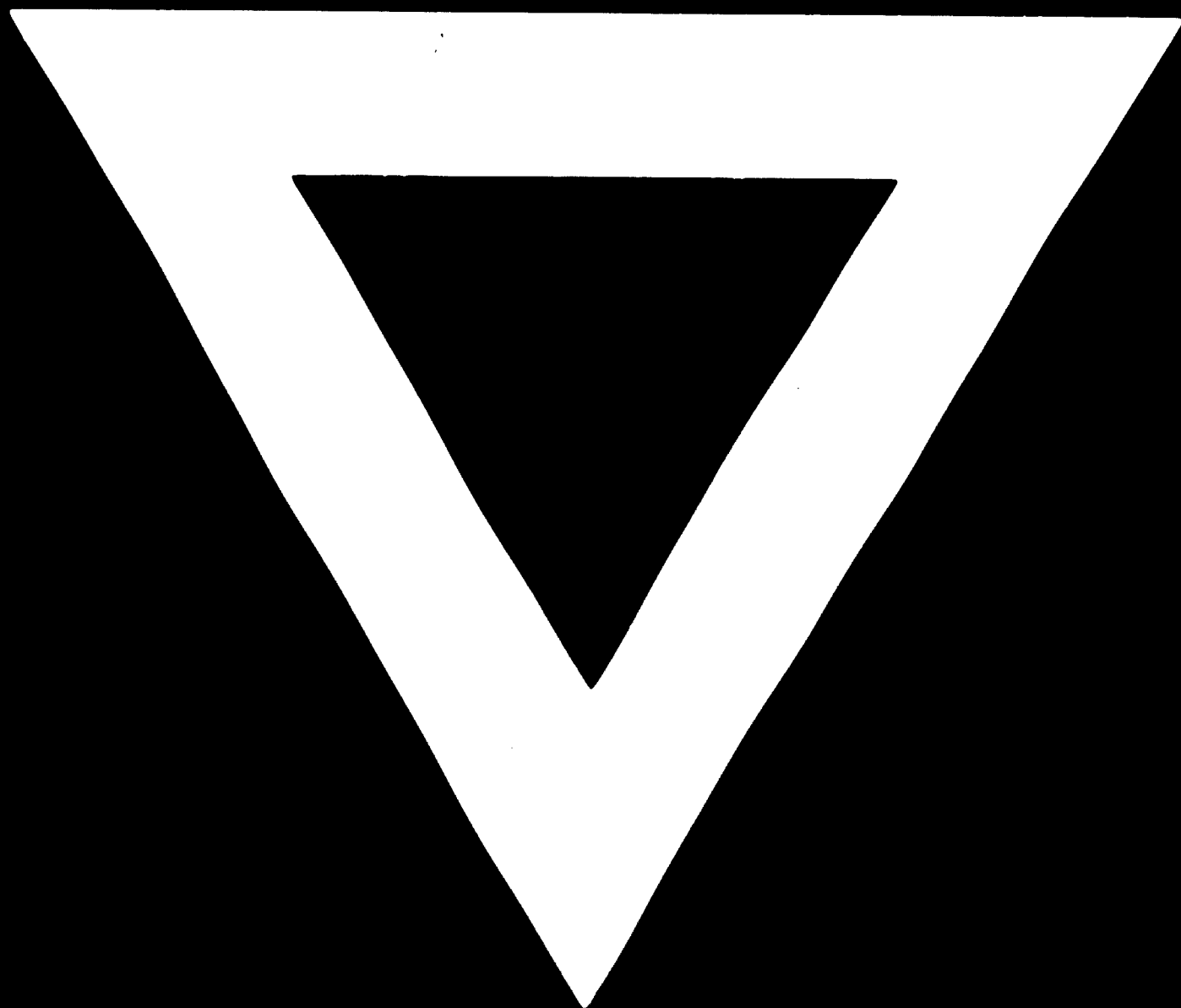
Weeks 47 and 48

Maintenance of leather goods machinery: Theory of maintenance and repair. Inspection, trouble-shooting and repair procedures. Lubrication. Repair tool-kits. Safety precautions. Reconditioning of parts. How to read drawings. How to mount dies.

After each period of instruction (normally one week, sometimes two or more) there was general review of the material that had been covered, together with lectures, demonstrations, individual guidance, review questions and tests.



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