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ENGLISH

LEATHER TECHNOLOGY CENTRE

DP/CPR/83/004

THE PEOPLE'S REPUBLIC OF CHINA

Technical report: Improvement of the present hand cutting technology of upper leather*

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

Based on the work of J. Pivecka
Footwear Consultant

Backstopping Officer: Juhani Berg, Agro-based Industries Branch

United Nations Industrial Development Organization
Vienna

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I. SUMMARY

The project DP/CPR/83/004 entitled "Leather Technology Center (LTC)" is a follow-up project to the project "Assistance to the Establishment of Central Leather Laboratory in Shanghai".

The Footwear Consultant, Job Description DP/CPR/83/004-53/3 was attached during the duration of his 3 weeks mission to Ministry of Light Industry through the Shanghai Leather Corporation and has worked in close cooperation with the National Project Director.

The expert had to provide extension services together with counterparts to a selected shoe factory for the improvement of the present handcutting technology with scissors and to carry out a training seminar to leather hand cutters for cutting the upper leather with a cutting knife.

The expert had also to prepare following technical report setting out his findings and recommendations to the Government on further action which might be taken.

II. TERMS OF REFERENCE, ARRANGEMENTS AND ACKNOWLEDGEMENT

1. Terms of reference

As specified in the Annex I. enclosed Job Description DP/CPR/83/004/11-53/31.7.D

2. Arrangements

After two days briefing in Vienna the expert left Frankfurt as per agreement on 18 October 1986 and

arrived via Hong Kong on 19 October 1986 in Shanghai. He left Shanghai again via Hong Kong on 7 November 1986. Briefing and debriefing in Beijing took due to the short duration of the mission not place.

3. Acknowledgements

The expert wants to thank Mr. Shi Xiang Lin, National Project Director and all his staff at the Leather Research Institute for all their assistance during his work as well as for their hospitality.

He wants also to express his commendation to all participants for their interest and hard work during the seminar.

III. INTRODUCTION

Cutting of upper and lining leather in the People's Republic of China is done today mostly by scissors after a preliminary skin designing. Up to some extent it is done on the mechanical cutting presses (which are mostly locally made) with the help of 45 mm or higher forged cutting knives.

Cutting of upper leather by scissors is traditional in China and to change it to be better and more efficient cutting by knife will be difficult task.

This technical report includes the observations, findings and recommendations of the expert on further action to be taken. It describes also the method used during the seminar for experts who will follow up with an evaluation of the results obtained.

The expert started his work on the 20 October 1986 and concluded it on 7 November 1986. The training seminar started on 24 October 1986 and ended with an evaluation of the results achieved and examination of the students on the 1 November 1986.

IV. RECOMMENDATIONS

These recommendations are addressed to the National Project Director at the Leather Research Institute for consideration and introduction in the Pilot Leather Shoe Factory.

Summary of the recommendations

1. Don't try to reeducate traditional leather tracing and cutting operators. It is time consuming.

2. Motivate young people and secure strong support from their supervisors.

3. Establish programme for at least two years training in the theory and practical work in the workshop

4. Make equipment in good quality required for upper leather cutting by knife locally available.

5. Use only upper leather cutters with at least two years training for leather cutting on the cutting presses.

Recommendations

Because of very old tradition of the leather cutting by scissors and the difficulties faced in changing the skin designers and the scissor cutters to knife cutters we recommend a systematic, long range training of selected young workers for this operation.

As in countries with a highly developed shoe-industry, such training with theory and practical work in the workshop should take from 2 to 3 years and must be supervised by a well trained instructor. It should include: Material technology, grading of the upper and lining leather, designing of the parallelogram, designing of the skin for calculation of the waste, cutting of non-leather material, cutting of lining leather and cutting of different upper leathers like split leather, pig-skins, side-leather, goat-skins and sheep-skins.

Before starting this long range training programme, the young workers must be motivated and the necessity of the change well explained. The supervisory staff of the factory, starting with the foremen in the workshops up to the factory directors, must understand and accept this new production method and try to eliminate any reactionary influence of the trainees in the workshops.

The best, most suitable cutting knives (holders with exchangeable blades) must be obtainable with necessary equipment for sharpening the blades in China. The cutting knives which the expert has brought to China can be reproduced locally and if the steel quality does not correspond to the requirements necessary for good quality of cutting knives, steel for blades should be imported.

All different cutting base plates used for leather cutting should be tested in the Leather Technology Centre in order to find out which is the most suitable one and at the same time also reproducible in China.

V. UPPER LEATHER CUTTING SEMINAR

During the preparation of the seminar the Shoe factory No.1 and the Leathergoods department of the Leather Technology Centre were visited in order to inspect the leather cutting operation as it is done today. The expert was familiar with the conditions of leather cutting in several factories in Shanghai which he visited in 1985.

During the visit to Factory No.1 and the discussion with one of the leather tracing operators a very strong conviction by the operator that his way of work is much more economical than direct leather cutting by knife was discovered. He argued that direct leather cutting would waste material and reduce the quality of his work.

In the Leathergoods Department of the Leather Technology Centre the expert demonstrated the use of a cutting knife to a leather cutting operator who has been doing this job for longer than a decade and offered to leave the knife with the operator if he will start using it. The operator refused because he is sure that when using the traditional spade knife and scissors he is more productive. (Annex.II. and III.)

The participants of the seminar were selected by the Director of the Leather Technology Centre where the seminar took place. Out of the 13 participants 5 were from Leather Shoe Factory No.1 and 8 from the Institute (LTC). Average age of the participants was 25 years, 7 were female and 5 male. Only 3 participants are working at present as leather designers (tracing leather) the rest are operators from stitching and lasting department and from the laboratory.

List of participants is enclosed in Annex.IV. The programme of the Seminar which is included in Anex.V. contained the following topics:

1. Introduction and motivation of the participants

The objective of the seminar was explained to the participants. During the discussion the participants were asked to express their arguments against the planned change in the production method by the introduction of the knife in place of leather tracing and cutting by scissors. Their arguments were as follows:

1. Cutting leather by scissors is the old traditional way of work in China

1.2 There is not the right equipment for knife cutting by hand available in China

1.3 Leather cutting by knife without leather tracing is more difficult

1.4 Scissors-cutting after tracing is material saving

The answers to all these arguments were immediatelly given and detailed discussion was reserved for the following lectures.

2. Video demonstrating the use of the cutting knife in the pattern cutting

A video film (25 minutes) demonstrating the work of one pattern cutter and one fashion designer in which the use of the cutting knife could be well observed were shown to the participants and commented.

3. Designing of the parallelogram

To make the participants understand well the necessity of the economic patterns and leather cutting, sufficient

time was spent in the training of the parallelogram design. Lesson prepared by the expert is included in Annex.VI.

4. Calculation of the upper and lining leather consumption with help of the parallelogram with the skin designing and calculation of the waste allowance

Calculation of the theoretical surface found by the parallelogr am and of the necessary waste allowance found by tracing of the skin was trained. Also the size allowance necessary for calculation of the consumption due to changes in the assortments was explained and exercised. Handouts prepared by the expert for this lesson are included in Annex.VII.

5. Different methods used for upper leather cutting

Different upper cutting methods were explained. Arguments for the change of the Chinese leather upper cutting by scissors to cutting by knife were given. Developments in other countries specially in Thailand, India and Philippines were mentioned. (Annex. VIII)

6. Leather cutting by knife

Practical lessons were started by cutting of paper in order to get the participants aquainted with the knife and were concluded by leather cutting.

7. Conclusion of the seminar

The seminar was concluded with an examination, and the (Annex. IX) presentation of diplomas and awards for best performance.

All participants passed the test examination and the results can be seen from the following table and Annex.X.

POINTS ACHIEVED IN TEST

QUESTIONS		1	2	3	4	5	6	7	8	TOTAL POINTS	CLASSIFI-CATION
PARTICIPANTS	1	10	6	2	10	10	10	100 %	YES	48	4
	2	10	6	4	10	10	10	100 %	YES	50	2
	3	10	-	4	10	8	10	100 %	YES	42	7
	4	8	4	0	10	5	10	100 %	YES	37	8
	5	10	6	0	10	10	10	100 %	YES	46	5
	6	10	10	4	10	5	10	100 %	YES	49	3
	7	10	-	2	10	10	10	100 %	YES	42	7
	8	10	4	6	10	5	10	100 %	YES	45	6
	9	10	10	4	10	5	10	100 %	YES	49	3
	10	10	6	4	10	10	10	100 %	YES	44	2
	11	10	6	0	10	10	10	100 %	YES	46	5
	12	10	10	10	10	10	10	50 %	YES	60	1
	13	10	6	0	10	10	10	100 %	YES	46	5

Comments of the expert:

1. In each task (16) 10 points could be obtained, totalling 60 points.

2. The test has demonstrated that all participants know what is required for making a parallelogram design (question 1).

3. The test has shown that only 3 participants out of 13 have designed the parallelogram with the required accuracy, but all of them demonstrated a basic knowledge (Question 2).

4. This task required only logical thinking and only one participant achieved the required 10 points (Question 3).

5. All participants know how to calculate the theoretical material consumption and the waste allowance (Question 4)

6. All but one and this one was the best in the test wrote that they understood everything and all of them would like to obtain still more knowledge (Question No.7)

7. The participants were asked (Question 5) what in their opinion is the reason for cutting upper leather in China by scissors. Their answers we present in a condensed form:

7.1. Cutting upper leather in China is traditional and is being maintained by the shoe factories and their management. Moreover there were in the past very limited contacts with foreign countries with an advanced shoe technology. (11 answers)

7.2. Knives as brought by the expert for the seminar cannot be obtained in China. (7 answers)

7.3. The leather tracing and scissor cutting workers strongly believe that the traditional way of cutting is material saving because the tracing errors can be corrected before cutting. (4 answers)

7.4. Another belief of the workers is that the leather tracing and scissors cutting is less energy consuming than the cutting method with a knife. (3 answers)

7.5. A few participants expressed the opinion that there is not enough knowledge available in China regarding this new cutting method. (2 answers)

8. Proposals of the participants as to what should be done to enable faster introduction of the advanced leather cutting method by knife to China, can be condensed as follows:

8.1. Start in one shoe factory and start with the motivation of the managers and supervisors who should be for, and not against the new method.

8.2. Start with the training of young people in a course similar to this one, train them for a sufficient length of time, allow them to practice, and do not allow them to stop in the middle of the training.

8.3. Start the production of the cutting knives to be the same as samples brought by the expert.

8.4. Ensure that the cutting patterns are suitable for cutting by knife (with metal binding)

8.5. It is necessary to prove that the new method is saving workers energy and material and improves the quality, as well as the productivity.

VI. CONCLUSION

Leather shoe export from the People's Republic of China went down in the year 1984 to 9,15 Millions pairs of shoes in a value of 46,78 Millions US Dol. In 1982 China exported 11,46 Millions pairs in a value of 56 Millions US Dol.

Without an intensive product development accompanied by improvements in leather tanning and finishing, the introduction of plastic lasts in a good standard for each market and the increased use of the prefabricated components the PRC cannot participate successfully in the export of leathe shoes to the important European and US Markets.

The Chinese shoeindustry can compete with other shoe exporting countries, only if it does not loose its lower labor cost advantage through very low productivity. The introduction of the upper leather cutting with a cutting knife is one of many possibilities how to increase the productivity and improve the quality of the work in the Chinese shoeindustry.

UNITED NATIONS

ANNEX I

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

10 June 1986

PROJECT IN THE PEOPLE'S REPUBLIC OF CHINA

DRAFT

JOB DESCRIPTION

DP/CPR/83/004/11-53/31.7.D

Post title Footwear Consultant

Duration 3 weeks

Date required November 1986

Duty station Shanghai

Purpose of project To complete the establishment of a well-functioning Leather Technology Centre in Shanghai including a laboratory/pilot plant for demonstrations and training and development/improvement of tannery processing methods.

Duties The expert will be attached to the Ministry of Light Industry through the Shanghai Leather Corporation and work in close co-operation with the National Project Director. The expert will be expected specifically to:

1. Provide extension services together with counterpart(s) to a selected shoe factory for the improvement of the present hand-cutting technology of upper leathers.

2. Carry out a training seminar for leather hand cutters and cutting department foremen.

The expert will also be expected to prepare a technical report setting out his findings and recommendations to the Government on further action which might be taken.

..../..

Qualifications

Extensive experience in footwear technology. The consultant should be able to provide training in hand cutting of upper leather with a hand clicking knife and to demonstrate it at experienced operator level. The consultant should be familiar with material calculations of upper leather according to modern methods.

Language

English

Background information

The country has fairly large resources of hides and skins and a long history in the development of the leather industry. The annual production of raw hides is estimated at 5 million pieces of bovine hides, in addition to which approximately 30 million goat and kidskins are produced in the country. The production of sheepskins is somewhat lower than that of goatskins and most of these are processed by the fur industry. (This availability of raw materials is considered to be a significant amount in world terms. However, it is rather low in comparison with the Chinese population.) A small quantity of cattle hides and wet-blues is imported to satisfy the needs of tanneries; these hides are processed only in tanneries of the coastal areas.

The production of pigskins reached 49.8 million pieces in 1979, which means a rather large resource for the leather industry. To promote the production of pigskins, modern skinning techniques and machines are required, tanning technology should be improved and special leather products made out of pigskins should be developed.

The country's leather industry consists of 40 - 50 important tanneries. The main leather manufacturing centres are in Beijing, Tianjin, Guangzhou and Sichuan with the most important one in Shanghai. The tanning of soft leather, mostly by chrome, is acceptable but the dyeing and finishing process needs to be improved. Vegetable tanning is used for processing leather for soles and technical purposes. The splits produced are of rather poor quality. Key operations of the leather processing, such as sammying, splitting, shaving, and especially dyeing and finishing processes, require considerable improvement, involving increased inputs of production machines, chemicals, know-how, improved production flow, layout, process control and higher skills of operators and supervisors.

The establishment of the Shanghai Leather Laboratory was the first step towards the long-term objective of the leather sub-sector development in China outlined above. Upon request of the Government, UNDP provided funds under project DP/CPR/80/007 in order to assist in the starting up of the laboratory. As a result, in May 1981, UNIDO fielded the Chief Technical Adviser to Shanghai for six weeks and, according to his recommendations, the delivery of equipment for the testing laboratory was commenced.

The laboratory was established and commenced its operations in April 1982 and constitutes the initial framework for the planned Leather Technology Centre. (The latter is understood to be a follow-up or expansion programme of the Shanghai Leather Laboratory.)

In order to facilitate the implementation of the Leather Technology Centre project, the Government has decided to p ovide a newly constructed six-storeyed building to house the Centre with the laboratories and the pilot plants for footwear and leather goods.

The Government, apart from meeting the increasing local demand, strives to expand the export of different leather products. However, in order to realize this objective, several aspects of the leather industry sector have to be considerably improved, such as processing techniques as well as upgrading the skills of the personnel at different levels and trade and export marketing practices, etc.

An essential requirement for a reasonably rapid development of the leather industry subsector in China is the extension and development of the Shanghai Leather Laboratory into a Leather Technology Centre, suitably staffed and with well-equipped laboratories, pilot plants and information services, which would ensure the best possible implementation of training courses and extension services to existing tanneries and leather product factories, thus achieving the improvements required.

An important part of the modernization of the leather industry is measures to reduce the extent of the pollution and proper treatment of tannery wastes. The present Government standards for the disposal of tannery effluents are as follows:

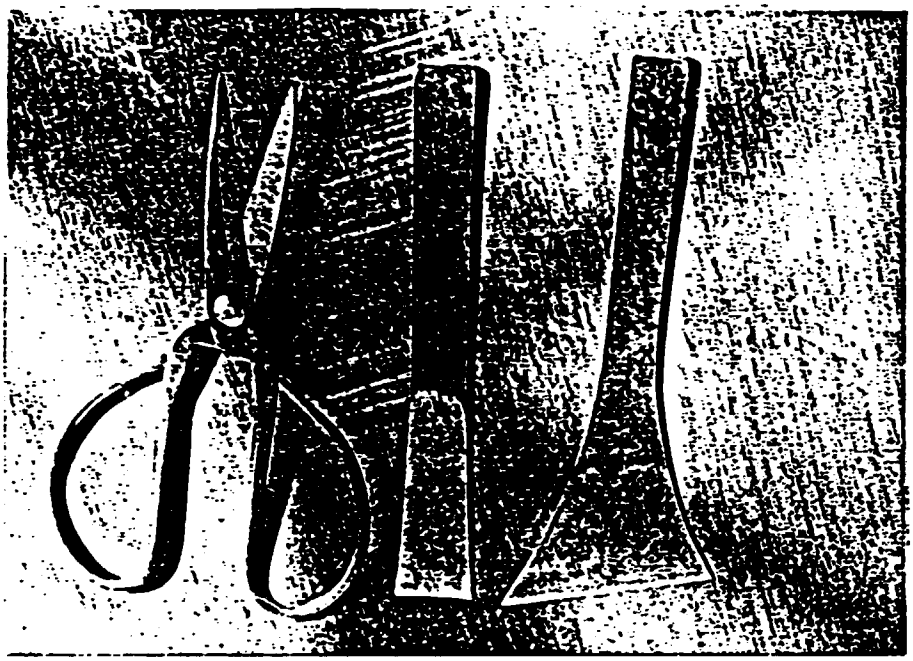
BOD_5 < 350 mg/l

COD < 300 mg/l

Chrome (trivalent) < 0.5 mg/l

Sulphides < 1 mg/l

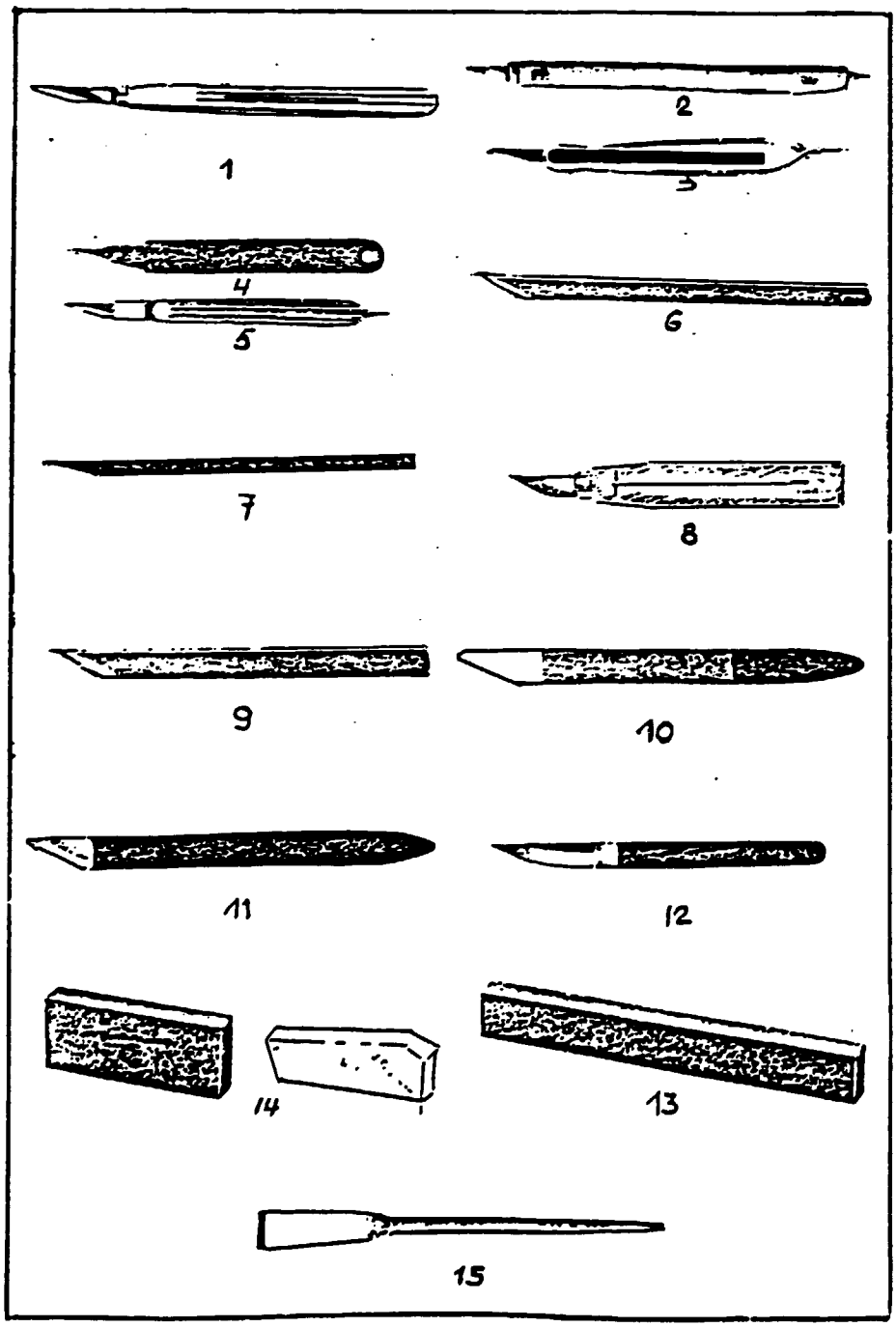
Suspended solids < 100 mg/l



TRADITIONAL UPPER LEATHER CUTTING EQUIPMENT USED
IN PEOPLE'S REPUBLIC OF CHINA IN 1986

UPPER LEATHER CUTTING AND SKIVING KNIVES

1. Utility knife MUNDUS, blade adjustable, metal handle
2. Cutting knife TINA
3. Cutting knife Kobito with marking thorn
4. Cutting knife with plastic handle
5. Cutting knife MUNDUS with marking thorn in metal handle
6. Cutting knife 12 mm
7. Spare blade for cutting knife handle MUNDUS
8. Leather knife , adjustable in wooden handle
9. Cutting knife 15 mm
10. Shoemaker knife
11. TINA knife
12. Skiving knife DON CARLOS
13. Whetstones / Sharpening stones (carborundum)
14. Whetstones / Sharpeningstones
15. Whetsteel/ Magnetic steel



UPPER LEATHER CUTTING SEMINAR

LIST OF PARTICIPANTS

Name	From	Sex	Age	Present Ocupation	Test-Point	Test-Classification
1. Ren Zhen Ping	No.1	M	25	Leather tracing	48	4
2. Yao Dong Mei	No.1	F	20	Stitching operator	50	2
3. Chen Qin	No.1	F	21	Stitching operator	42	7
4. Dong Jin Di	No.1	F	30	Leather tracing	37	8
5. Qu Qiu Yao	No.1	M	25	Stitching operator	46	5
6. Yuan Li Yun	LTC	F	25	Stitching operator	49	3
7. Len Yi Ming	LTC	M	26	Lasting operator	42	7
8. Wu Wan Ding	LTC	M	25	Lasting operator	45	6
9. Li Ying	LTC	F	25	Silicon mould maker	49	3
10. Dai Ling Jun	LTC	M	27	Lasting operator	50	2
11. Ye Hong Yi	LTC	M	30	Translator	46	5
12. Zhu She Jia	LTC	F	25	Silicon mould maker	60	1
13. Zhuang Yi Qun	LTC	F	25	Leather tracing	46	5

1. - 5. from the Leather Shoe Factory No.1, Shanghai (NO.1)

6. - 13. from the Leather Technology Centre, Shanghai (LTC)

Shanghai

24 October - 1 November 1986

TIMETABLE OF THE SEMINAR ON UPPER LEATHER CUTTING

HELD FROM 24 OCTOBER TILL 1 NOVEMBER 1986

24.10	9.30 - 10.55	Upper Leather Cutting - Introduction and motivation of the students.
	11.00 - 11.30	Video demonstration of pattern cutting and the use of the cutting knife.
	11.30 - 13.30	Lunch
	13.30 - 15.30	Designing of the Parallelogram.
25.10	9.30 - 11.30	Calculation of the upper and Lining Leather consumption with help of the parallelogram.
	11.30 - 13.30	Lunch
	13.30 - 15.30	Skin designing and calculation if the waste percentage.
27.10.	9.15 - 10.00	Methods used for upper leather cutting.
	10.00 - 11.30	Pattern and Leather cutting with help of leather cutting knife (Practical training)
28.10 29.10	9.15 - 11.30	Practical leather designing for calculation of the consumption.
	13.30 - 15.30	Leather cutting by knife.
30.10 31.10	9.30 - 11.30	Upper leather Grading
	13.30 - 15.30	Leather cutting by knife
1.11	9.30 - 11.30	Examination
	13.30 - 15.30	Conclusion of the seminar.

鞋面革下料讲课日程

（1986年10月24日～11月1日）

10月24日 （1）皮革下料介绍

（2）刀割下料录象

（3）平行直角划画法

10月25日 （1）平行直角法计算鞋面、衬里料消耗

（2）皮革划画和废料计算

10月27日 （1）介绍不同划画、下料方法

（2）刀割下料（实践）

10月28～29日 （1）皮革划画和皮革消耗计算（实践）

（2）刀割裁断皮鞋

10月30、31日 （1）鞋面革分档

（2）刀割皮革裁断

11月1日 （1）考试

（2）总结

CALCULATION OF UPPER MATERIAL CONSUMPTION WITH HELP OF A PARALLELOGRAM-SYSTEM

The Parallelogram-System is after short training the simplest and most accurate manual system for leather consumption estimate.

It requires:

1. Cardboard patterns in the average size of the assortment to be cut. The orientation lines on each pattern part facilitate an accurate designing in the parallelogram system (Fig. 1).

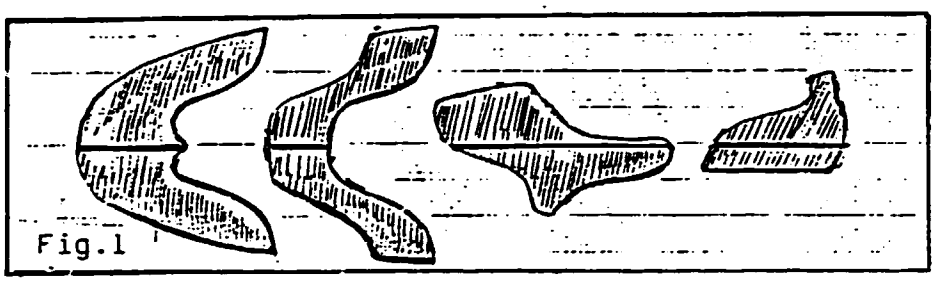
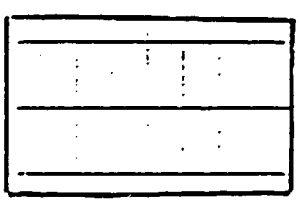
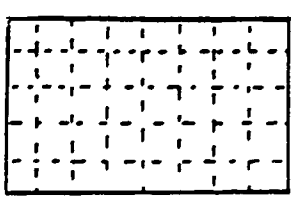


Fig.1

2. A pencil well sharpened should make precision designing possible.
3. Paper used for designing should be lined or square-lined to make an accurate designing more easy.





While designing the following rules should be observed:

1. Individually designed patterns should be centered around 180^{0} as demonstrated in Fig. 1. Here the part one is turned 180^{0} to the part two and the part three again 180^{0} to the part four. It is indispensable that all parts are designed the same way. Any change in such a system creates errors.

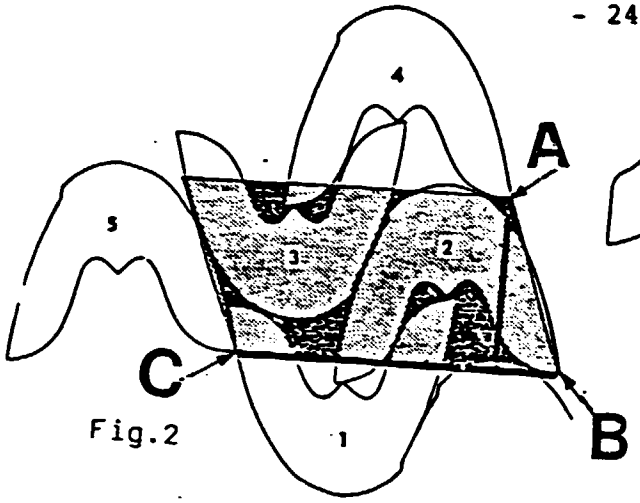


Fig.2

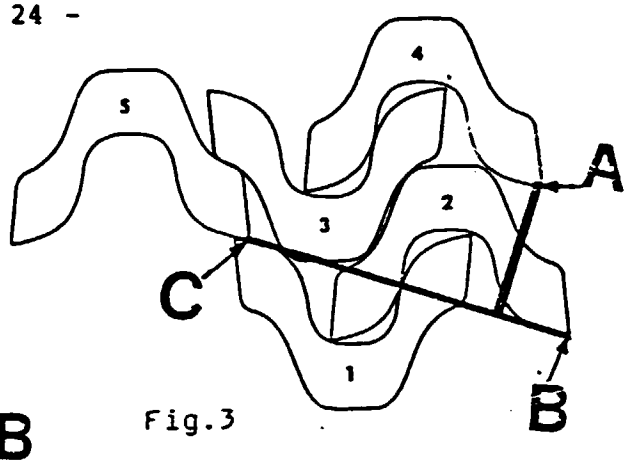


Fig.3

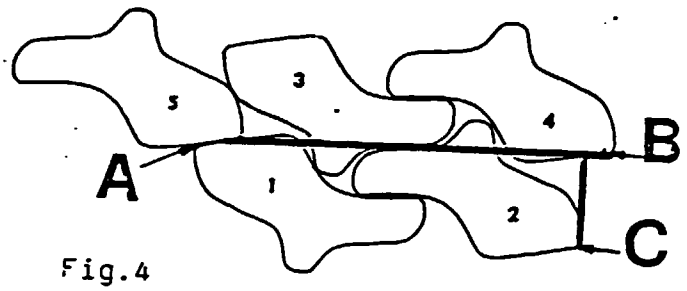


Fig.4

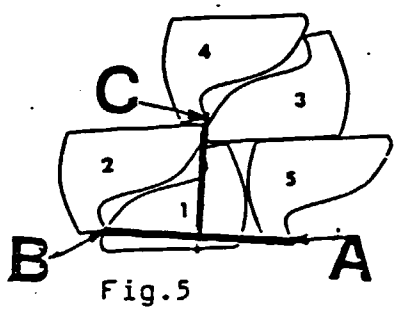


Fig.5

3. Before drawing the connecting lines for the surface calculation make sure that the points selected are always identical. They should not be taken by error from the parts which have been turned by 180^{0} (Fig. 3+4+5).

4. Area calculation must be always made for so many parts as are in a pair of shoes. There are two vamps and four quarters and because only two quarters were designed the area has to be multiplied by two in order to get the consumption for a pair.

   Example of the recapitulation of the calculation for all parts area with the unavoidable waste is:

2 Toecaps	29 x 13.6	=	394.4	sq. cm
2 Vamps	28 x 11	=	308.0	sq. cm
4 Quarters	32 x 7.8 x 2	=	499.2	sq. cm
			1,201.6	sq. cm
		=	12.01	sq. dm

5. Due to leather grain defects, uneven shape and substance of the skin a certain percentage for waste has to be added to the result of the parallelogram design.

   This percentage can be found by designing on a skin of an average quality with a marking pencil in a way as it would be cut by a very experienced operator. If the result is for example 10 complete pairs out of a skin having 162.22 sq. dm, the calculation of the waste allowance will be:

Actual consumption for 10 pairs	162.22 sq. dm
Consumption area calculated with help of the parallelogram system for 10 pairs is	
12.01 sq. dm x 10 pairs	120.10 sq. dm
The difference is the waste caused by the defects in the skin	42.12 sq. dm

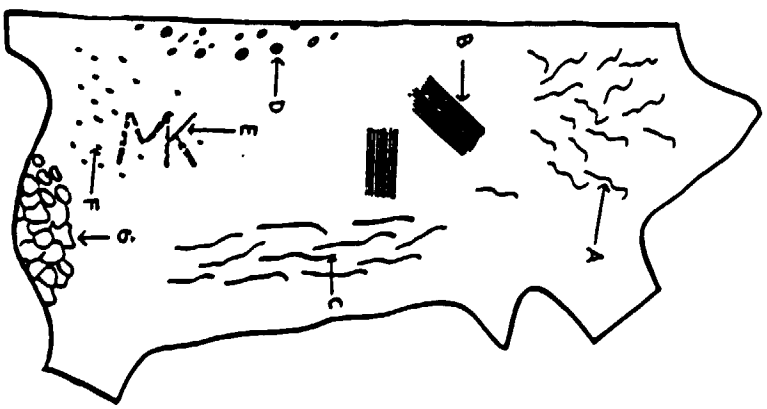
   The formula for calculating the percentage of the waste is:

$$\text{Waste} : \frac{\text{theoretical consumption}}{100} = \text{Percentage of the waste allowance}$$

$$42.12 : \frac{120.10}{100} = 35.07\ \%$$

   Waste allowance in our example is 35 %. In practice every type and grade of leather will have a different percentage of waste allowance, which may range between 20 - 40%. The fixed waste allowances have to be re-checked from time to time.

6. Damages to a cattle hide (Fig. 5a)



A = thorn scratches
B = currycomb scratches
C = barbed wire scratches
D = grub damage
E = brandmark
F = prod marks
G = damage by manure

Source:G.Moog, Reutlingen.

LEATHER DESIGNING AND CUTTING

In order to obtain good quality and processing results, the specialist charged with cost calculation and designing on the skin or the operator cutting or clicking the upper and bottom leather must have a profound knowledge of the leather types, grades and structures. They must know out of which part of the skin and if in or against the stretch the individual parts of the shoe have to be cut.

Fig. 6

Classification of Leather Quality

No. 1. is the best

No. 7. is waste.

1. The butt
2. The middle (butt)
3. The shoulder
4. The neck
5. The bellies
6. The shank
7. Waste

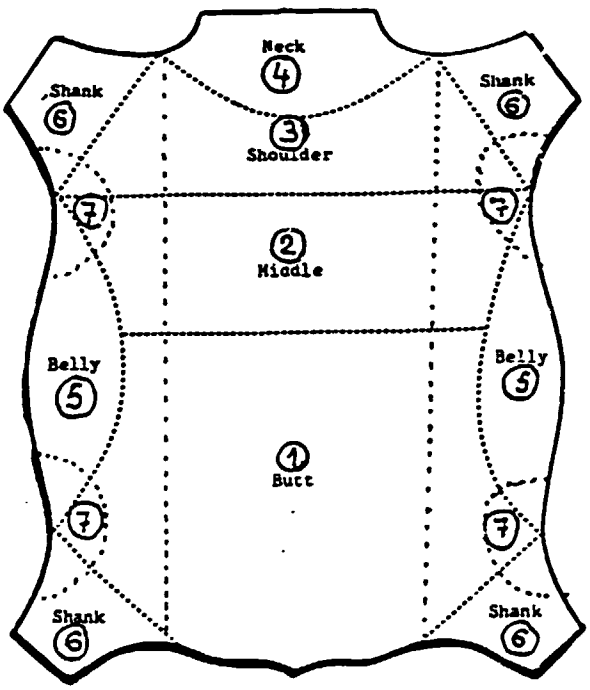


Fig. 6

Fig. 7

Demonstrates with the arrow lines the lowest stretch of the skin. Such a knowledge is most important for correct positioning of the shoeparts during the cutting operation.

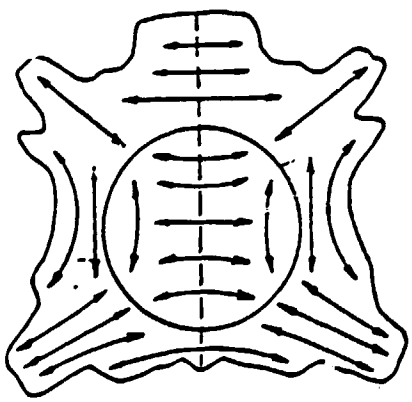


Fig. 7

EXAMPLES OF CORRECT DESIGNING AND CUTTING OF LEATHER

Fig. 8 - 9 Calf leather
Fig. 10 - 11 Kid skin leather (goatskin)
Fig. 12 Goat skin lining leather
Fig. 13 Cow-side leather
Fig. 14 Cow and ox leather for bottom parts

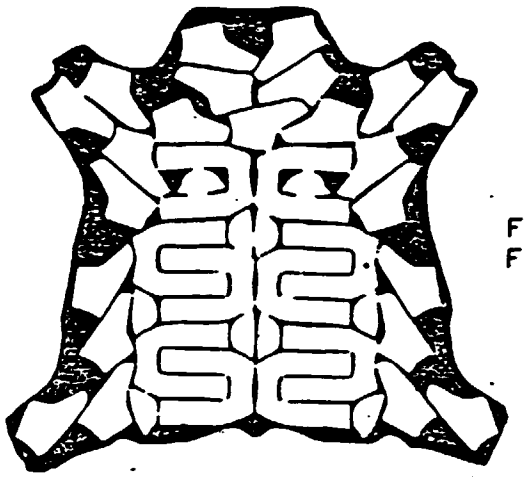
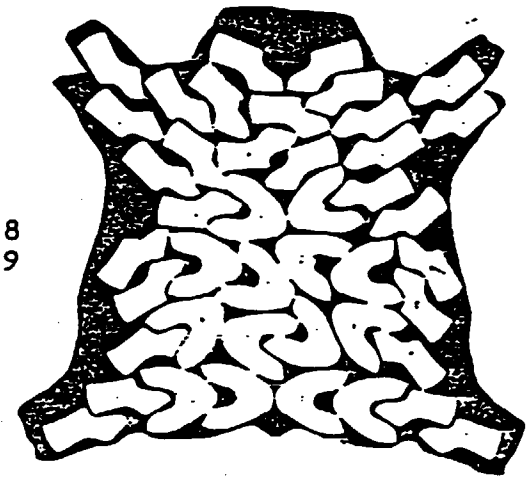


Fig.8
Fig.9



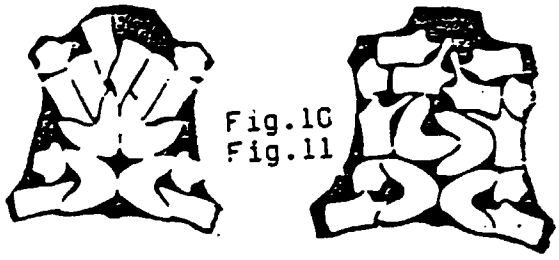


Fig.10
Fig.11

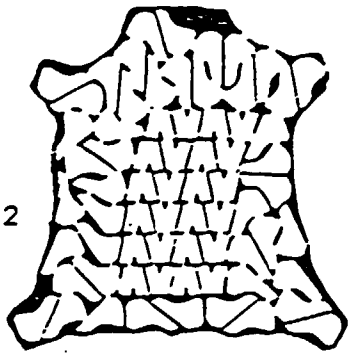


Fig.12

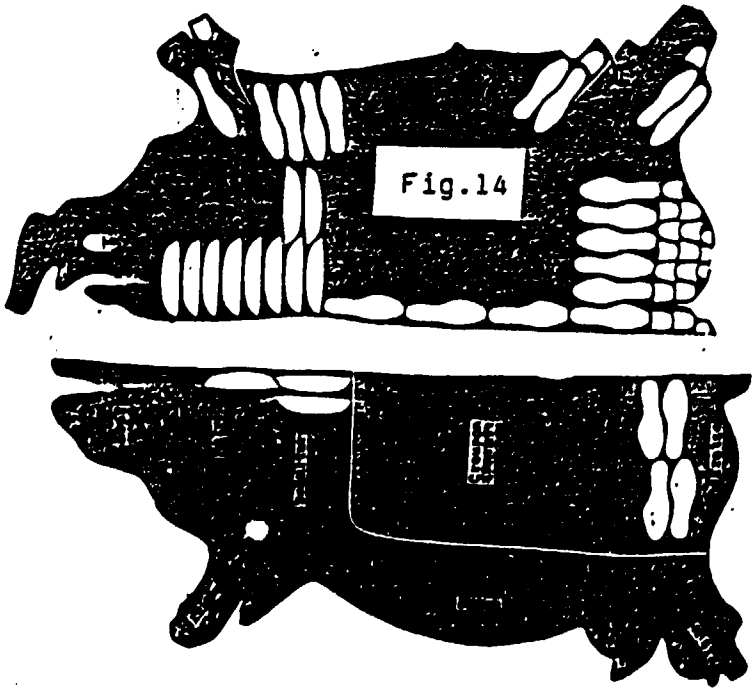


Fig.14

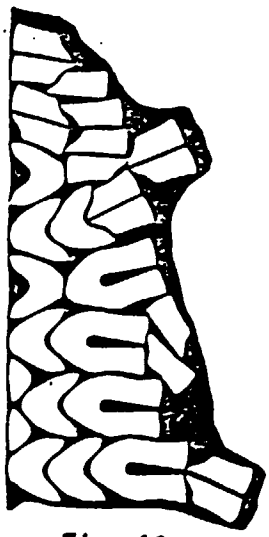


Fig. 13

MATERIAL CUTTING IN THE SHOE INDUSTRY

The traditional method of leather cutting by scissors (shears) is still being used in some South East Asian countries. Knife cutting by hand is commonly used all over the world for pattern cutting, cutting individual pairs (samples) and in case when the making of cutting does not pay due to a small number of shoes to be produced of the same design.

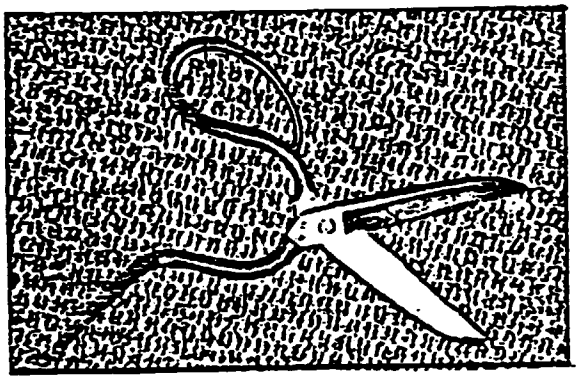


Fig. 1

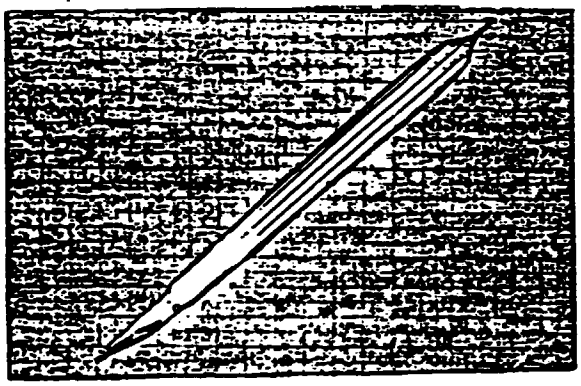


Fig. 2

Fig. 1: Scissors made in Germany, used for leather cutting in Thailand

Fig. 2: Leather cutting knife with adjustable and replaceable blade and marking thorn, made in Germany, used all over the world.

For machine cutting in the footwear industry the generally used machine is still the swing press. Very little has actually been changed from the first mechanical presses from the beginning of the 20th century to the hydraulic presses of today (Fig. 3 and 4).

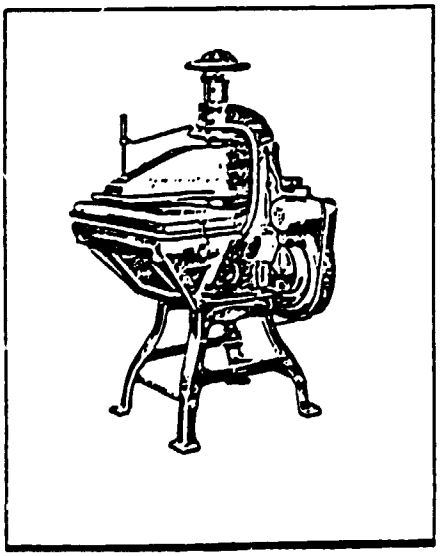


Fig. 3

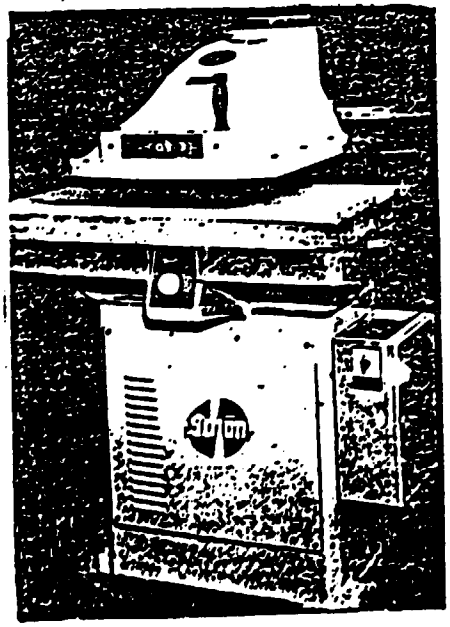


Fig. 4

The size of the cutting area has remained the same. The mechanical presses had the stroke of 12 mm with one hand release. Modern hydraulic presses have a longer stroke with one hand release up to 12 mm stroke. The cutting force has been increased from 10 - 12 Mp to 20 - 25 Mp.

A significant improvement in this cutting system is not envisaged owing to the pressure to keep the prices of this fundamental cutting machine down. Nevertheless the machinery manufacturers have introduced some improvements which make the handling of the machine for the operator more easy.

It should not be overlooked that a clicker cutting leather under manual control processes material of an annual value of about US$ 200,000. This is valid for a daily output of 220 pairs at 1.8 sq. feet of material at a price of US$ 2 per sq. feet and an annual working time of 250 days. If the operator, for instance as a result of using a machine which is easy to operate, achieves better material utilization of only 1 %, this will result in a material saving of US$ 2,000 in a year. Investigations have shown that an operator working on a machine with a finger tip movable swing arm is less tired and is therefore better able to concentrate on material utilization.

In the modern shoe factories several alternatives to the swing arm press exist. For the cutting of lining, toe puff and counter materials, synthetic leather as well as bottom and upper leather, there are semiautomatic receding head cutting presses in use (Fig. 5).

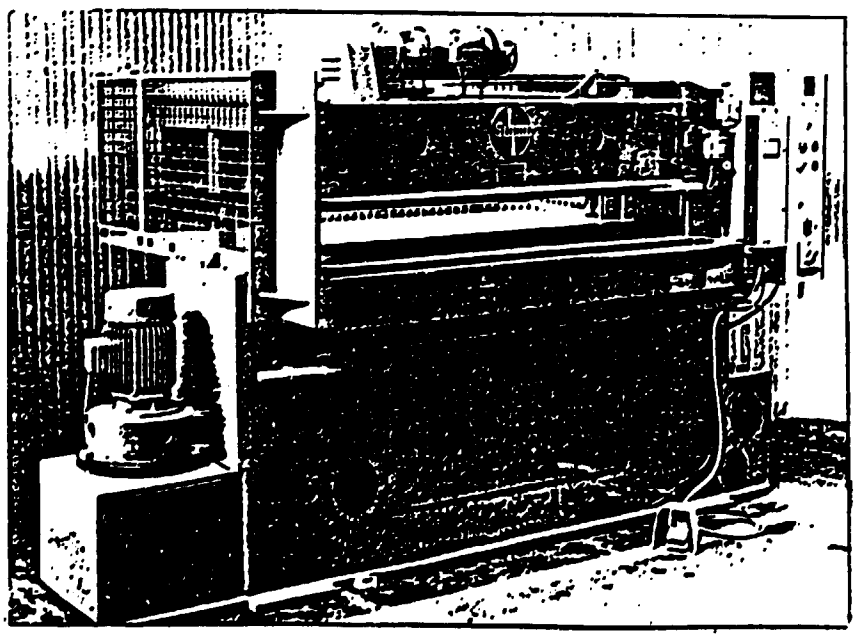


Fig. 5: Large area die cutting press with receding head

In this case the operator places the knife by hand on the material to be cut. As soon as the optical safety barrier is released, which means that the light beam is no longer interrupted the receding head moves spontaneously forward and cuts automatically the material. The way of the operation is similar to that of a swing arm press but with the advantage that the operator does not have to move the swing arm. On this machine the daily output is nigher than on the swing arm press. The operator has a free view on the material, certainly achieves a better material utilization and the danger of an injury is virtually excluded.

The travelling head presses are mostly used for the cutting of lining material and synthetic leather supplied in roles. In their simplest form the travelling head moves automatically aside after cutting giving the operator again a free view on the material for a new positioning of the cutting knife. Because of the two hand release the machine is also accident proof (Fig. 6).

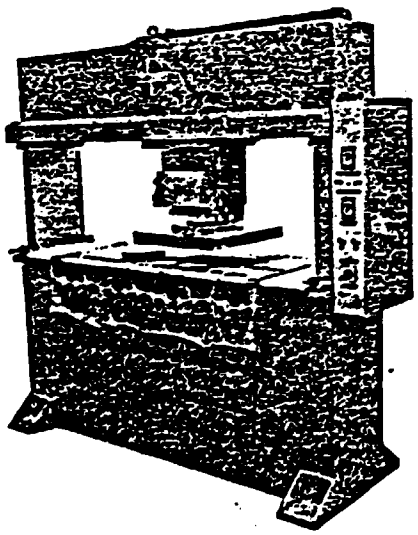


Fig. 6

Fig. 6: Hydraulic travelling head cutting press

The highest productivity can be achieved by automatic cutting presses which are fitted with two travelling heads, a revolver cutting head or an automatic knife changing facility. A 3 coordinate microprocessor control with a programme storage also exists and is for these presses available. Not so long ago the machine manufacturers were worrying how many presses can be controlled by one computer in order to be able to reduce the cost of the computer. Nowadays the question is how many microprocessors can usefully be built into one single automatic cutting press (Fig. 7 and 8).

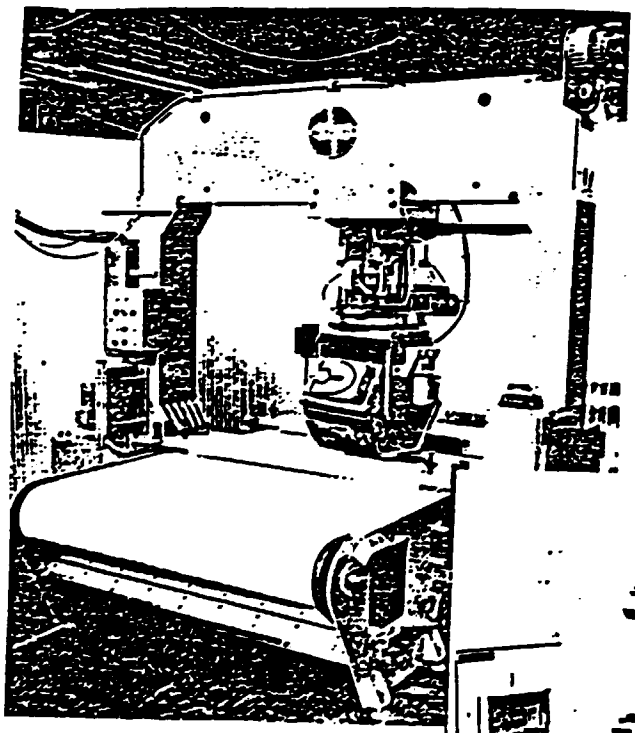


Fig. 7

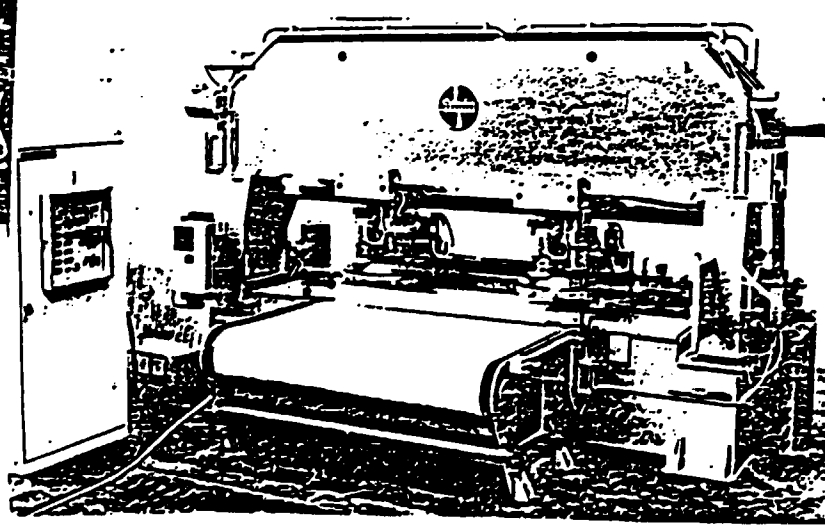


Fig. 8

Fig. 7: Travelling-head automatic press with cutting band and 2 travelling cutting heads

Fig. 8: Travelling-head automatic cutting press with knife changing facility

Such automatic by microprocessors controled cutting presses perform on average 50 cuts per minute with an accuracy of +/- 0.1 mm.

An investigation in manually controled cutting of bottom leather shows the following distribution of the annual costs of this operation:

Material cost	(US$ 333,000)	94 %
Machinery cost	(US$ 3,330)	1 %
Labour cost	(US$ 13,320)	4 %
Cost of knives	(US$ 3,330)	1 %

This shows that only in material cost a significant saving can be achieved as this amounts to 94 % and all the remaining cost to 6 % in all.

The productivity of an automatic cutting press is four times higher than the productivity of a manually controled press.

This is the new developed technology of cutting material in the shoe industry. The well trained operator, who is cutting leather by hand in a quantity of 80 till 100 pairs can cut on a swing arm press 200 - 220 pairs of the same article. The same operation in some developing countries using the traditional method of designing on the skin first and afterwards cutting it with scissors is not competitive because even if the output of cutting would be the same, which is not, one additional worker for designing on the skin is required.

In the past many developing countries were successful in exporting shoes due to low cost of labour. Today the industrialized countries are increasing their productivity by use of computers, machines with micro-processors and roboters. The developing countries will loose very soon their advantage of the low labour cost if they do not start to care more about the increase of their productivity.

To increase the productivity not always automatic machines are required. Sometimes it is sufficient to start using such a simple and not expensive tool like a leather cutting knife.

LEATHER CUTTING SEMINAR - TEST Date: 1. November 1986.

Name:.....

.....

1. What material and equipment is required for Parallelogram designing ? (name five)

.....

.....

.....

.....

.....

2. Design the parallelogram for enclosed patern and find out the nett area for this pattern.

3. Consuption of upper leather for size 41 is 1.589 cm2. How much material must the leather cutter get for the order in following assortment? (same quality as in the calculation) 39/20 40/25 41/60 42/50 43/25

4. Out of a skin measuring 16.222 cm2 we can cut 10 complete pairs of a modell with folloving parts and parallelogram measurements (as per drawing)

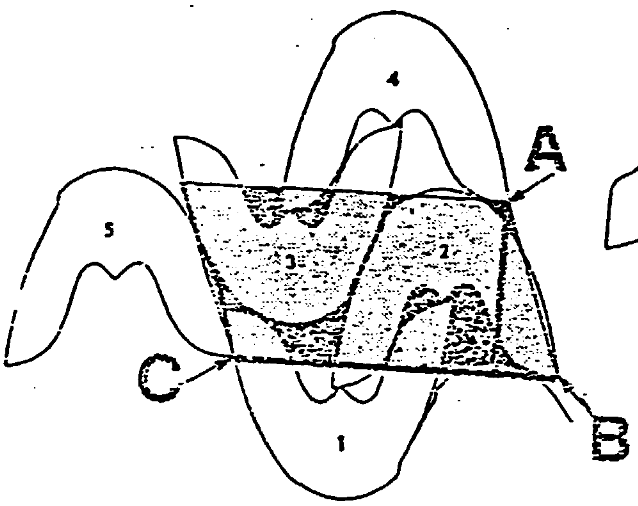
2 toecaps   29 x 13.6 =

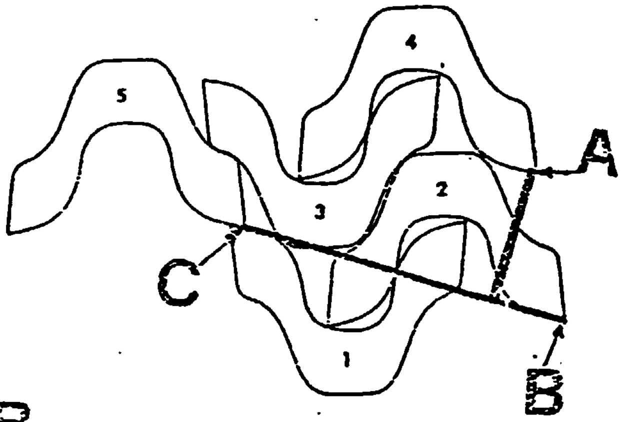
2 vamps 28 x 11   =

4 quarters   32 x 7.8   x 2

(Measurements in centimeters)

Calculate waste allowance for this type of leather





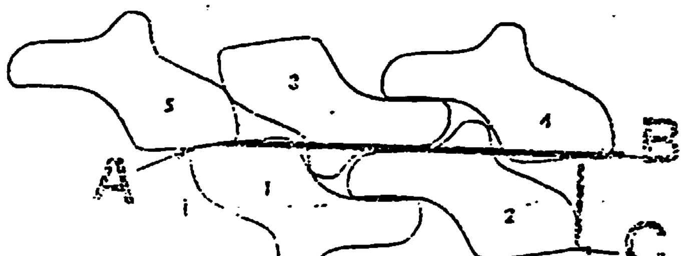


Fig. 4

5. In your opinion, why is cutting of upper leather by scissors still popular in China?

6. In your opinion, what should be done in order to introduce leather cutting with help of a knife and eliminate the tracing and the cutting by scissors?

7. Did you understand everything
only something
nothing
out of the topics discussed during the seminar?

8. Are you interested to continue the training as leather cutter?

yes/ no

19 年 月 日 第 页共 页

皮鞋划面下料培训班考卷

日期：1986年11月1日

姓名：

1. 采用平行四边形法设计时，需用什么材料和设备？（试述五种）

2. 根据发给你的样板，设计出平行四边形，并计算其面积。

3. 41码皮鞋划料时需用面革1.589 cm²，当用同样的面革划料时，下列号码的皮鞋各需用料多少？

39/20 40/25 41/60 42/50 43/25

4. 从一张面积为16.222 cm²的面革上，我们可以划出10双皮鞋，每双皮鞋的用料为：

2块外包头 29 x 13.6 = cm²

2块前帮 28 x 11 = "

4块后帮 2 x 32 x 7.8 =

计算出面革的损耗率是多少？

5、你认为为什么当前在中国仍然通行用剪刀下料？

6、如何推广在中国采用这次培训班中讲授的划面下料法来代替现行的先划面再用剪刀下料的方法？试述你的具体建议。

7、你是否{全部 / 部分 / 不能}理解这次培训班中所讲授的方法？

8、你是否对继续培训成为一名划面下料技工感到兴趣？

LEATHER CUTTING SE[illegible]R - TEST Date: 1. November 1986.

Name: Zhu Sou ja

....

1. What material and equipment is required for Parallelogram designing ? (name five)

1. 削尖的铅笔 PENCIL ✓
2. 直角三角尺 RULER , RECTANGULER ✓
3. 印有方格子的纸 . PAPER W/ SQLINE ✓
4. 所需样板 PATTERN ✓
5. 橡皮和卷笔刀、计算机 . RUBBER , SHARPENER , COMPUTER ✓

10 ✓

2. Design the parallelogram for enclosed patern and find out the nett area for this pattern.

$10.6 \times 29 = 307.4\ cm^2$

10 ✓

3. Consuption of upper leather for size 41 is 1.589 cm2. How much material must the leather cutter get for the order in following assortment? (same quality as in the calculation) 39/20 40/25 41/60 42/50 43/25

10 ✓

	39	40	41	42	43	
	20	25	60	50	25	180
	780	1000	1460	2100	1075	7415
每双尺码用料	1.494 cm²	1.54 cm²	1.589 cm²	1.67 cm²	1.684 cm²	
[illegible]之用料	29.87 cm²	38.53 cm²	95.34 cm²	81.83 cm²	42.11 cm²	

7415 ÷ 180 ≐ 41.19

∴ 中间尺码为41码.

4. Out of a skin measuring 16.222 cm2 we can cut 10 complete pairs of a modell with following parts and parallelogram measurements (as per drawing)

10

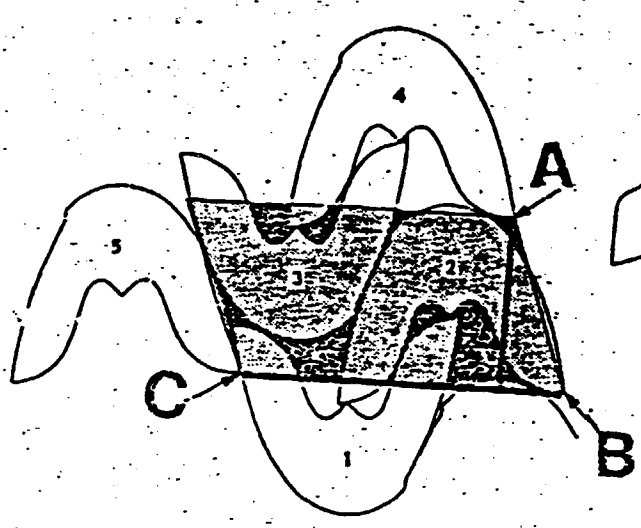
2 toecaps 29 x 13.6 = 394.4 cm²
2 vamps 28 x 11 = 308 cm²
4 quarters 32 x 7.8 x 2 = 499.2 cm²

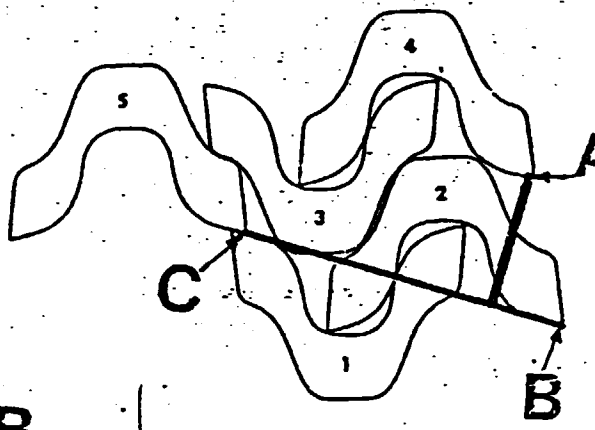
394.4 x 10 = 3944 cm²
308 x 10 = 3080 cm²
499.2 x 10 = 4992 cm²

(Measurements in centimeters) 3944 + 3080 + 4992 = 12016 cm²

16222 − 12016 = 4206 cm² 废料率 = $\frac{4206}{12016} \times 100\% \approx 35\%$ 答：该二层皮革为 35%

Calculate waste allowance for this type of leather





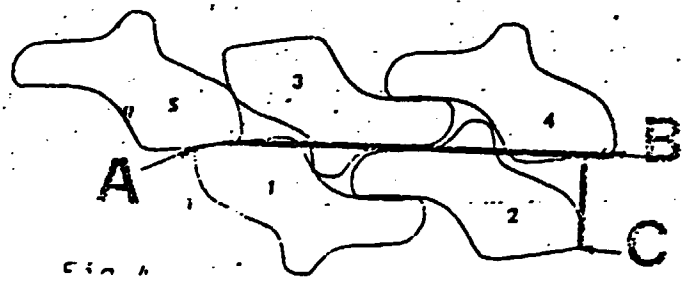


Fig. 4

5. In your opinion, why is cutting of upper leather by scissors still popular in China? 10 ✓

答：①各国都有自己之传统观念，而既成传统之观念就很难在人们之意识中消除，长期传下之剪刀下料，人们认为是理所当然之。① TRADITIONAL ✓

②因为长期习惯于剪刀下料，而别之工具就不去寻找，况且优质之刀材~~料~~中国也不容易找到。 ② CAN'T FIND A GOOD KNIFE. ✓

③用惯了剪刀之[illegible]下料，都认为：先用笔划后再用剪刀剪能减少失误，节约材料。 ③ SCISSORS CUTTERS THINK: SAVE MORE SKIN TO USE SCISSORS. ✓

④习惯了剪刀认为很轻松，而用刀刻则太费力。(因为不习惯之原故)。

④ MUCH LIGHTER TO USE SCISSORS THAN KNIFE. ✓

6. In your opinion, what should be done in order to introduce leather cutting with help of a knife and eliminate the tracing and the cutting by scissors?

答：在没有参加这次培训班讲授前，我认为用划后剪刀[illegible]下料是目前皮革各厂家之唯一办法，而且是理所当然之，通过这次先进刻刀下料法之~~培训~~班讲授，使我认识到水向低处流，而人是往高处走之。要使我国之皮鞋产品走向世界先进行列，则吸收国外先进技术是最为重要之。况且先进刻刀下料法确实是既能节约时间而产品质量又高，这是我们所向往之。 10 ✓

① WE KNOW ONLY SCISSORS CUTTING. THROUGH THIS COURSE. WE KNOW WE MUST DRAW IN THE ADVANCED TECHNIQ FROM ABROAD. KNIFE ~~SCISSORS~~ CUTTING ACTUALLY SAVES ~~[illegible]~~ TIME. MAKE IT WITH BETTER QUALITY.

7. Did you understand everything
~~only something~~
nothing
out of the topics discussed during the seminar?

答：任何事物都有一个发展之过程，而且少不了实践经济。通过一段时期之亲身实践，我想我一定会全部掌握这次培训班中所讲授之方法。但现在只是部分掌握。

8. Are you interested to continue the training as leather cutter?

yes/ no

Yes.