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**CONSULTANCY SERVICES  
TO THE APPLIED RESEARCH  
AND EXPERIMENTAL CENTRE  
FOR THE LEATHER AND  
LEATHER GOODS INDUSTRY  
AT ULAN BATOR.**

**IS/MON/75/004**

**MONGOLIAN  
PEOPLE'S  
REPUBLIC**

**TERMINAL REPORT**

**Prepared for the Government of the Mongolian People's Republic by the  
United Nations Industrial Development Organization,  
executing agency for the  
United Nations Development Programme**



**United Nations Industrial Development Organization**

United Nations Development Programme

CONSULTANCY SERVICES TO THE APPLIED RESEARCH AND  
EXPERIMENTAL CENTRE FOR THE LEATHER AND  
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MONGOLIAN PEOPLE'S REPUBLIC

Project findings and recommendations

Prepared for the Government of the Mongolian People's Republic  
by the United Nations Industrial Development Organization,  
executing agency for the United Nations Development Programme

  
Based on the work of Stanislaw Piatkiewicz, footwear  
manufacturing expert.

United Nations Industrial Development Organisation  
Vienna, 1976

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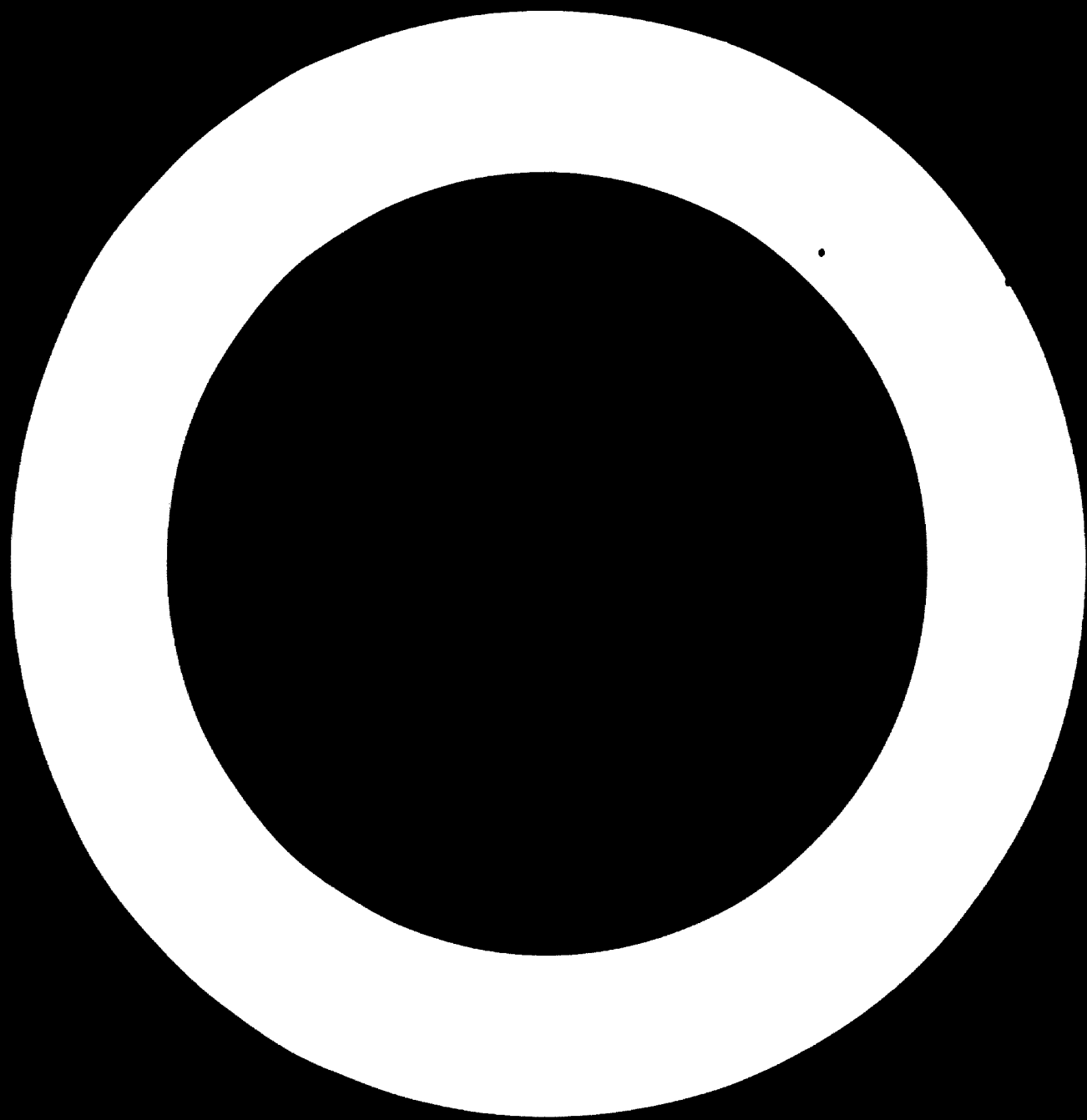
ABSTRACT

The project "Consultancy Services to the Applied Research and Experimental Centre for the Leather and Leather Goods Industry at Ulan Bator" (IS/MON/75/004) was implemented with the assistance of the United Nations Development Programme (UNDP). The executing agency was the United Nations Industrial Development Organization (UNIDO). The co-operating governmental agency was the Ministry of the Light and Food Industries of the Mongolian People's Republic. The Centre was completed in 1975. Although it was still new and the experience of its staff was not yet great, the effectiveness of the Centre had already been amply demonstrated.

The purpose of the project reported here was to provide technical and scientific assistance to the staff of the Centre in solving the most pressing current research problems relating to the improvement of leather goods and haberdashery technology. This assistance was rendered by providing, for six months (May to October 1976), the services of a footwear production process engineer.

Following a detailed programme of activities, the consultant, together with members of the staff of the Centre, worked out solutions to certain production problems and improved the organization of work. In addition, he delivered a series of six lectures on subjects related to the most advanced techniques and technologies for the production of footwear, as practiced in countries that have made the greatest strides in this area. These lectures were attended by the technical staff of the footwear factory and of the Leather and Footwear Industry Combine as well as by the research staff of the Centre.

The report concludes with recommendations for the further improvement of the Centre and the formation of its staff over the long and the short terms.



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## INTRODUCTION

The Mongolian leather and footwear industry occupies a leading position in the national economy. In recent years, progress has been made in increasing the volume of production and increasing the quality and expanding the range of leathers and leather articles produced. Nevertheless, a considerable quantity of raw hides is still being exported, and the quality of these hides, and especially of cattle hides, falls short of the requirements of the consumers. For this reason, the Government has taken a number of important measures to upgrade the quality of these products and expand their output.

One of these measures was the construction and organization of the Applied Research and Experimental Centre for the Leather and Leather Goods in Ulan Bator, a project undertaken with the technical co-operation of the United Nations Industrial Organization (UNIDO) and the United Nations Development Programme (UNDP). As a result of the project, Mongolia now has a modern research centre that is furnished with the very latest equipment and staffed with a number of trained Mongolian specialists who are capable of carrying out the applied scientific work that this economic branch now requires. However, these staff members are still too few and their research experience too limited to permit them to carry out the full range of tasks that have been entrusted to the Centre by the industry. This newly formed scientific institution consequently has a continuing need for far-reaching external assistance which, like the project itself, will be provided by such means as intergovernmental agreements and the exchange of experience with institutions working in allied fields in other countries.

UNIDO and UNDP are continuing to assist the Government and the Centre by providing experts in various specialities. The present report concerns the activities of one such consultant, a footwear production process engineer, from March to October 1976.



## I. PROJECT ACTIVITIES

### Duties of the consultant

The footwear production process engineer had professional experience and advanced knowledge of production-related factors, the organization and conduct of research in this industrial branch, and the latest achievements of science and technology and of physical-chemical and mechanical methods of testing. His primary task was to make his expertise available to the trained Mongolian staff of the Centre, both specifically with regard to problems currently encountered and in general in his field of specialization. Particular attention was to be devoted to developing improved technology for the production of footwear, using pre-prepared bottom parts (soles and heels) and cement bonding. Specifically, his efforts were to be concentrated in the following areas:

(a) Analysis, from a practical standpoint, of the characteristic features of footwear technology and of the progress that had already been made in this field in Mongolia, and recommendation of definite methods and techniques for the process as a whole and for individual operations;

(b) Organization of experimental projects to further this effort;

(c) Training local specialists and transmitting to them his expertise both in the area of research and in the practical performance of the methods and techniques of producing cement-bonded footwear;

(d) Determination and recommendation of optimal models of footwear for production under the conditions that prevail in Mongolia;

(e) Assistance in efforts to improve the organization of labour and the quality of the footwear produced at the existing plant and to submit recommendations concerning the introduction of the latest advances of science and technology into the manufacture of footwear.

He was also to train a local expert to conduct further work in these areas. The training programme for this person is attached to this report (annex I).

In accordance with the work programme, the expert and the local expert in training worked in the footwear section of the Centre. This section had a research staff of 32, plus 15 technical personnel. The research staff were assigned as follows: Technological Laboratory, 5; Footwear Design, 5; Chemical Laboratory, 3; and Pilot Workshop, 19.

### Revised programme

Although the original work plan had been quite extensive, the management of the Centre drew up the new and far-reaching supplementary one (annex II). It was on this basis that the work of the consultant was performed.

Initially, he worked with the five staff members of the Technological Laboratory. Here, attention was concentrated on improving the quality and output of modern types of footwear. Four of the thirteen subjects included in the research programme of the Centre for 1976 were directly connected with these aims. However, much attention had to be given to the establishment of standards for raw materials, semi-finished goods and finished products (footwear). In this connexion, it was possible to incorporate into the research programme the methods proposed by the Permanent Working Group for the Leather and Footwear Industry of the Council for Mutual Economic Assistance (CMEA). These methods include research in the following directions:

- Soft and hard natural skins in footwear
- Artificial and synthetic skins in footwear
- Footwear fabrics (textiles)
- Footwear trends
- Ready-made rubber soles
- Adhesives of various types for footwear
- Ready-made footwear

An appreciable amount of time had to be devoted to the preliminary processing of leather soles by traditional methods and the explanation of modern methods and machines not available at the Centre. In collaboration with the staff of the Technological Laboratory, the following draft standards and technological instructions were prepared:

- Ready-made footwear
- Lasts
- Cutting skins and stitching semi-finished parts
- Cementing and other forms of bonding of footwear parts
- Chemical finishing of footwear
- Production of soles (rubber, porous, solid etc.)
- Rubber heels

Together with the local staff and the local expert in training, the consultant repeatedly inspected the production process. Shortcomings in it were pointed out, specific suggestions and recommendations for their correction were made, and a new system of work organization was developed. Similar inspections and consultations were carried out in the workshops that produced rubber soles, glues, and chemical preparations used in the production of footwear. In addition, the expert conducted an evaluation of the collection of footwear models for 1976-1977.

During the period of his mission, the expert delivered six lectures on subjects related to new techniques and technologies for the production of footwear as applied in the countries that have made the most progress in this field and on the organization of production (annex III). In addition to the research staff of the Centre, these lectures were attended by the technical staff of the footwear factory and combine. On each occasion the need was stressed to give particular attention to the production of goods that would meet the requirements of both function and fashion. As a practical demonstration, the production of at least five pairs daily of modern boots for women was organized in the pilot workshop.

Together with a local specialist, the consultant devoted considerable time to the question of installing an extrusion machine for the production of plastic heels. In the end, however, it proved impossible to introduce this method at the time. It now appears that the needed machine will be erected in the workshop for the production of plastic goods, which is not part of the footwear factory.

Towards the end of his mission, the consultant worked with local staff in the chemical laboratory, which is developing new preparations for use in footwear production. The success of this work made possible the installation of three new appliances at the Centre.

## II. FINDINGS AND RECOMMENDATIONS

### Findings

The Applied Research and Experimental Centre for Leather and Leather Goods at Ulan Bator is part of the Leather and Footwear Industry Combine. Its Director is also Deputy Director of the Combine, with responsibility for research and the introduction of technical and technological innovations in the leather and allied products industry. Consequently, the Centre also has the task of monitoring output and implementing recommendations on the rationalization of production processes. The Centre is also responsible for the introduction of new models of footwear on a trial basis and their eventual industrial production. This last function is an extremely important one.

Although the Centre has been established only quite recently and the experience of its staff is not yet great, its effectiveness has already been amply demonstrated. For example, the improved quality and expanded range of products is proved by the fact that the leather and footwear complex now exports a large volume of kidskins, hides, glues and leather garments to many countries. A new collection of footwear models that is intended for export next year is in preparation. A far-reaching programme for the development of the leather industry has been drawn up on the basis of existing domestic supplies of natural raw materials, that is, of hides and skins.

### Recommendations

#### Short term

Over the near term, the efforts of the Centre should be concentrated on priority tasks so as to form a solid basis for long-term progress. These priority tasks should include the following:

1. Organization of technical education in the form of training centres for skilled workers, foremen and technicians, with the assistance of the Czechoslovak specialists, of whom five to ten are now attached to the Leather and Footwear Industry Combine.
2. Fellowships for practical training abroad, for periods from six months to one year, for training abroad in specific subjects, such as the organization of production and the design of industrial equipment should be provided for selected members of the staff.

3. Existing standards for all types of raw materials, chemical agents, semi-finished and finished goods should be reviewed and, when necessary, new ones should be prepared. Quality-control techniques based on the recommendations of the Permanent Working Group on the Leather and Footwear Industry of CMEA should be applied.
4. The Centre should send representatives to the various international footwear fairs held in various countries of Europe so as to become familiar with modern trends.
5. Methods for the economic utilization of raw materials on an industrial basis should be introduced, with incentives in the form of bonuses being offered.
6. Technology for the production of women's footwear with high (50-85 mm) heels should be developed, since there is great domestic demand for it.
7. A commission with responsibility for evaluating models of footwear should be organized and attached to the Centre. It should consist of representatives of the domestic retail trade and of the artists' and orthopaedists' unions and would serve as a means of ensuring the correct and thorough evaluation of proposed collections for the current year and coming season. It should be convened four times yearly.
8. There should be annual formulation, on the above basis, of a plan that would assure an adequate range and volume of footwear collections and models to satisfy domestic requirements.

#### Long term

Once a solid basis for it has been established, research in later years should be concentrated on the improvement of product quality and serviceability and meeting consumer demands. Such research should be undertaken before production begins at the new footwear factory that is to be built in 1979. The major questions to be dealt with in this context are the following:

1. Standardization of lasts on the 2/3-cm basis and of industrial equipment on the basis of the anthropometric findings of the Mongolian Academy of Sciences and other institutes, primarily those in other member countries of CMEA.
2. Development of technology for the production of footwear of fabric and synthetic leather, mainly for summer wear.

3. Development of technology for the production of plastic lasts, using the experience of Czechoslovakia, Poland, Romania and the Soviet Union.
4. Research into the most modern organization of production, including appropriate use of electronic equipment, including computers.

Annex I

TRAINING PROGRAMME FOR THE LOCAL EXPERT

<u>Topic or activity</u>	<u>Starting date</u>
Technology for mounting and attaching plastic and wooden heels	22 June
The preliminary working of footwear bottom parts (leather soles and heels)	5 July
Procedures for putting into effect the results of completed pilot projects; forwarding of complete documentation to the footwear plant	13 July
Modern methods for the modelling and design of cement- and welt-bonded footwear such as women's kidskin boots and men's half-length boots	26 July
Method of joining footwear uppers by the use of high-frequency current	9 August
Technology and method for manufacturing footwear by hot vulcanization and die-casting	23 August
New types of industrial equipment	6 September
Preparation of cementing standards for cement lasting operations	13 September
Methods of testing the adhesion of footwear bottom parts (heels and soles) for purposes of standardization	20 September
An efficient method for the multiple cutting of footwear uppers, taking into account the experience of Polish specialists	4 October

Annex II

REVISED PLAN OF THE WORK OF THE CONSULTANT

<u>Topic or activity</u>	<u>Starting date</u>
Methods and technology of shoe manufacturing with respect to the method of fastening: Cement lasting Working of shoe bottoms Working of shoe uppers	7 June
Footwear manufacturing by the casting method	14 June
The technology for producing leather-covered wooden heels	22 June
Improvements in the styling, production and finishing of men's and women's kidskin boots	28 June
Optimum use of available adhesives and development of a new formula for gluing leather soles and heels in a manner best suited to local conditions a/	5 July
Techniques and methods for the preliminary working of footwear bottom parts	13 July
Methods of joining parts by welding and through the use of high-frequency current	19 July
The Polish method of hot vulcanization in footwear production; its comparison with the method and technology used in Czechoslovakia	26 July
Introduction to and study of synthetic materials used in the production of footwear soles and uppers (polyvinyl chloride and polyurethane materials)	3 August
The procedure for putting into effect the results of completed experimental projects: Collection of materials Forwarding the complete documentation to the footwear plant	9 August
<u>Familiarization with the Centre's links with footwear factories in Poland</u>	17 August

a/ The Centre has a quantity of stiff leather produced by combined and all-chrome tanning.



<u>Topic or activity</u>	<u>Starting date</u>
Familiarization with Polish procedures for conducting experiments	23 August
Familiarization with the Centre's administrative structure	30 August
Familiarization with existing arrangements for obtaining footwear information	6 September
Production in the training shop of 100 pairs of modern ladies' fashion boots, using the knowledge acquired and the skills referred to under points considered on 22 and 2 <sup>nd</sup> June and 5 July, with the participation of the group of Mongolian specialists	13 September
Lecture for the group of Mongolian specialists on footwear production throughout the world	Once every two weeks
Lecture on light industry in Poland and the countries of CMEA (for the entire staff of the Centre)	Once monthly
Forwarding of all lectures in written form to the library	As appropriate
Submission to the Mongolian specialists' group and plant management of suggestions and recommendations regarding improvements and changes in production technology and organization at the footwear plant	Once monthly
Standardization, in co-operation with footwear department specialists, of a cement lasting method for fastening footwear uppers and bottoms at all stages of the manufacturing process	20 September
Assistance in the establishment of internal plant standards for the following sections: Procurement Sewing Cutting	27 September
Study and comparison of test methods and quality-control criteria for finished footwear in use in other European countries, and development of draft standards for finished footwear	4 October

Annex III

LECTURES DELIVERED BY THE CONSULTANT<sup>a/</sup>

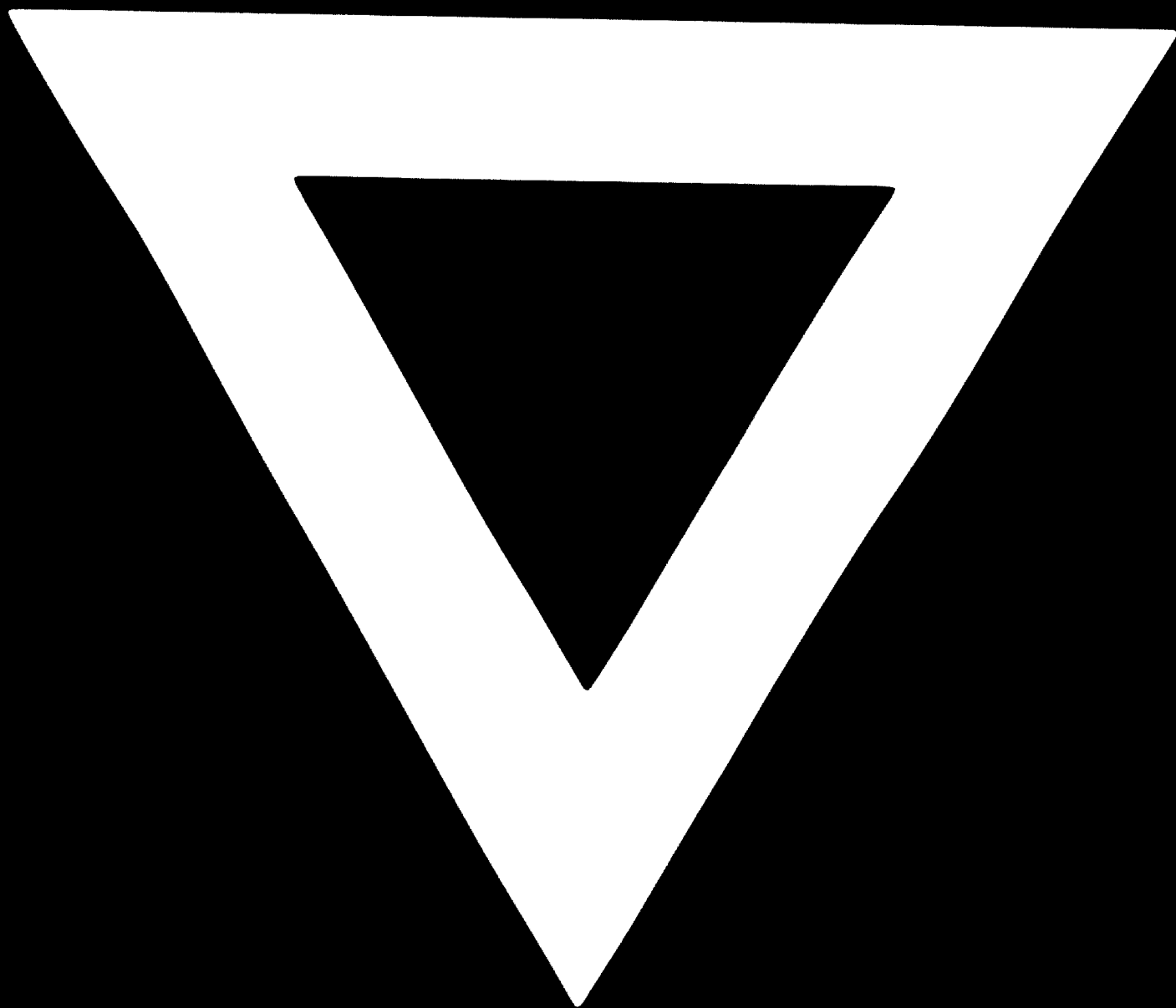
1. Familiarization with procedures for conducting experimental research projects and introducing the results into industry in the footwear sector.
2. Trends in the development of the footwear industry throughout the world, including Poland.
3. Trends in footwear production techniques and technology throughout the world, including Poland.
4. Technology for the production of footwear and soles from polyurethanes.
5. Characteristics of artificial and synthetic materials for use in footwear production.
6. Organization and modern methods for the formulation of standards for footwear: raw materials, semi-finished goods and finished products.

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<sup>a/</sup> These lectures were attended by the technical staff of the footwear factory and the combine as well as by the research staff of the Centre.



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