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Seminar on the Development of
the Leather and Leather Products
Industries in Developing Countries,
Regional Project for Africa

Vienna, Austria, 22 February - 5 March 1971

INTRODUCTION
AND
SHORT SUMMARIES OF PAPERS 1/

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INTRODUCTION

The principal objective of this UNIDO leather seminar is to bring together a group of selected people concerned with various aspects of the leather and leather products industries to discuss basic problems concerning these industries and to work out practical answers to existing specific problems relative to the industrial development of this sector in developing countries.

UNIDO has invited some 25 participants from African countries, selected by their respective Governments, and from various sectors of the leather industry to attend this seminar. Some 15 papers will be presented by invited specialists. These will cover the whole spectrum of the leather industry sector, dealing with hides and skins improvement; tanning technology; leather industry development; industrial production of footwear and leather goods; as well as by-products utilization. To obtain a fully integrated approach such subjects as investment assistance and export marketing and promotion of these products are also included in the agenda.

It is hoped that during discussions following the presentation of the papers the subjects will be amplified in order to cover the differing circumstances prevailing in the various countries represented, some of which have well developed leather industry sectors, while others have low levels of industrialization or have not yet begun industrial production of leathers or leather products at all. The papers being presented by experts, with a wealth of industrial experience and familiar with conditions in developing countries, are of a wide ranging nature. Therefore, as a result of the discussions it is hoped that specific problems may be identified in specific areas of the leather industries sector, finding solutions that will assist development to proceed along fruitful lines. It is also hoped that these discussions may lead to the identification of commercially attractive investment propositions.

The presence of representatives of other United Nations organizations, together with some 50 observers who represent governments, international leather organizations, trade associations, research and development institutes and many commercial undertakings, will broaden the discussions and with their extensive experience will, no doubt, greatly assist the seminar in attaining its objectives.

In addition to these verbal deliberations, plant visits in Austria are arranged to give participants an insight into the practical operation of modern plants within the leather and leather footwear industries sector. This will assist participants to evaluate better prospective industrial developments discussed during the seminar.

Although it would be premature, at this stage, to anticipate any recommendations or follow-up action which may result from this seminar, it should be stressed that UNIDO considers that seminars such as this must not be viewed in isolation but act as starting points for future activities of the organization. Through such follow-up activities UNIDO hopes to develop to the fullest its catalytic role of accelerating the transfer of technology from the technically well developed countries to the developing countries in order to ensure the necessary industrialization in such countries, in the leather industries sector, which will lead to the proper exploitation of their indigenous raw materials and other local resources.

As a result of the complete programme it is hoped that opportunities for new African projects in the leather and leather products sector of industry will be highlighted. Participants will also have a clearer picture of possible avenues of industrial development in these sectors in their respective countries, and will better appreciate and be able to make fuller use of the assistance which UNIDO can offer to assist them in reaching their goals.

To facilitate the convenient and rapid familiarization with the various subject matters contained in the papers being presented, the following short summaries of these papers have been prepared by the UNIDO secretariat.

PROBLEMS AND PROSPECTS FOR THE DEVELOPMENT OF THE LEATHER INDUSTRY IN DEVELOPING COUNTRIES - Y. Nayudamma (ID/WG-79/5)

During this survey of current and future problems and prospects for leather industries the following factors are discussed:

Social problems, in many countries where the industry is old established, are due to the many scattered small tanneries which yield only low standards of living to the operators. Improvements to this situation are advocated by educational and extension work and reorganization of the industrial setup, e.g. co-operatives, etc.

Planning for future development should come after a rigorous survey of existing conditions and potential. With care it should be possible to develop and/or integrate plants at all production levels: cottage, small or large scale. The size of proposed developments must be geared to the situation in any given country.

Poor business management, production control and accounting systems must be overcome by utilizing more professionally trained management.

Marketing and trade channels are in most developing countries weak, their deficiencies are discussed and the necessity for opening new trade channels is proved as is the desirability of positive export programmes based on stable support measures.

It is suggested that as technology is the foundation of any new development, the best must be obtained from wherever available, subject to adaptation and improvement to suit circumstances. Technology can only successfully be exploited where suitably trained personnel are available at all levels - in this respect "entrepreneurship" training is of much value. Capital for development, which need not be large, must be directed to the most desired sectors, may be to the existing small scale industry to raise quality.

International and bilateral aid and assistance schemes are reviewed and other possibilities outlined.

THE ELABORATION AND IMPLEMENTATION OF A PROGRAMME FOR HIDES AND SKINS IMPROVEMENT AND MARKETING IN DEVELOPING COUNTRIES - E.J. Johnson (ID/WG.79/4)

This paper is based on work undertaken in one country, Ethiopia, it is realized that conditions and problems vary from country to country but it is felt that many problems and their solution may be common to other developing countries.

The initial situation in the country was that the hide and skin industry was most unorganised - no legislation existed to control it. Little incentive was given for better quality curing or grading, therefore, the majority of hides and skins were ground dried and sold ungraded even those few air-dried hides and skins were often mixed with ground dried. Slaughter site and flaying conditions were crude.

Steps to improve the situation were taken - an advisory panel of interested parties formed, steps taken to increase staff for extension work, legislation drafted for hide and skin buying and exporting.

A practical example of improved values of air-dried and graded hides was allowed when two tanners agreed to pay 100% differential for suspension dried hides and 25% differentials between grades. This encouraged a pilot scheme when five butchers agreed to join forces to operate a drying shed - for their improved product they received an increase of 129% (US \$1.32 per hide). This success led to an expansion of the scheme and a rapid increase in yield to the primary producer.

To market these increasing quantities of suspension dried hides a "Central Hide and Skin Marketing Store" was organized to include grading followed by auction.

A retraining and re-equipping crash programme of the Hide and Skin Improvement Service was carried out to ensure effective utilization of manpower with the general aim of raising Ethiopian flaying and curing to at least as high a level as obtains in some other countries and avoid losses due to poor branding/flaying which are said to lose some US \$300 000 per annum (hides only).

MARKETING AND EXPORT POSSIBILITIES OF LEATHER AND LEATHER PRODUCTS MANUFACTURED IN DEVELOPING COUNTRIES - D. Winters (ID/WG.79/9)

This paper suggests that conditions in the developed countries - high wages - concern for clean environment etc. have today created a situation where exports of leather and leather products should be able to be made from developing countries to these former large producers of these goods.

It is suggested that tanneries concentrate on the production of dry tanned goods preferably in the "ready to finish" form. This would ensure maximum "added value" as well as remove many of the technical problems and complaints associated with "Wet Blue" which today forms such a large percentage of exports.

Footwear exports could be obtained if assistance was given to small-medium mechanized artisan producers - if they were modernised and organized in associations and co-operatives they would produce a complete leather shoe - either "fashion" style or "classical" which today forms the bulk (in value) of International trade.

Given better market information and design assistance many developing countries should be able to export leather goods.

The markets for all of the above goods is large and expanding yet most developing countries have not been able to reap the possible benefits. It is thought that to raise exports to worthwhile levels the following must be looked into: a) Possibilities of developing countries establishing finishing plants (for leather) in the market countries; b) Reassessment of export taxes to ensure higher added value of exported goods; c) Closer contact with importers to be obtained by Government Trade Missions or business travel by a representative of associations of producers; d) Possibility of establishing showroom/warehouses in consumer markets; e) More flexible Government attitude to importation of chemicals and accessories when the finished product is to be exported; f) Specific market studies should be encouraged to find the correct product/style/design for a particular country to produce and export to suit its production capability.

WET BLUE CHROME LEATHER FOR EXPORT - Y. Nayudamma (ID/WG.79/3)

This paper reviews in some detail the whole field of industrial production and international marketing of wet blue leathers. The problems experienced by both producer and recipient (finisher) are discussed (mainly based on Indian experience, but augmented by knowledge of some African countries).

Given conditions existing today, i.e. developed countries' preference for semi-processed imports - developing countries' large share of raw hides and skins resources, it would appear that wet blue or similar products have much scope for expanded production and export.

The problems of some developing countries which have many small artisanal units is discussed and the suggestion is made that wet blue can be produced in cottage industry as well as industrial plants providing technical and organizational aid is given.

The necessity for strict adherence to set standards is emphasized to ensure a smooth flow of national and international trade. Quality control in the tannery must be associated with "standard specification" and preshipment inspection.

No international standards exist in this sector but it is suggested that the basic parameters should be: moisture content 50-60 per cent; chrome 5 - 7 per cent ($\text{Cr}_2 \text{O}_3$) based on hide substance; pH above 3.0.

The processing of skins/hides to the wet blue is covered in detail and processes also given to utilize any rejects obtained into cheap garment, suede and lining leathers.

Subjects which must be examined in the course of a feasibility study, prior to erection of a tannery, are also outlined. As an exercise the basic data is given for setting up a tannery (at two levels of production) to process goat skins to produce wet blue augmented with some vegetable tanned and chrome crust for export.

At the end of this comprehensive study are listed problems which still require further elaboration of solutions. These include such perennial thorns as: coexistence of different sizes of production units; whether wet blue production can be detrimental to the exporting country; the "threat" of synthetics.

THE TANNING AND INDUSTRIAL PRODUCTION OF REPTILE LEATHER UNDER CONDITIONS ENCOUNTERED IN DEVELOPING COUNTRIES - Milan Gergely (ID/WG.79/7)

This paper reviews the current position of reptile production throughout the world. Statistics as to supply are poor but the writer feels that for discussion purposes the following may be available approximately: 1 million crocodile skins per annum (equivalent 15 inches wide); 6 million lizard skins and 3 million snake skins. With increased tanning of reptile skins in developing countries lesser amounts enter the world market in the raw form.

A review of the histological characteristics of reptiles is followed by a wide survey of nomenclature and sources of commercial reptile skins. Some notes on farming of crocodiles, and its problems, suggest that this may be the best way to guarantee future supplies as the reptile population is being decimated by indiscriminate killings.

The general processes of reptile leather production are discussed with emphasis on the most important sectors: liming to ensure removal of scales/membrane without destruction of natural markings; tanning, usually mixed, to afford possibility of drying to crust; and finishing. Notes are also given as to simple everyday process control techniques.

The economic aspects of tanning reptiles is covered as is the production of leather goods from the tanned skins. Typical costings for tannage of lizard skins are quoted. Integration of tanning and leather goods production is supported and an outline is given of required capital and machinery to set up a combined plant capable of producing 500 sets (matching ladies shoes and handbags).

Detailed process formulations are given covering white and natural tannage for lizards and snakes. Crocodile processes are also quoted.

GUIDELINE FIGURES TO ESTABLISH THE INTERRELATION BETWEEN VARIOUS PARAMETERS OF THE LEATHER INDUSTRY - J.A. Villa (ID/WG.79/6)

A novel method of evaluating leather factories' productive capacity, general technological characteristics and tannery dimensions is given in this paper. This statistical evaluation method can be used to measure the "efficiency" of one tannery against another or may be used in formulating the requirements of a new leather factory.

To this end the author suggests that an inventory of the industrial characteristics of a tannery must be drawn up. For this purpose 24 parameters are established (including many of the traditional yardsticks of the leather industry, i.e. footage produced; no. of hides tanned; kilogram of raw hide; hours worked, but in addition many factors not usually measured are noted, i.e. weight in kilogram of machines installed; litre capacity of drums installed).

From the data of the 24 parameters he establishes 32 "key numbers". These are the most significant coefficients which may be obtained by interrelating the established parameters, (including traditional measures such as:

productivity = $\frac{\text{sq.ft. of tanned leather}}{\text{man hours}}$; yield = $\frac{\text{sq.ft. of tanned leather}}{\text{number of tanned hides}}$,

but also many new coefficients: power factor = $\frac{\text{m}^2 \text{ of tanned leather}}{\text{horsepower installed}}$

output of drum = $\frac{\text{number of tanned hides}}{\text{total capacity in litres of drums installed}}$).

After establishing the differences between four categories of hide (large, medium, small, very small), based on Argentinian material, normal average values are quoted for these 32 coefficients, based on a detailed study of the Argentine tanning industry. The coefficients for tanneries under evaluation may be compared with these norms. Where deviations are found one must analyse further to discover the reasons.

On the basis of these coefficients (norms established) a complete picture is built up of a leather factory, to produce 300 hides a day based on an aim for an initial parameter (basic coefficient) of 1.5 $\frac{\text{sq.ft. of tanned leather}}{\text{kg of raw hides processed}}$. Once this initial basic coefficient and the number of hides to be processed are established, one may establish the overall picture of the dimensions of the tannery and equipment, including calculations of all possible combinations of parameters (elaborated in accompanying table).

This methodological approach may be employed in studying any size of projected or existing hide tannery, but certain adjustments must be made for differences from basic Argentinian conditions.

FANCY LEATHER GOODS FACTORY FOR DEVELOPING COUNTRIES - J. A. Grant (ID/WG.79/3)

This paper covers in some detail the subjects necessary to be studied prior to the installation of a leather goods factory. Full details are given concerning the equipping and operation of such a factory.

The facts and figures quoted are based on a study for a particular projected plant but are capable of being used as a basis for erection of leather goods factories elsewhere subject to adjustment of certain costs e.g. building wages, etc.

Following the 'outline of processes' one is given the basic data of the plant - 70 people employed in a plant of 700 m² - capital requirement of US \$434,000 yielding a profit of 20.5 per cent on capital employed (13 per cent on sales).

For this study it has been assumed that four basic items would be produced: handbags, document cases, belts and billfolds in three top grade materials: crocodile, lizard and python. The workmanship levels suggested are high to ensure full utilization of the materials employed and to allow exportation to the quality conscious markets of North America and Europe (e.g. exfactory price of a crocodile handbag being US \$95).

Detailed production layout and flowcharts are included as are schedules of materials and labour requirements and cost and profitability calculations.

It is suggested that if sufficient local expertise is not available, a one month study by a visiting expert could decide on the feasibility of such a project. If implemented, it is thought that four experts would be needed to assist in setting up/operating of the unit until the staff were sufficiently trained.

Initial production would be sold on the domestic market (for tourists) and in adjacent countries but long-term sales would be in Europe/North America where large markets exist - for this reason an association of some form with a producer in one of the market areas is recommended.

A schedule of requirements, operating and selling calculations are also included for a unit with twice the output of the above suggested plant.

THE DEVELOPMENT OF THE FOOTWEAR MANUFACTURING INDUSTRY IN DEVELOPING COUNTRIES
J. Horák (ID/WG 73/11)

This paper contains a detailed study of the organisational and technical requirements of a shoe factory which it is suggested is suitable for installing in a developing country. The production outlined is for a "small" - "medium" unit relative to the developed countries but would be a "large" unit in a developing country.

An analysis is made of factors which must be examined during a feasibility study prior to the installing of a shoe factory - these include a) marketing study; b) capital requirements; c) other conditions; d) evaluation of all factors.

Differences in organisation and operation of shoe factories are given according to size of production, development trends are discussed including the pros and cons of vertical and horizontal organisational structures.

Preproduction work is outlined, covering the establishment of a "collection" (sample models), shoe design, internal technical documentation and costing.

Production requirements are analyzed in the following sectors - machinery - manpower - space - transport. Organization of production processes is outlined and the necessity for good internal communications is stressed in order to obtain swift economic manufacture of shoes against customers orders.

Current shoe technology is examined and possible developments in shoe technology, mechanisation and materials are related to the finished product.

THE PROPER UTILIZATION OF BY-PRODUCTS FROM THE LEATHER AND LEATHER PRODUCTS INDUSTRIES.

(a) CHAPTER I: The Survey of Occurrence and Use of Tannery and Shoemaking Wastes - C. Halámek

This paper subdivides possible tannery wastes into three categories - (1) untanned collagenous wastes; (2) tanned collagenous wastes; (3) miscellaneous wastes. These categories of wastes are then discussed with regard to possible products, ease of processing, outline method of commercial exploitation and also possible value of finished product in relation to raw waste material.

A survey of "losses of proteinous material" is quoted from which it can be seen that more than half of the original protein of the raw hide is lost by the time the leather is converted into a shoe. Thus proving the economic necessity for finding means of utilizing these waste materials in order to obtain full economic advantage of raw hides.

Untanned collagenous wastes are shown to be far easier/cheaper to process as the collagen is easily utilizable. Tanned wastes prove difficult and expensive to convert to available collagenous materials and therefore proves only suitable economically for production of fibrous materials (see Chapters I and II).

Outline production processes are given for artificial casings, surgical materials, glues and gelatines (of various grades) and fodder from untanned wastes. Fodder production from limed glue stock is said to yield an economic product being a valuable foodstuff (8-10% of digestible protein) provided it is used together with other full valued proteins (as fodder from this source is deficient of certain essential amino acids). This fodder production may be in liquid or dry forms and the advantages/disadvantages of each form is discussed.

From tanned wastes glue, fertilizer and fodder may be produced - yields and quantities being lower than similar products from limed material due to denaturation during detannisation. 32% yield of dry fodder is obtained in Czechoslovakian production from chrome clicking wastes but due to its stickiness it is only used as an additive (up to 2%).

To date no economically utilisable materials have been recovered from tannery effluents. Growing world demand is forcing better utilization of wastes and by-products. Untanned wastes, e.g. gluestock will become more valuable, due to scarcity, with increased tannery developments in the developing countries which increase the volume of tanned hides (not pelt split) into developed countries.

The paper includes technico-economic data for casings, glue and gelatine, fibrous leather hydrolysate of glutin (fodder), and felt, covering capital cost of equipment - consumption of steam, water and energy as well as an evaluation coefficient $\frac{\text{Product price}}{\text{Waste price}}$.

(b) CHAPTER II: Production of Fibrous Leather from Leather Wastes -
A. Suchomel

The economic utilization of tanned leather scrap is proposed in this paper. In Chapter I it was suggested that tanned waste was unsuitable economically for production into glue/gelatine and casings, etc. and therefore a more detailed study of Leather Board manufacture is given here as a means of utilizing this material. (Sole leather scrap and chrome shavings).

It is suggested that Leather Board ("reconstituted leather") should be viewed as a new alternative to leather and not as an inferior substitute as from some viewpoints such material may be superior as it can have its properties adjusted, allowing manufacturers to obtain optimum performance. End uses suggested are counters, midsoles, insoles and even soles for some house slippers.

The five basic processes necessary to produce leather board are discussed in some detail including the necessary machinery:

- (1) Milling is carried out on the cleaned blended material either dry - using hammer or disc mills or wet, using a "Condux" mill or for chrome shavings using a converted paper "Hollander".
- (2) The fibres are prepared by stirring to obtain a homogeneous suspension - adjusting properties by addition of Sulph. Oils and Hydrophobic agents (glueing) to improve stability in wet medium. The necessary binding is also added: elastomers such as copolymers of butadiene/styrene, etc. and plastomer materials, e.g. P.V.A. or Latex.
- (3) Dewatering must be carefully carried out to ensure correct felting of the fibres. Five different machines are outlined, some being for batch processing, others for continuous processing. The machine's capital costs/productivity are mentioned as also are the differences in fibre orientation which differing machines produce.
- (4) Pressing is necessary to reduce the water content from some 80% down to 50% as well as to compact the sheets. A hydraulic press is used.
- (5) Drying may be effected using a variety of machines - conditions being regulated to suit the original raw materials, e.g. slower drying needed for blends containing high proportions of veg. tanned scrap.
- (6) Finishing may be by calendering, buffing or pigmentation.

The main outlet for the material produced has been as counters where its use has proved most economic - due to the high price of genuine leather and as a means of disposing of tannery and shoe factory scrap materials.

(c) CHAPTER III: Using the Tannery Wastes for the Production of Semi-synthetic Poromeric Upper Leather - V. Pektor

In addition to the outlets, discussed in Chapters I and II, for leather scraps and wastes, a study is made of possible production of a poromeric semi-synthetic material suitable for shoe uppers.

A survey of existing poromerics is made, and some property comparisons are given comparing the Czechoslovakian product with others. The raw material employed is Lined or Chrome Tanned Splits. The six stages of processing are outlined:

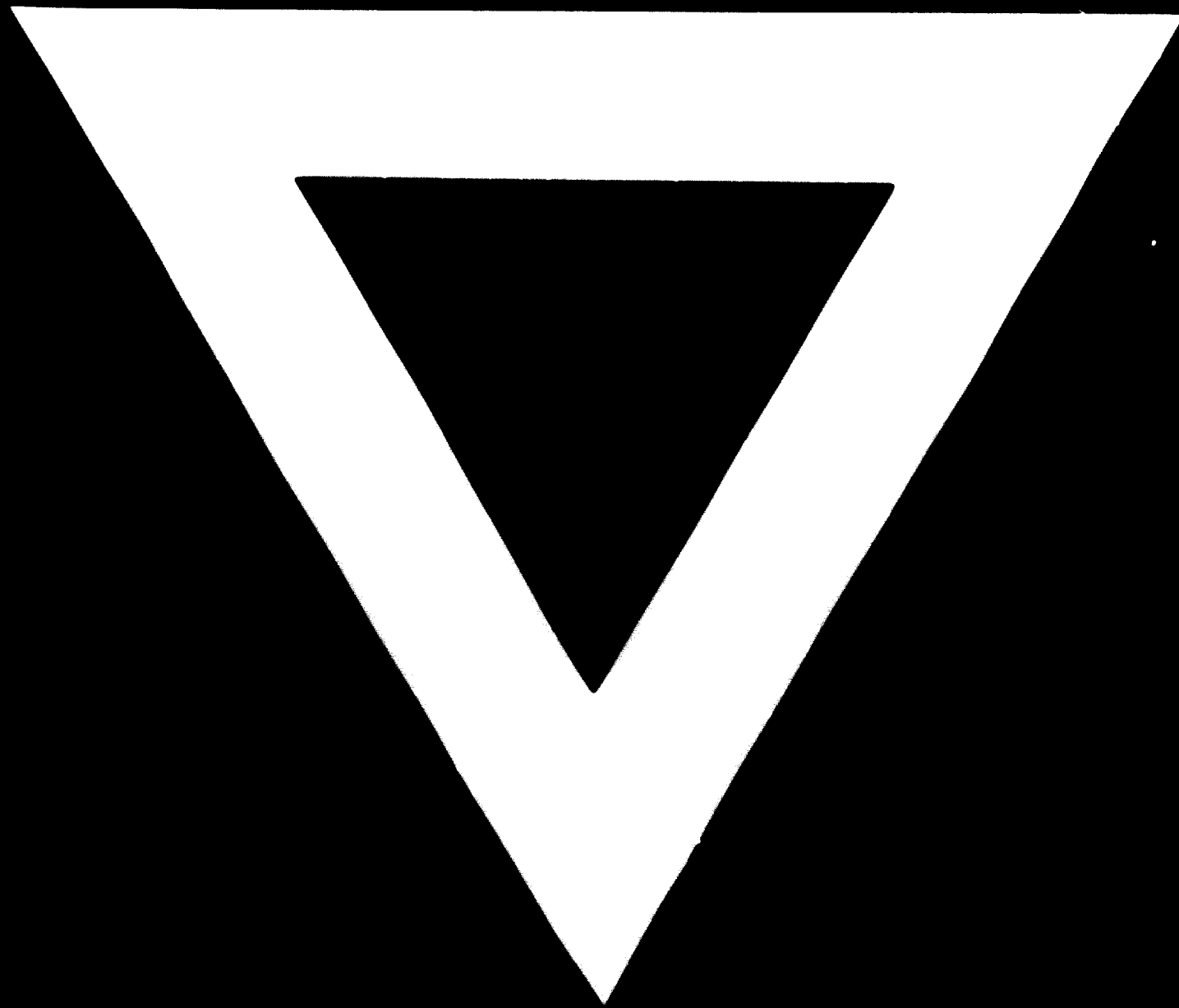
- (1) Preparation of collagen fibrous material - obtained by milling the scrap after suitable chemical treatment to yield fibres of length 16 - 21 mm.
- (2) Web formation is obtained by mixing the collagen fibres with synthetic fibres, e.g. polypropylene - followed by machine processing and needling and precipitation.
- (3) Binding the web may be carried out using polyurethanes with dimethyl formamide as solvent using special machinery.
- (4) A grain layer (microporous) is usually prepared from linear polyurethanes - a reinforcing fabric is often laminated between grain and web to improve mechanical properties.
- (5) The most difficult process is said to be the binding of web to grain using special adhesives and machines.
- (6) Finishing was originally carried out using thin polyurethane films but newer processes yield results more similar to leather appearance.

Four different grades/styles of this material are available - each having different properties and constituents.

Some notes are given covering the handling and usage of the material in shoemaking processes - where techniques differ from those employed on genuine leather alternative methods are given.

It is felt that prospects should be good for poromeric semi-synthetic materials as their properties now approach those of genuine leather and the effective price is comparable with leather. Due to high world demand for leather a place for these "semi-synthetics" seems assured, especially in the field of cheap shoes.





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