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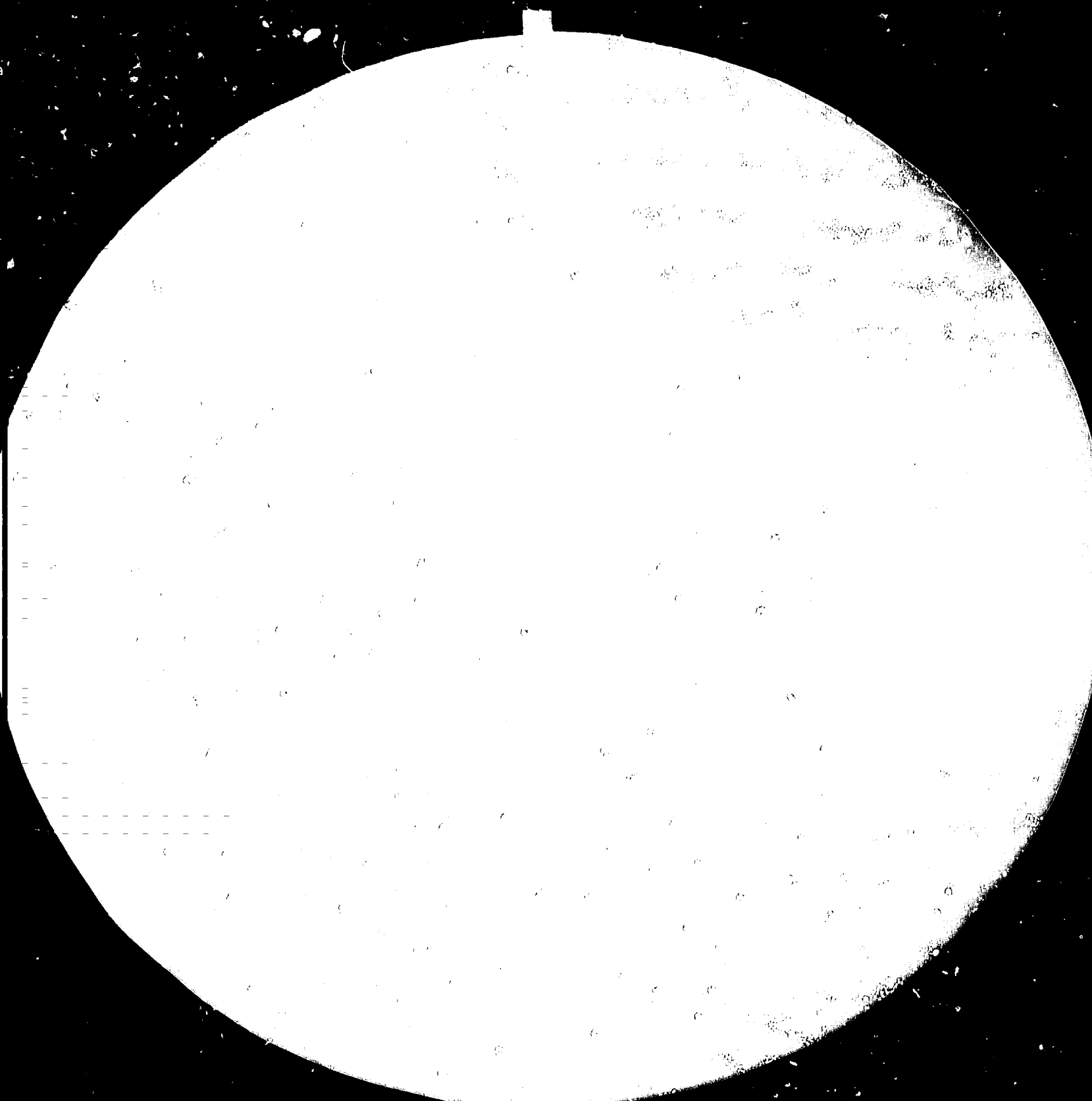

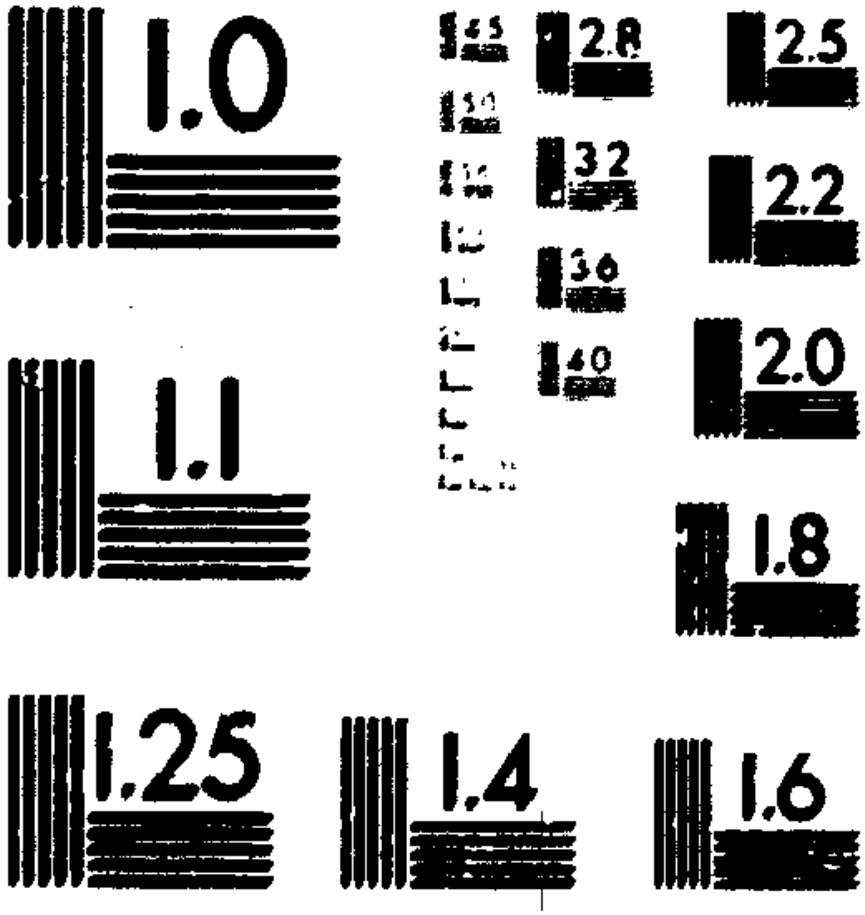

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DP/ID/SER.A/562
18 January 1985
ENGLISH

LEATHER TECHNOLOGY CENTRE

DP/CPR/83/004

CHINA .

Technical report: Assistance to the Improvement of finished leather, especially pigskins and goatskins

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

Based on the work of V. N'Gueyilbé, leather technologist

United Nations Industrial Development Organization
Vienna

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ACKNOWLEDGEMENT

During the mission, the Expert has experienced a warm welcome, hospitality and an effective cooperation from all technicians at the Institute and from the tanneries concerned. He thanks all those who have shown great interest in his works and made his stay in Shanghai as pleasant as possible.

Special thanks go to UNIDO office/Vienna for having accepted to pay the excess kilos free samples the Expert has brought for his works, to Mr. Shi Xiang Lin, the National Project Director for having made available leathers and some finishing chemicals without which the task of the Expert would not be possible to fulfill and, for his everyday sustained assistance of all kinds, to Mr. Liu Guang Lu and to Mr. Chen Ru Quan from the Ministry of Foreign Affairs Bureau, Ministry of Light Industry - Second Department for their assistance in Beijing, to Mr. Sissingh of UNDP office/Beijing and finally the expert would like to thank his Spouse and his children for their courage, comprehension and their support received during these six weeks mission.

C O N T E N T S

I - SUMMARY

Under the project DP/CPR/83/004/11-01, the Government of the People's Republic of China has made a request to have a Leather Finishing Expert to carry out various tests and demonstrations by using the up-to-date finishing compounds and displaying the latest finishing techniques and procedures in order to upgrade the pig- and the goatskins for domestic use and for export market.

The mission has taken place from 8th of November until 8th of December at the Shanghai Leather research Institute.
During his work in the field, the Expert has conducted a various number of demonstrations and practical tests on :

- Pigskins for shoe-uppers and for leather goods,
- Goatskins for shoe-uppers, garments, gloves,
- Cow-hides for shoe-uppers and garments,
- Buffalo-hides for leather goods,
- Cow split leathers for sport shoes and for children shoes.

The leather Institute and the tanneries in Shanghai were directly involved in all experiments and the technicians have carefully participated and followed step by step the Expert's works.

Certain deficiencies in the processes preceding the finishing have been noted and suggestions and/or recommendations have been given that are essential in order to achieve a satisfactory quality of finished leather.
All relevant finishing procedures and/or guide lines were given at disposal of the counter-parts.

Although it is believed that the work of the expert has made a positive impact in the methods of finishing leathers, fundamental improvement of the finishing techniques needs continious efforts and also training courses abroad in the field of practical leather finishing would certainly contribute to reach in a short time the goal of this project.

II - INTRODUCTION

1 - Background :

The Peoples's Republic of China has fairly rich resources of pig- and goatskin. Comparatively only a few millions of bovine hides are locally produced. To satisfy the growing demand for bovine leathers, a considerable quantity of salted hides and wet blue hides are imported.
There are many tanneries in the country with long experience in tanning of hides and skins but dyeing and finishing techniques are still to be improved.
Realizing that the country has a huge amount of pig- and goatskins, the Chinese Government in one hand, has decided to put as much efforts as it is necessary in encouraging the skins tanneries to produce a better quality leathers out of these skins to accommodate the domestic demand and to cut down the import of hides, saving foreign currency and, in another hand, to upgrade these leathers to a level, to match the international standard for export market. Also, the Government of the People's Republic of China is well aware of that , export of finished leathers and even much better, the export of manufactured articles from finished leathers has much more added value than exported skins in raw, in wet-blue or in crust stage.

2 - Objectives :

Recognising the fact that, China has a large resources of pig- and goatskins, that there are a quite a number of tanneries distributed all over the country with long histcrical experience in tanning process and reasonably well equiped but, that the dyeing and the finishing techniques are backward, the Government has come to a conclusion and with the assistance of UNIDO/UNDP to set up in Shanghai, one of the most active city in China and an international business trade center, a Leather

Research Laboratory to serve the tanneries in Shanghai and the development of the leather industry of the People's Republic of China as a whole. This laboratory is equiped with modern testing equipments, modern tanning and finishing machines. It is supposed to carry out the following duties :

- to train the personnel in the field of physical and chemical test methods and in the process of leathers,
- to establish the effective measures for quality control,
- to improve the quality of leathers, finished leathers and manufactured leather products,
- to employ and popularize the test methods issued by the international standard organization.

Most of the project phases have been realized or are going to be realized in a very near future.

3 - <u>The role of the finishing Expert (11-03)</u> :

The task of the finishing expert is to assist the institute to improve the quality of finished leathers. To advise the finishing chemicals to upgrade the leathers and to operate the modern and recently installed finishing machines.
To fulfill his mission, the expert has recommended/advised the Institute to procure the finishing chemicals needed for demonstrations and has brought free samples of chemicals in order to further carry out finishing trials if time allows it.
During the mission, the expert has concentrated his work in the practical side of the leather finishing only, introducing modern finishing techniques, new fashion finishing systems, the latest fashion looks by using the up-to-date finishing compounds.

III - FINDINGS

1 - Activities during mission :

During the absence of Mr. Shi Xiang Lin, National project Director, the Expert has :

- checked finishing products availabe in quantity and quality,
- prepared solvents for lacquer emulsions,
- checked leather types in quantity and quality for different types of finishes,
- checked finishing room and cleaned it up ,
- checked finishing installation : spray gun,compressor drying chamber,
- checked finishing machines : rotary plating machine, polishing machine, rotary colour coating machine,
- finishing on polishing machine and rotary colouring machine.

As the manual on the rotary colouring machine did not give information as for which application the screen cylinder on the machine is meant for, the Expert has prepared different pigment/resins mixtures with different viscosities from 10 seconds till 20 seconds to find out whether the rotary colouring machine can be used for applying pigment onto the leather.

With Mr. Shi Xiang Lin : suggestions of getting crust leathers from different tanneries and to gather technicians from different tanneries to attend the demonstrations.

- Different trials with pigments/resins mixtures with viscosities from 20 t0 35 seconds. Demonstrations have failed. The Expert has concluded that the screen cylinder is not suitable for colouring with pigments. The screens of the cylinder are too fine for this type of application. The highest pigment application obtained per square foot is only 5 grams liquid mixture.
- glazing finish on pigskin - aniline look,
- glazing finish on pigskin -semi-aniline,
- dyeing of pigskin crust leathers on rotary colouring machine : good results. This confirms the above expert's statement (the screen cylinder on the machine is not suitable for the application

of pigment onto the leather) it is merely for the application of liquid dyestuffs onto crust leathers and the rotogravure effect ("two tone effect" : an application of mixtures of lacquer emulsion and lacquer dyes onto crust leather, onto ready pigmented and/or onto printed leathers). Also, the position of the screen cylinder on the machine proves that the machine is not suitable for pigment applications : the leather comes out from the machine with pigment coated surface down, and sticked to the colouring screen cylinder. One needs two workers at the back of the machine to pull off (to separate) the leather from the cylinder, to turn it grain up and to hang it for drying. These are not only extra works but the applicated pigment might drip by a low viscosity and the finished leather might have orange peel (orange skin) appearance when applying pigment with high viscosity.

The Expert suggested that, if the machine is going to be used for pigmented application, to convert the machine with screen cylinder (colour carrier) above and the pression cylinder down. Thus, the leather will come out from the machine with pigmented surface up. He also, suggested to build a transport conveyor adjacing or connected to the pression cylinder so that the outcoming leather can be immediately transported into the drying chamber (drying units). He further recommended to procure appropriate cylinder for pigment application purposes.

Different demonstrations effected during this mission:

- glazing finishes : aniline
- plated finishes : semi-aniline
- semi-aniline finish
- pigmented finish
- split finish
- rotary coating : mixing pigments + dyes
- polish finishes
- rotary coating and polish finishes
- polish finishes
- tipping effects

- goatskins : Xin Yi Tannery
  glazing finishes
  plated finishes
- goatskins : Zhun Yi Tannery
  garment finishes
  gloves finishes
- printed leather for polishing and milling
- polished leather with different base coats
- different base coats for aniline leather to trace the looseness problem
- different base coats for aniline leather
- milled leather
- gloves leather and polished kid leather
- pigmented finish and practical training
- pigskins : Xin Xin and Hong Guang Tannery
- cowhides : Hong Wei and Ye Ming Tannery

2 - <u>Observations on some leathers used for finishing</u> :

a) Pigskins :
- the soft one are loose in the belly areas,
- when they are round and mellow, they became loose after finishing and drying process and/ or when polished
- the backbone and butt areas are stiff
- they seem to have an excess of fatliquors
- the moisture content is too high (25%)
- they absorb aniline spray dyeing unevenly
- appearance of spots when spray dyeing
- when plating or embossing dark spots appear on the surface,
- spew on finished leather,
- they became loose when polished.

b) Goatskins :

- uneven spray dyeing,
- backbone line shade differs from the rest of leather colour,
- spots on light colours,
- spew on finished leathers,
- easy tendency to looseness.

c) Cowhides/Buffalo hides :

- garment finish
- full grain finish
- corrected grain finish
- finish for leather goods

No particular remark. The quality of these crust leathers respond to what one can expect from these leather types, types of finishes required for each item and their respective end-use.

d) Split leathers :

- splits for finishing should be prepared duly and accordingly
- not too stretchy by using adequate retanning agents
- smooth surface by using surface impregnation and/or drum impregnation and buffind.

If the split does not fulfil the above requirements before finishing, the finished leather will have a rough surface and orange peel appearance.

3 - Remarks on technical aspects :

This paper does not pretend to give solution to immediately solve the defaults observed. A considerable time and efforts, several researches, investigations and trials starting from beamhouse till the last process preceding the finish are

necessary to trace the defects and find out the solutions. Special attention should be paid to following precesses :

a) degreasing :

The pigskins have a high content of natural fat which could have a detrimental and negative effects on the finished leather. A through degreasing by using appropriated degreasing/ emulsifying agents. These products should completely emulsify and disperse the fat and washed out. Their presence in the leather would negatively affect the next tanning process.
If the fat is not completely or only partly degreased, the following defects may occur :
- bad distribution of tanning or retanning agents
- overloading of fatliquors
- uneven drum dyeing
- uneven aniline spray dyeing
- uneven absorption of the finishes into the leather
- looseness of the grain.

In some cases, it is advisable to degrease twice : in the degreasing process and in the pating process but, they (degreasing agents) should be eliminated during washing out as these products are sensitive to water.

b) Tannage/retannage for aniline leather :

A pure chrome tannage/retannage is not suitable for this type of leather. The leather tends to be loose and has bad absorption.
A pure vegetable tannage/retannage gives good fullness and pleasant handle but grain tightness, grain appearance, dyeing properties and light fastness are unsatisfactory.
When tanning/retanning with vegetable, synthetic or resin tans, special attention should be paid for :

- round filling and mellow tans,
- good levelling tans,
- good aniline levelling tans,
- good lightfastness tans.

It is difficult to definite or to predict an accurate topography of the distribution of retanning materials in the leather. But experience shows that, vegetable and synthetic tans tend to be fixed in the butt areas and the resin tans in the belly and flank areas. Thus, an adequate combination of these products might help to solve the problem.

c) Fatliquoring for aniline leather :

As one is never hundred per cent sure to eliminate completely the natural fat, it is necessary to conduct several preliminary trials. However, in the case of pigskin, a low amount of fatliquor will certainly do. One should not try to achieve a mellow, round and soft leather by using an excess of fatliquors as this would remain on the grain and lead to poor absorption of the film and finally would make the finishes susceptible to developing loose grain.

The fatliquors should have the following characteristics :

- good stability in liquors,
- good light fastness,
- heat resistance,
- migration fast
- good levelling for drum dyestuffs,
- good levelling for aniline spray dyes.

d) Dyeing for aniline leather :

Dyestuffs for aniline leather crust should respond the following criteria :

- good levelling,
- good light fastness,
- solvents fast,
- even colour,

- brilliant shade,
- good penetration,
- fast to water and perspiration,
- resistant to acids and alkalis,
- formaldehyde resistant,
- stable to hard water,
- fast to fatliquors

e) Drying of aniline leather :

Mostly :
- hang drying,
- vacuum drying,
- combination hang drying/vacuum drying.

The leather must be dried to a moisture content of approx. 15-18 % before finishing. High moisture content leads to a poor coverage of the finish and looseness of the grain. Too dried leather may produce a crusty, cispy, tinny, hard leather which loses it temper.

IV - RECOMMENDATIONS

1 - Chemicals :

As for degreasing, retanning, fatliquoring agents and aniline dyestuffs, cooperations and technical exchanges with the suppliers of these chemicals may be helpful. Intensive researches are still to be conducted to find the causes of looseness, stiff backbone/butt, uneven absorption of finishes.

2 - Outsider Expert : wet-end expert.

Tanning, retanning dyeing and fatliquoring Expert. An outsider Expert with experience in these processes is absolutely and strongly recommended. His work should be practical and not only giving lectures.

3 - Institute Personnel :

The personnel at the Institute is theoreticcally well educated and keen to learn. However, their knowledge in finishing techniques needs improvement.
The finishing is not a science which one can learn from a book. It is a practical experience which one gains, acquires with time in trying and doing finishing himself.
It is not useful to copy the finishing formulations for the archive purposes. They are there to be repeated and, the best way will be to try them on different leathers and if necessary, to modify them accordingly.
Also, it is by trying that one could get the feeling of the finished leather : how much finish this specific type of leather needs, the gloss and the handle of the leather. In a tannery, a finisher is a key person in the production of leather. It is him, who carries the burden of producing attractive leathers. It is him to develop new shades, fancy colours, to promote new structures, in one word, to follow closely the fashion trends and accordingly to create finish effects.
During this mission, the Expert had gone several times for window-shoppings. He observed that the common colcurs are black and brown. The shoes and garment leathers look very pigmented . Some of the leather jackets are too shiny so that one could not distinguish whether it is a leather or a plastic material ; they are not supple and have rough feeling.
Of ccurse, everybody has his own view-point but, taking into consideration that, the objective of this project is not only to improve the quality of leather for domestic use, but also for export market, thus, a nice colour finished leather will not only improve the selection but, it will make the leather attractive and thus saleable.

4 - Training abroad :

It is advisable to send leather finishers abroad for practical training.
They should be sent with their crust leathers to the finishing chemicals suppliers. During these periods they would have the

opportunity to familiarize themselves with the latest finishing techniques, fashions and while "window shopping" on week-ends, they could see what is going on in the world market.

5 - Marketing of finished leathers :

The marketing of finished leathers and of leathers in general, is not an easy job. The customers and suppliers have establish a routine connection, the market is filled up in quality and quantity.
After improving the quality and reaching the international quality level, to catch up the track, the new comer must throughly study the market-milieu, must have solids relations in this milieu and at last, he should make sure to offer an equal and regular quality product.
Regular visits abroad, visiting leather-show and leather-goods fairs are recommended in order to be in the picture.

6 - Marketing of manufactured articles from finished leathers :

Since the aim of improving the quality of finished leather is not for domestic consumption only and now, with "the policy of open door to the world", and at last, with the increasing number of tourists and business men coming to China, one should produce good-looking, attractive, well designed and fashionable products and display them for sales in the shops. Some visitors might buy these products and take them away : "A leather made in China" - An advertisement for China leather industry.

ANNEXES

Annex I	:	Travel programme
Annex II	:	Job description
Annex III	:	Formulations.

Annex I

Travel programme

31.10.84	Arrival Vienna
1.11.84	Briefing at UNIDO Office
2.11.84	Departure Vienna Frankfurt Beijing
3.11.84	Arrival Beijing
5.11.84	Briefing at UNDP Office
7.11.84	Departure Shanghai
8.11.- 29.11.84	Shanghai
30.11.84	Departure Beijing
1.12.84	Visit Beijing International Leather Fair
2.12.84	Departure Shanghai
8.12.84	Departure Beijing
10.12.84	Debriefing at UNDP Office
10.12.84	Departure Vienna
12.12.84	Debriefing at UNIDO Office
13.12.84	End of mission.

Annex II

JOB DESCRIPTION - DP/CPR/83/004/11-03

1.11.84 - 13.12.84

Leather finishing Expert with duty station SHANGHAI

Purpose of the project :

To complete the establishment of a well functioning Leather Technology Centre including a laboratory/pilot plant for the development of leather processes and chemicals used in tanneries. The expert was attached to the Ministry of Light Industry through the Shanghai Leather Corporation and worked in close co-operation with the National Project Director.

The expert has :

1 - advised on and demonstrated the use of modern leather finishing chemicals and agents in order to improve the appearance, fashion look, feel and physical properties of the present standard of leather finishing,

2 - advised on and demonstrated various modern finishing technologies and combinations thereof on the various kinds of locally produced grain leather, particularly pigskin upper leathers,

3 - prior to starting the mission, the expert has advised the Shanghai Leather Corporation what materials and chemicals are needed for the demonstrations.

The expert has prepared and submitted a technical report setting out the findings of this mission and recommendations to the Government on further action which might be taken.

Annex III

FORMULATIONS

The Expert has left all formulations used during his works with Shanghai Leather Institute and tanneries involved in the trials.
The Institute and or the tanneries are free to divulge these formulations.
He, also, intentionally, did not mention the commercial name of the machines he worked with and or the manufacturer's name.