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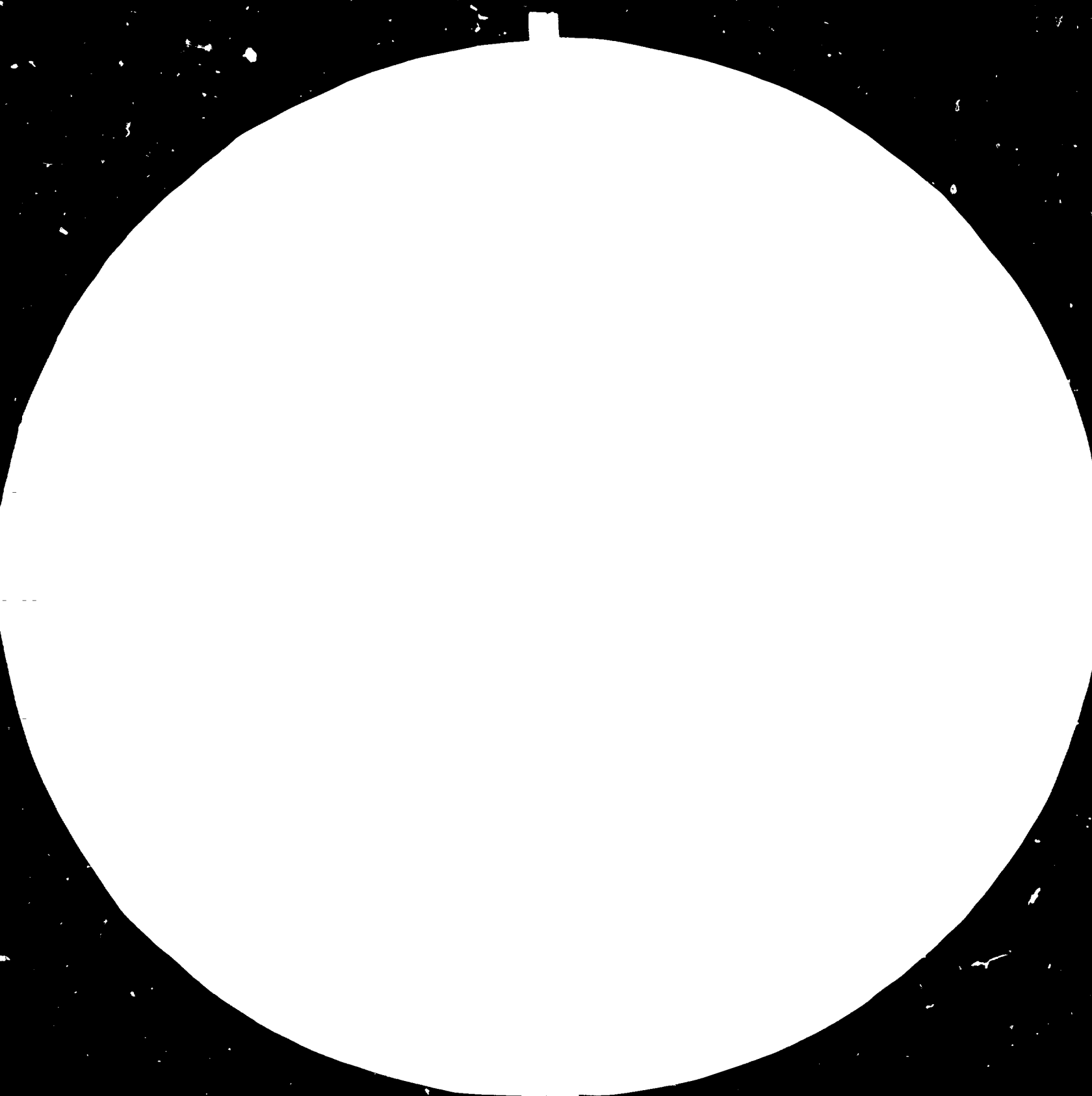
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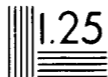


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Resolution test charts are used to measure the resolving power of an imaging system. The charts consist of a series of patterns of lines, each labeled with a number representing the spatial frequency of the lines. The resolving power of the system is determined by the highest spatial frequency that can be resolved.

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DP/ID/SER.B/440
2 February 1984
English

China.

ASSISTANCE TO THE ESTABLISHMENT
OF CENTRAL LEATHER LABORATORY
IN SHANGHAI

DP/CFR/80/007

PEOPLE'S REPUBLIC OF CHINA

Terminal Report *

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

United Nations Industrial Development Organization
Vienna

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1. Objectives of the Project:

As stated in the Project Document, the development objective of this project is to establish a technical center of leather which will serve the development of the leather industry of the People's Republic of China. In the first phase of the project, a laboratory -- the initial framework for the technical center will be set up. Its functions are as follows:

- (1) To employ and popularize the test methods issued by the International Standard Organization (ISO);
- (2) To establish the effective measures of quality control;
- (3) To improve the quality of the finished leather.

The immediate objectives of the project are preliminary measures necessitated for the fulfillment of development objectives which are as follows:

- (1) Establishment of a complete chemical analysis and physical testing laboratory;
- (2) Training of the qualified personnel in the field of the testing and methods of quality control for finished products and materials used in production.

2. Activities and Outputs

A. Invitation of Experts

- (1) Mr. Bo Lunden, the CTA, was invited twice. On his first mission, a detailed work plan for the implementation of the project was performed in collaboration with the KFD. This plan includes a list of selected testing instruments, training programmes, laboratory lay-out plan, a bibliography of useful books and journals etc. (see Technical Report, based on the work of Bo Lunden, 27 July, 1981). On his return mis-

sion, he assessed the progress of the implementation of the project, and assisted in the preparation of a detailed project document for the second phase of the project concerning the establishment of a leather technical center. (see Technical Report, based on the work of Bo Lunden, 8 Nov. 1982)

(2) Mr. A. Lesuisse, the tannery expert and leather analyst, was invited to guide the national staff to install the testing instruments and put them into operation. He also made lectures to popularize the ISO methods of leather testing and helped the national staff to start the chemical analysis and physical testing of different kinds of leather produced in Shanghai according to the international standard method. (see Report on the mission prepared by A. Lesuisse, 19 April 1982)

(3) Mr. Max May, the leather industry consultant, was invited to spread the modern developments in leather technology which will guide the R & D activities to be carried out to improve product quality to follow up the testing work done in the newly set-up laboratory. The lectures made by Mr. May were highly appreciated by the national technical staff and were recorded on tapes. (see Technical Report, based on the work of Max May, 30 August 1983)

B. Training

The dispatchment of technicians abroad for 4 months training in order to staff the Central Laboratory with qualified personnel has been postponed due to the insufficiency of language training of the candidates. After one year retraining, 4 candidates passed the language examination held in Beijing, Mr. Zhu Jun and Mr. Xie Kaibao were accepted by the Institute for Leather and Shoe Research TNO in Netherlands for training in the field of chemical analysis and physical testing of leather

while Mr. Wen Zuxou and Mr. Yao Feide were accepted by Organization for International Technical and Scientific Cooperation (TESCO) in Hungary for training in the same field. The four trainees completed their four months course of study at the end of 1982 with good results and received certificates from institutes responsible for it. They started up the operations of the laboratory in accordance with the methods issued by ISO since the beginning of 1983, and details of testing work done this year are described in the section "achievement of immediate objectives". They also transferred their know-how to 4 other technicians who are now acting as assistants in the laboratory work.

C. Study Tour

A group of 5 members visited Europe from 3 Sept. 1983 to 13 Oct. 1983. The names and functions of the members are as follows:

Shi Xianglin	National Project Director, Senior Engineer, Technical Manager of Shanghai Leather Corp.
Lan Youming	Assistant Project Director, Engineer, Manager Assistant of Shanghai Leather Corp.
Wei Qingyuan	Senior Engineer, Shanghai Leather Corp.
Ding Zhijie	Engineer, Shanghai Leather Corp.
Liu Renrong	Secretary

The objectives of the study tour are:

- (1) To promote the works of the newly set-up laboratory to a more advanced stage after studying the management and methods of quality control of the institutes to be visited.
- (2) To survey the present technological status of the leather industry in developed countries in order to revise the draft document of the second phase of the project on a more advanced and yet still practicable basis.

(3) To develop the contacts for future closer relations with organizations to be visited.

They visited institutes, schools and industrial plants located in FRG, Italy and England. A total number of 30 organizations were visited during the tour. They observed that the guiding principle of management in BLMRA, PFI, SATRA etc. is that the object of a leather institute is not confined to monitoring product quality, but also aims at controlling and improving product quality by means of technical services and research programmes. This principle should be pursued by the newly set-up laboratory as a goal. As a follow-up to the better understanding of the modern technology of leather manufacture in Europe, they are now revising the draft document of the 2nd phase of the project by adopting appropriate means for the implementation of new technique on a feasible basis. They have also built a good relation with quite a number of organizations in the visit, for instance, they have received letters from BLMRA (England), TEPF (England), SALP (Italy) in which various activities are suggested for promoting international technical cooperation.

Kr. Bo Lunden, Chief Technical Adviser of the Project commented in his technical report of July 1981 that "the theoretical knowledge of engineers of Shanghai Leather Corp. is in general quite high, in many cases surprisingly high, lacking is, however, a knowledge and understanding of the latest technological advances made in most of the highly industrialized countries." All activities mentioned above aimed at transferring the modern expertise knowledge to the national staff and assisting them to develop international contacts with the world leather industry, thus facilitated the implementation of the project

significantly.

The problem existing is the insufficiency in language training of the national staff in general. This has been realized by the National Project Director since the laboratory is created to develop the latest processing and control methods used internationally and will rely much on foreign, oral and written, communications. Measures have been taken to resolve this problem. For instance, an intermediate course of English for retraining 20 technicians from local industrial plants will begin in December of this year.

Another problem existing is the inconvenience of communication. This has resulted in the delayed arrival of equipment as well as informations related to the implementation of the project. It's suggested that appropriate means be taken to eliminate this impedimental factor in the course of the implementation of the 2nd phase of the project.

3. Achievement of Immediate Objectives

(1) A leather laboratory equipped with 37 instruments provided by the assistance of UNDP & UNIDO and supplemented by 12 instruments made domestically has been established and put into operation.

(2) The work of physical testing and chemical analysis of leather produced in Shanghai as well as in other provinces has been carried out regularly since 1983 in accordance with the methods recommended by ISO. The details are as follows:

Table 1 : Physical Testing

No.	Description	Items tested	Testing method	Total number of samples tested	Source of the samples
1	Cow hide upper leather	IUP 9, IUF 450 10, 470 13, 401 20.	IUP, IUF	470	Local tanneries
2	Cow hide ball leather	IUP 10, IUF 401 470	IUP, IUF	470	"
3	Goatskin upper leather	IUP 9, IUF 470 10, 450 13, 401 20.	IUP, IUF	500	"
4	Goatskin garment leather	IUF 421 450 470	IUF	400	"
5	Pigskin upper leather	IUP 9, IUF 450 10, 470 13, 20.	IUP, IUF	300	"
6	Pigskin corrected grain upper leather	IUP 9, IUF 450 10, 470 13, 20.	IUP, IUF	60	"
7	Synthetic leather	IUP 9, IUF 421 13, 450 20, 470	IUP, IUF	500	Local plants
8	Cow hide upper leather	IUP 6, IUF 450 8, 470 9, 20.	IUP, IUF	30	Leather imported from Argentina
9	Cow hide ball leather	IUP 10, IUF 401	IUP, IUF	20	Leather imported from America
10	Goatskin upper leather	IUP 9, IUF 450 20, 470 401	IUP, IUF	30	Tanneries located in other provinces
11	Synthetic leather	IUP 9, IUF 450 20, 470 401	IUP, IUF	70	"
Total				4,200	

Table 2 : Chemical Analysis

No.	Description	Items tested	Testing method	Total number of samples tested	Source of the leather
1	Cow hide upper leather	IUC 5 6 8 11	IUC	26	Local tanneries
2	Goatskin upper leather	IUC 5 6 8 11	IUC	13	"
3	Pigskin upper leather	IUC 5 6 8 11	IUC	26	"
4	Pigskin suede leather	IUC 5 6 8 11	IUC	13	"
5	Goatskin garment leather	IUC 5 6 8 11	IUC	13	"
6	Goatskin glove leather	IUC 5 6 8 11	IUC	13	"
7	Pigskin upper leather	IUC 5 6 8 11	IUC	10	Tanneries located in other provinces
Total				114	

Note:

1. IULTCS- International Union of Leather Technologists and Chemists' Society
2. IUP - Physical Test Methods for Leather of IULTCS
3. IUF - Fastness Test Methods for Leather Dyes and Dyed Leather of IULTCS
4. IUC - Chemical Test Methods for Leather of IULTCS
5. IUP/9 - Measurement of Distension and Strength of Grain by the

Ball Burst test

IUP/10 - Dynamic Waterproofness Test for Boot and Shoe Upper leather

IUP/15 - Measurement of Two- Dimensional Extension

IUP/20 - The Measurement of the Flexing Endurance of Light Leather surface Finish

IUP/6 - Tensile Strength of the Leather

IUP/8 - Tearing Strength of the Leather

6. IUP/401 - Fastness to Daylight of Coloured Leather

IUP/421 - Fastness to Water of Coloured Leather

IUP/450 - Fastness to Rubbing of Light Leather

IUP/470 - Adhesion of Finish to Leather

7. IUC/5 - Determination of volatile matter in leather (moisture etc.)

IUC/6 - Determination of water soluble organic and inorganic substances in leather (water soluble matter)

IUC/8 - Determination of chromic oxide (Cr_2O_3)

IUC/11 - Determination of pH value and difference figure of an aqueous leather extract

4. Utilization of project results

The utilization of the testing results by the tanneries for quality control and quality improvement is evidently of a long-range type and cannot, in general, be expected very quickly. In the following cases, however, the work has had immediate and practical results of importance to the local leather producer:

- (1) The white upper leather produced in Shanghai was found to turn yellow when made into shoes on storage. However, the factors causing yellowing of leather were not clear due to lack of proper instrument to test the light fastness of white leather within a reasonable interval of time, by using the fadeometer provided by the UNIDO assistance, samples of leather tanned by different recipes were tested for their light-fastness by adopting the IUF method. After a series of experiments, it was found that it's the oxidation of fungicide added to prevent mold growth in the tannage, that causes the yellowing of leather. By using another fungicide instead, the lightness of white leather increases from grade 2-3 to grade 4-4.5 on Grey Scale. Subsequently a considerable quantity of light fast white leather has been produced, the yearly quantity being in the range of 50,000 M².
- (2) Football matches are now being played even in raining days, hence the waterproofness of football leather is highly desired. However the football leather produced in Shanghai was found to be not so resistant to water penetration. Various modifications of finishing recipe have been made in order to improve it, but the results were only tested in matches of raining days, and definite conclusions cannot be drawn by these "practical tests". By employing the Penetrometer, various samples finished with different recipes were tested for their resistance to water

penetration, quick and reproducible results were obtained. One of the best recipes increases the resistance to water penetration from $\frac{1}{2}$ hr. to 3 hr. This was adopted by the tannery and leather ball factory in production. The leather balls thus produced were attested by all the referees at an international football match held in Beijing in Nov. 1982 and approved by FIFA as the leather ball to be used in international tournaments.

(3) It was found as a result of testing that rub fastness of the leather finish is inferior when compared with the guideline values recommended by GERIC. This is due to the fact that all local tanneries use acrylic resin as the binder in the finish while acrylic polymers are thermoplastic in nature and do not withstand either dry or wet rubbings. We are now making demonstration experiments by using polyurethane dispersions instead of acrylics, and good result is expected.

5. Conclusion:

(1) "The primary objective of UNDP is to support the efforts of the developing countries to accelerate their economic and social development by providing them with systematic and sustained assistance in the field of technical co-operation, geared to their national development plans and for the benefit of their population." The programming and implementation of the Project CFR/80/007 is in conformity with the above statement quoted from "A guide to the UNDP and its system of technical co-operation" issued by UNDP.

(2) The achievement of the established leather laboratory is confined in the field of testing and quality control. Advices, technical service as well as R & D activities are required by the industrial plants for the improvement of their product quality as the follow-up of the work done in the laboratory whenever the

testing data reveals some defects in respect to quality specification. Hence immediate steps should be undertaken for the establishment of a leather technology center to meet these requirements.

(3) Assistance to provide expertise knowledge is as important as, if not more than, the assistance to provide equipment, especially when the problem of the promotion of self-reliance to develop leather technology in our country is considered. Besides, the training in the field of managerial and administrative capabilities has been somewhat neglected when compared to the inclination to emphasize more training in the field of technical expertise. This inclination should be corrected because both the qualified administrative staff and technical personnel are important for the successful running of a technological institute. The above concepts are realized by the N.P.D. as the knowledge gained in the course of implementation of the project.

6. Recommendations

The People's Republic of China has fairly rich resources of hides and skins and has experienced a long history in the development of leather industry. The raw hides production is about 5 million pieces of bovine hides, besides that about 40 million pieces of goat skin and 80 million pieces of pigskin are produced. The government has made great efforts to develop the production of leather products. For instance, the pigskin production increased from 50 million pieces in 1979 to 80 million pieces in 1981, and various kinds of pigskin leather are made for the use of shoe uppers, soles, garments, balls and small leather goods to accommodate to the domestic demand of the huge population. However, there still remains much space to be exploited for the utilization of this potentially very big resource as both the leather and footwear industry lack modern technical know-how, adequately trained personnel -- especially in management, technology and product development. Technical information supply, training and retraining of specialists from industrial plants, ie, transfer of up-to date know-how to a higher level would be of great assistance to the better utilization of domestically available hides and skins in order to meet the requirement of the national economy.

Based upon the demand of the development of leather industry of China, UNDP provided funds under the Project DP/CPZ/80/007 in order to assist in the establishment of a leather testing laboratory. This is the first step on the path towards the above outlined long-term objective of the leather sector in China, and the Project Document states: "It's hoped that after the accomplishment of the first phase of the project, UNDP will continue its

assistance to build the technical center of leather including a tannery pilot plant, a footwear designing department and a leather training center."

The project has been carried out as scheduled. The achievement of immediate objectives and utilization of project results are described in this report under entitled sections. On the basis of the initial framework of the newly set-up laboratory, the government planned to establish a new building in 1981 in order to conform with the need of the leather technology center. This plan has been carried out, and a six-storied new building was completed in Sept. 1983 (see photo). This evidently provides the convenience for the implementation of the second phase of the project. The draft project document for the second phase of the project has been prepared and sent to relevant organization of the government as well as UNDP and UNIDO, as the future steps for the consolidation and development of the initial framework are highly desired.

Annex A

International Project Staff

(Experts and Consultants)

<u>Name of Expert/ Consultant</u>	<u>Country of Origin</u>	<u>Post or Field of Specialization</u>	<u>Duration of Service From</u>	<u>To</u>
B. Lunden	Sweden	Leather expert	1st mission 25 May 1981 --- 26 June 1981	Return mission 4 August 1982 ---18 August 1982
A. Lesuisse	Belgium	Leather analyst	17 March 1982 ---16 April 1982	
Max Kay	Switzerland	Leather industry consultant	21 May 1983 --- 12 June 1983	

ANNEX B

National Project Staff

Name	Position held	Full-time/ Part-time	Dates of Service From To
Shi Xianglin,	National Project Director Senior engineer	P	Jan. 1982 --
Lan Youming	Assistant Project Director Engineer	P	Apr. 1981 --
Zhu Jun	Head of the Laboratory Assistant engineer	F	Apr. 1981 --
Wen Zumou	Assistant engineer	F	Apr. 1981 --
Xie Haibao	technician	F	Apr. 1981 --
Yao Peide	technician	F	Apr. 1981 --
Ding Lifang	technician	F	Jan. 1983 --
Jin Wenshan	technician	F	Jan. 1983 --
Han Caizhong	technician	F	Jan. 1983 --
Lu Yuanmei	technician	F	Jan. 1983 --

Note: The former NPD, Mr. Chang Xilin, deceased in Jan. 1982.

ANNEX C

Project Study Tours

Name of Participant(s)	Place and Institution Visited	Field of Study	Period of Study Tour From To
Shi Xianglin	In F.R.G.		
Lan Youming	(1) Bayer AG (2) BASF Aktiengesellschaft	} leather } chemicals	} 3 Sept. 1983 } -- 15 Sept. 1983
Wei Qingyuan	(3) Carl Freudenberg & Co.	} leather } technology	
Ding Zhijie	(4) PFI (Prüf-und Forschungs-Institut f.d. Schuher-Stellung)	} shoe test- } ing	
Liu Renrong	(5) Westdeutsche Gerberschule Reutlingen	} training } of leather } technolo- } gist	
	In Italy:		
	(1) SALP (Soc. P.Az. Lavorazione Pelli)	} leather } processing	} 16 Sept. 1983 } -- 1 Oct. 1983
	(2) Tiger		
	(3) New Caste		
	(4) Cortan		
	(5) EMI		
	(6) Conceria Del Chienti		
	(7) Berflex S.p.A.	} processing of } leatherboard	
	(8) Bontex		
	(9) Italmacchine Plants S.p.A.	} tanning } machinery	
	(10) Vallero		
	(11) Mostardini		
	(12) Flanner		
	(13) P.I.S.I.E. (Politecnico Internazionale Per Lo Sviluppo Industriale Ed Economico)	} training of } leather } technicians	
	(14) Istituto Tecnico Industriale Di Stato		

In England:

- | | | |
|---|-----------------------------------|---------------|
| (1) Alma Ltd. | leather trading | } 2 Oct. 1983 |
| (2) Odell Leather Industries Ltd. | } leather processing | |
| (3) Holems Halls Tanners Ltd. | | |
| (4) Spencer | | |
| (5) Nene College | } training of leather scientists | |
| (6) Cordwainers Technical College | | |
| (7) BLMRA (British Leather Manufacturers' Research Association) | leather research programming | |
| (8) SATRA (Shoe and Allied Trades Research Association) | shoe testing | |
| (9) Tanning Extract Producers Federation) | developments in vegetable tannage | |
| (10) BUSMC (The British United Shoe Machinery Co. Ltd.) | shoe machinery | |

ANNEX D

Project Fellowships

<u>Name of Fellow</u>	<u>Field of Study</u>	<u>Place of Study</u>	<u>Period of Study</u>	
			<u>From</u>	<u>To</u>
Zhu Jun	Chemical Analysis and Physical testing of leather	The Institute for leather and Shoe Research TNO, Waalwijk, Netherlands	3 Sept. 1982	
Xie Haibao			--1 Jan. 1983	
Wen Zumou	Chemical Analysis and Physical testing of leather	(1) Institute of Commercial Quality Control (KERMI) Hungary	6 Sept. 1982	
Yao Peide			--10 Sept. 1982	
			(2) The Leather, Artificial Leather and Footwear Industries Research Institute (BMKI) Hungary	11 Oct. 1982
		(3) The Laboratory of the Budapest Tannery Association, Hungary	22 Nov. 1982	- 31 Dec. 1982

ANNEX E

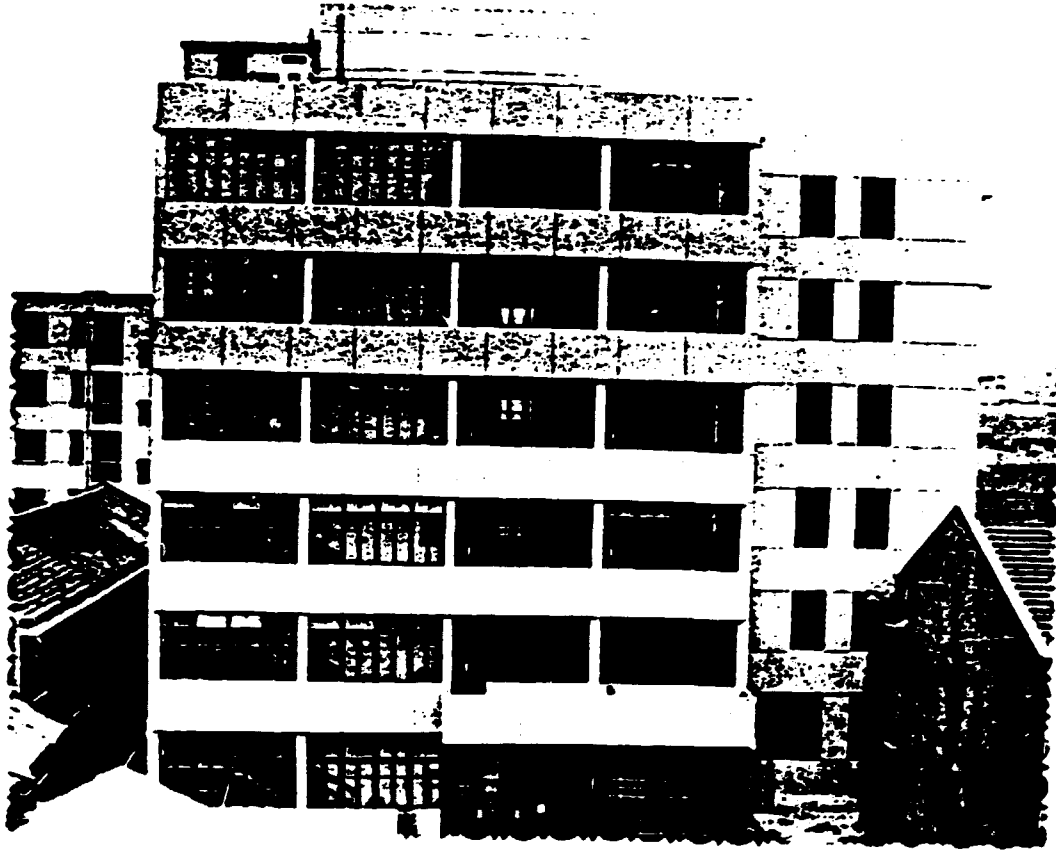
List of major items of equipment provided by UNDP:

1. El. Precision Balance FC 180
2. Analytical Balance H 80
3. Zoom Stereoscopic Microscopes
4. Zeromatic pH Meter
5. Bally Penetrometer
6. Impeller Type Cutting Mill
7. Band Knife Splitting Machine
8. Bally Flexometer
9. Standard UV Long-life Fade Meter
10. Portable pH Meter
11. Zahn Viscosimeter
12. Drying Oven
13. Dyeing Device with glass dyeing drums
14. Copier
15. Instron Tensile Tester
16. Macro Kjeldahl Apparatus
17. Sole adhesion tester
18. Lastometer
19. Dome Plasticity Apparatus with Mic.
20. Finish Rub Fastness Tester (STM 102)
21. Apparatus for Leather Shrinkage Temp. Determination
22. Finish Adhesion Tester
23. Shaking Machine for Leather Analysis
24. Leather Thickness Gauge
25. Muffle Furnace
26. Engler Viscosimeter
27. Vanesty Water Still
28. Dosemat Test Tanning Drum
29. Frank-Abrasion Resistance Tester
30. Finish Rub Tester
31. Water Vapour Permeability Tester
32. Stiffness Tester
33. Bally Tensometer
34. Permeometer for Sole Leather
35. Apparatus Hydrotest with 11 Plexiglassplates
36. Pneumatic Glazing Machine
37. Laboratory Drum Tannox

ANNEX F

List of documents prepared during the project's lifetime:

1. "Technical report" Based on the work of Bo Lunden,
27 July 1981.
2. "Report on the five weeks mission--- 10 March- 19 April 1982"
Prepared by A. Lesuisse.
3. "Project Progress Report" Prepared by Shi Xianglin,
May 1982.
4. "Technical report" Based on the work of Bo Lunden,
6 November 1982.
5. "Report of a four months' training in leather testing and
analysing at the Institute for Leather and Shoe Research
TNO, Waalwijk, the Netherlands"
Prepared by Zhu Jun and Xie Haibao,
January 1983.
6. "Report on the training in leather testing and analysing
in Hungary" Prepared by Wen Zunou and Yao Feife
Dec. 1982.
7. "Technical report" Based on the work of Max May
30 August 1983.
8. "Report on study tour" Prepared by Shi Xianglin, Lan Youming,
Wei Qingyuan, Ding Zhijie, Liu Renrong,
Nov. 1983.
9. "Project Finding and Recommendations" Prepared by Shi Xianglin
15 November 1983.



The new six-storied building for the Leather
Technology Center.

