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ASSISTANCE IN MANUFACTURE OF DIRECT-MOULDED SOLE FOOTWEAR.

SI/SRL/74/871

SRI LANKA.

TERMINAL REPORT

Prepared for the Government of Sri Lanka by the
United Nations Industrial Development Organization,
executing agency for the
United Nations Development Programme

United Nations Industrial Development Organization

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United Nations Development Programme

ASSISTANCE IN MANUFACTURE OF DIRECT-MOULDED SOLE FOOTWEAR

SI/SRL/74/871

SRI LANKA

Project findings and recommendations

Prepared for the Government of Sri Lanka
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of K. H. Longman, shoe technologist

United Nations Industrial Development Organization
Vienna, 1977

Explanatory notes

The monetary unit in Sri Lanka is the rupee (SRs). Following the revaluation of the rupee on 12 March 1977, all rupee figures quoted are at the new rate. The value of the rupee in relation to the United States dollar was $US 1 = SRs 7.30. In converting the German mark (DM) to the pound sterling (£) a conversion rate of DM 4.43 = £1 was used.

References to dollars ($) are to United States dollars, unless otherwise stated.

The following abbreviations are used in this report:

CLPC	Ceylon Leather Products Corporation
f.o.b.	free on board
c.i.f.	cost, insurance, freight
FEEC	foreign exchange entitlement certificate

The direct-moulded sole process is also referred to as "vulcanizing process".

ABSTRACT

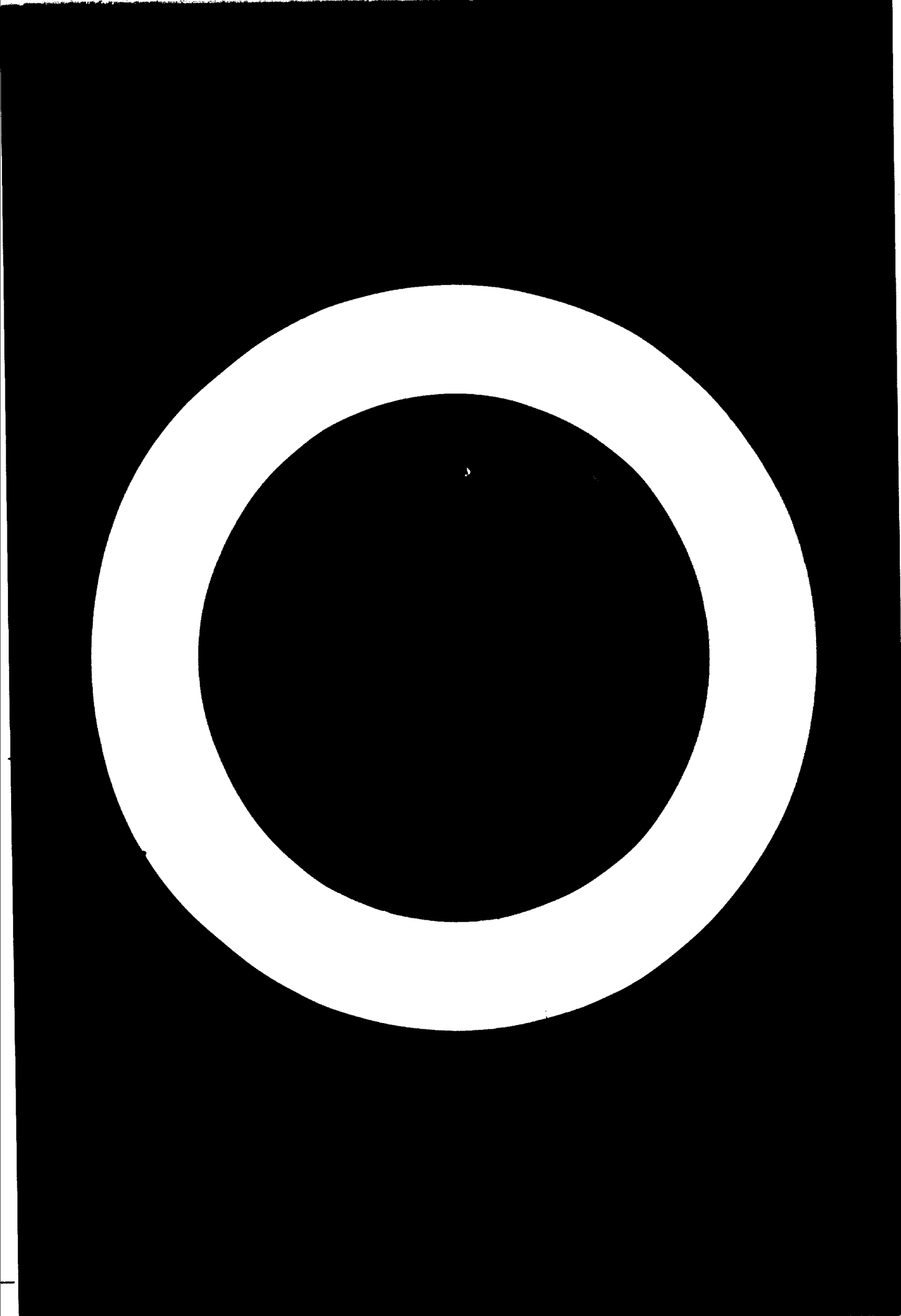
In 1974, the Government of Sri Lanka requested the United Nations Development Programme (UNDP) to assist the Ceylon Leather Products Corporation (CLPC) in starting the production of direct-moulded sole footwear in their shoe factory.

The project "Assistance in Manufacture of Direct-moulded Sole Footwear" (SI/SRL/74/871)[1/] was approved in January 1975 and the United Nations Industrial Development Organization (UNIDO) was designated executing agency. A footwear technologist went to Sri Lanka for three months and completed his mission in April 1977. The expert was attached to the Ministry of Industries and Scientific Affairs and worked at the CLPC shoe factory at Mattakkuliya, Colombo.

The expert found that, by converting from the McKay process to the direct-moulded sole process, both machinery and labour could be saved. His recommendation for a conveyor layout, description of the sequences of operation for the various designs to be produced and financial and feasibility analysis of the new process are given in the annexes.

In addition to the duties connected with the introduction of the new direct-moulded sole process, the expert was requested by the management of CLPC to advise on the possible reorganization of the entire shoe factory in order to improve quality and productivity. His recommendations include a reduction of the number of different types of footwear constructions produced, a reduction of the labour force or a substantial increase of productivity by the introduction of some form of effective incentive payment system related to the actual daily output.

1/ On 1 January 1977 the project number was changed from IS/SRL/74/071 to SI/SRL/74/071.



CONTENTS

INTRODUCTION

The Ceylon Leather Produots Corporation (CLPC) was formed in 1956 and now consists of three units: a tannery, a leather goods factory and a footwear factory. The planned produotion of the footwear factory is 275,000 pairs per year. Its actual production is only 215,000 pairs, which is a shortfall of almost 22%. The footwear factory has been operating at a loss since 1965. In the two years, 1975 and 1976, its losses were SRs 2.4 million. The other two units of CLPC, the tannery and the leather goods factory, are profit making.

The production of the footwear factory consists of a varied collection of types and construotions, some of whioh are made in small quantities. There are eight types: McKay leather soles, with a planned production of 50 pairs a day; McKay rubber soles, 250 pairs a day; hand-sewn, welted specials and sports, 30 pairs a day; cemented, 400 pairs a day; sandals and slippers, 350 pairs a day, and Veldsoheons (stitch down), 70 pairs a day. The planned production is 1,150 pairs per day.

The production is practioally all for the looal market with very little for export. Of the 215,000 pairs produoed per year, 53,000 are for government organizations, and the rest is sold to the publio.

Government organizations, in particular the army, requested a more durable type of footwear since the existing McKay oonstruction was unsatisfactory for the climatic conditions enoountered in Sri Lanka. In the MoKay construction threads are used to attach the sole; in the wet, highly humid climate of Sri Lanka the threads rot, oausing the soles to become loose and fall off. This construction is also not fully waterproof.

These shortcomings in the McKay oonstruotion led the CLPC to request assistanoe in starting a direct-moulded sole footwear produotion. The request was made in 1974 through the Sri Lanka Ministry of Industries and Scientifio Affairs to the United Nations Development Programme (UNDP).

Sri Lanka has an abundant supply of rubber, whioh is the material used for the direct-moulded soles. There are no threads used to attach the soles, the footwear is fully waterproof, and the production prooess requires less maohinery and labour.

The project "Assistance in Manufacture of Direct-moulded Sole Footwear" (SI/SRL/74/871)[1/] was approved in January 1975 and the United Nations Industrial Development Organization (UNIDO) was designated executing agency. A footwear technologist went to Sri Lanka on a three-month mission; he arrived on 13 January 1977 and left on 2 April 1977 after completion of his assignment. The expert was attached to the Ministry of Industries and Scientific Affairs and worked at the CLPC shoe factory at Mattakkuliya, Colombo. His counterpart was R. Wijesinghe, Factory Manager, who was later unable to continue owing to the pressure of work; he was replaced by the Quality Control Manager, L.R. Ekanayake.

The objective of the project was to provide CLPC with qualified assistance in conversion from the McKay to the direct-moulded sole process. Specifically, the expert was expected to:

(a) Make a survey of the existing plant and machinery used in the manufacture of boots and shoes;

(b) Suggest and devise means of adopting the equipment used at present for the new techniques;

(c) Advise on and recommend the selection of plant with a suitable capacity to meet the required output and ensuring the economic feasibility of the project;

(d) Advise on the required changes of the present layout and on the installation of the new plant;

(e) Train local counterparts.

In addition to these duties, the expert was requested by the management of CLPC to advise on the possible reorganization of the entire shoe factory in order to improve quality and productivity. His report therefore deals with the situation for the whole factory, and the findings and recommendations include problems related to the factory as a whole.

No visits were made to other footwear factories in Sri Lanka. The main buyers of CPLC were visited in order to evaluate their requirements and to learn their reactions to the new product. The expert brought with him from England an example of an army boot made by the new process. The reaction to the product was most favourable.

1/ On 1 January 1977 the project number was changed from IS/SRL/74/071 to SI/SRL/74/871.

Visits were also made to find sources of supply for the vulcanizing compounds and other components. It is expected that there will be no difficulties with the supply of these various materials. Supplies of the vulcanizing compounds could be obtained from the Industrial Development Board, a government agency.

I. FINDINGS

Produotivity

Sinoe 1956 CLPC has aoquired maohinery from various manufaoturers for different types of constructions. Most of the machinery was supplied in 1962 and constitutes the main plant of the factory. Two pull toelasting machines were purchased in 1956. A pulling-over maohine purchased in 1973 was never properly installed, and is awaiting replaoement parts before it can be used.

Although most of the maohinery is old and out of date, this is not the main problem of the shoe factory. More severe obstacles are low quality and very low productivity. At present the faotory is produoing 900 pairs per day with a total labour force of 360, not including the staff of suoh offices as sales, costing, wages etc., which also undertake work for the other two units.

The low productivity is directly related to the great laok of discipline at practioally all levels of staff. The factory works an 8½-hour day but the actual hours worked cannot be more than 6 to 6½ hours. There is a Moenus pull toelasting machine which according to the manufacturer is capable of producing 1,000 pairs a day. The planned production on this line, however, is only 400 pairs a day and the actual average daily production is 350 pairs. On the same production line there is a Moenus seatlaster whioh could turn out up to 3,500 pairs a day, but which is producing only 350 pairs a day. The factory has two toelasters and three seatlasters, but only two are in full working oondition.

Because of the varied constructions produced on the four lasting lines, and by hand-lasting, the machinery is greatly underutilised and exoessively labour-intensive.

Another problem is that the output varies greatly from day to day, and planned production figures are rarely achieved, making production planning very difficult. Table 1 indicates planned and actual production figures for the month of February 1977. A factory of this size with its labour foroe and machinery should be producing a minimum of 2,000 pairs a day.

Table 1. Planned and actual production figures for February 1977

Date	Cement lasting (department 240)			McKay boots welts (department 241)			McKay shoes (department 242)			Sandals, slippers (department 246)		
	Target	Output	Loss	Target	Output	Loss	Target	Output	Loss	Target	Output	Loss
1	400	305	95	150	150	–	250	100	150	350	175	175
2	400	360	40	150	200	+50	250	150	100	350	175	175
4	400	225	145	150	150	–	250	200	50	350	200	150
7	400	325	45	150	100	50	250	200	50	350	200	150
8	400	300	100	150	100	50	250	200	50	350	300	50
9	400	400	–	150	100	50	250	250	–	350	150	200
10	400	375	25	150	100	50	250	100	150	350	150	200
11	400	450	+50	150	100	50	250	200	50	350	125	125
14	400	300	100	150	115	35	250	200	50	350	250	100
15	400	400	–	150	110	40	250	200	50	350	250	100
16	400	425	+25	150	150	–	250	200	50	350	250	100
17	400	426	+26	150	150	–	250	200	50	350	200	150
18	400	340	30	150	140	10	250	200	50	350	200	150
21	400	397	3	150	140	10	250	175	75	350	175	175
22	400	385	15	150	150	–	250	200	50	350	251	99
23	400	301	99	150	200	+50	250	200	50	350	250	100
24	400	251	149	150	100	50	250	200	50	350	200	150
25	400	365	35	150	130	20	250	200	50	350	100	250
28	400	275	125	150	175	+25	250	200	50	350	254	93
Total	7 600	6 630	1 040	2 850	2 560	290	4 750	3 545	1 145	6 650	3 985	2 665

Table 2 shows the labour force employed in each department.

Table 2. Work force employed, by department

Department	Department number	Work force
Design office	522	5
Adhesive making	211	3
Bottom components	210	31
Upper components	220	21
Repairing room	225	2
Closing (cemented)	230	38
Closing (McKay boots, welts)	231	24
Lasting, finishing (cemented)	240	41
Lasting, finishing (McKay boots)	241	39
Lasting, finishing (McKay boots)	242	36
Components sandals	246A	11
Closing sandals	246B	20
Lasting and finishing sandals	246C	20
Quality control		25
Factory management		12
Planning		2
Others		3
Total		333

From tables 1 and 2 one may compare the productivity with the labour used. For instance sandals, department 246, employs a total of 51 persons directly engaged in the production of just over 208 pairs a day, which is slightly over 4 pairs per person. McKay shoes, department 242, has a total of 73 persons in closing and lasting, producing 193 pairs a day, making about 2½ pairs per person. These figures are extremely low when one takes into account the amount of machinery used, even if it is not new.

Quality

The quality is generally low, mainly because there appears to be little thought put into the product. The materials and the applied technology is not of high standard in most cases.

Patterns are cut for one last and then, without tests, another last is used.

The staff in the quality control section does not seem to be very well trained and does not really know what to look for. Problems and faults are not promptly dealt with and the solutions are not quickly passed to the management for approval.

Product specifications are out of date; the responsible department is aware of this, but makes no effort to revise them.

Materials

Leather

The leather used in the factory is all supplied by the tannery unit of the Corporation. The upper leathers vary from good to medium quality.

It appears that the factory has little control over the type of leather supplied. This applies mainly to insole leathers which are generally too hard and rigid.

Micro rubber

The micro rubber used is of poor quality in hardness and colour. The micro rubber is produced in Sri Lanka and it appears that the manufacturers cannot always obtain the correct chemicals and therefore produce a substandard material.[2/] Micro rubber splitting machines are not available in Sri Lanka at the moment, which makes it difficult to obtain the correct substances.

Stiffeners and toepuffs

Both leather and celastic are used for toepuffs and stiffeners, leather for the heavy types of footwear and celastic for cemented footwear and shoes.

Leather seems to be giving satisfactory results, but the use of celastic for stiffness is not satisfactory. By the time the shoe reaches the heat laster it is often completely dry because of the climate and the time taken, and is then very difficult to mould to the shape of the last.

2/ See the report of N.C. Thakurta, UNIDO expert in rubber for use in the shoe industry, of 29 April 1976 (UNIDO/IOD.33).

Shanks

Where shanks are used, they are made of wood. Unfortunately, they do not fit the last. For army boots properly fitting steel shanks should be used.

Insoles

All insoles are made of leather. The leather used is generally hard and rigid which is not suitable for cement and welt constructions. It is also too hard for most of the McKay construction.

Lasts

As no last production exists in Sri Lanka, lasts have to be imported, mainly from Europe. Because of delays in procedures, other formalities, and the distance involved, the lasts are often out of date before they arrive. This has prompted the CLPC shoe factory to keep a collection of lasts for styles which the sales office finds difficult to sell.

Fashion media

The sales office complains that the designs produced by the design office are not good. The expert found that no fashion magazines are supplied to the design office. So far away from the West European fashion centres it is difficult to follow fashion trends and therefore important to be supplied with good magazines (e.g. the Italian Moda Pelle).

Direct-moulded soles

After a preliminary discussion with the expert, CLPC decided that all of the present McKay constructions should be transferred to this new process, which would comprise six styles on two last shapes.

For the purpose of production planning, a survey of customers requirements was carried out by the counterpart and the expert. (For a detailed breakdown of customer requirements see table 3.) The result of this survey was the identification of a total annual requirement of 78,300 pairs. Taking into account an estimated reject rate of 5%, a total annual production of 82,215 pairs, say 82,250 pairs, was established.

With 240 working days per year, this makes a daily produotion rate of 343 pairs. This figure is split up into six different designs on two last shapes, four on one and two on another.

Table 3. Customer requirements (pairs)

Customer	Design						Total
	Heavy sole				Light sole		
	20S	21S	21CC	40MRP	61RC	63MR	
Army	15 000					1 000	16 000
Navy		1 000		1 100			2 100
Air force				2 000			2 000
olice						30 000	30 000
Postal Department					8 000		8 000
Tyre corporation			750			1 250	2 000
Cement corporation			2 000			200	2 200
Steel corporation			1 000				1 000
Petroleum corporation						2 000	2 100
Others			3 000			10 000	13 000
Total	15 000	1 000	6 750	3 100	8 000	44 450	78 300

From table 3 one may see that the demand for the four styles with heavy soles amounts to 25,850 pairs and that for the two light-sole styles to 52,450 pairs a year.

The expert feels that a reject rate of 5% is excessive, particularly in view of the fact that for the heavy-sole oonstructions there is virtually no sales outlet for rejects in Sri Lanka. Therefore any damage occurring before vulcanizing should be repaired, which would reduce the reject rate to not more than ½% to 1%.

The direct-moulded sole process calls for a much more precise shoemaking technique than the McKay construction used in the factory at present. Much narrower tolerances in upper leathers will have to be observed. This will also apply to other components such as stiffeners and toe puffs, and to a lesser extent to insoles. Uppers and components must not vary from one design to another if these designs are going on the same last with the same sole mould.

The four designs with heavy soles should, therefore, be changed in appearance to conform with the army boot. This applies in particular to the back part of the boots. Specifications of the leathers and other components are contained in annex I. Changes to these specifications should only be made in consultation with the mould manufacturer before the moulds are made. Once the moulds have been supplied, changes should only be made after exhaustive tests.

At the moment all of the McKay construction is either hand-lasted or the toe lasting is done on a Consol tack laster. The expert feels that this will not be good enough for the new process and problems will occur which will result in rejects.

The direct-moulded sole process is less labour- and machinery-intensive than the McKay construction and will result in redundant labour and machinery not only in the Lasting or Assembly Department, but also in the Bottom Stock Department. Suggestions for economy in the use of machinery and labour are contained in annex II.

Also, if production can be speeded up to more realistic figures, both in labour and machinery output, possibly by the introduction of some form of incentive system, then further savings can be made in both labour and machinery.

An inspection of the existing lasts was carried out and as the army boot last is 15 years old and in a very bad state of repair, it was decided that new lasts would be ordered both for the army boot (heavy sole) and the two shoes on the light sole. A new last for the light-sole shoe is needed because whole- and half-sizes of shoes are required by the oustomers and if linked-size lasts were purchased this would reduce the number of mould lasts and sole moulds required, resulting in less capital outlay.

Two quotations were obtained from machinery manufacturers, Desma of Bremen, Federal Republic of Germany, and CIC Ralphs Ltd, of Bath, United Kingdom. These quotations, both for the direct vulcanizing of 200 pairs of rubber soles on to army boot uppers in 8 hours, are given below for comparison.

Desma quotation

	£ [3]
8 Desma 203 vulcanizing presses (1 Desma press at £3,535.44)	28,283.52
12 Army boot moulds (6 pairs) (1 army boot mould, ½ pair, £938.14)	11,257.78
1 Desma 057 compressor unit [4]	989.84
16 Light-sole moulds (8 pairs) (1 light-sole mould, ½ pair, £938.14)	15,010.24
	55,541.38

CIC Ralphs quotation

	£
4 CIC Mark 6 vulcanizing presses (1 CIC press at £4,060)	16,240.00
1 Hydraulic pressure unit (can operate 8 presses)	1,945.00
2 heating cabinets (1 heating cabinet £330)	660.00
6 pairs army boot moulds (1 pair army boot moulds £1,700)	10,200.00
8 pairs light-sole moulds (1 pair light-sole moulds £1,700)	13,600.00
	42,645.00

The prices of both quotations are f.o.b. Inquiries should be made whether the prices include installation and training.

With that machinery 400 pairs can be produced in two shifts (16 hours), which will give 60 pairs spare capacity. It should be pointed out that 8 Desma presses are needed because the Desma press does one foot only at a time whereas the CIC press can do one pair at a time.

This proposed machinery will fit into the existing buildings without any alterations; power, light and the conveyor system are available so that the machines could simply be fitted in the proper position on the conveyor.

The conclusion of the survey and the economic feasibility study is that the proposed installation of the direct-moulded sole equipment is a viable proposition provided that the above-mentioned production figures are obtained.

3/ The original quotation was in DM; the conversion rate used was £1 = DM4.43.

4/ Suitable compressors might be already available in the factory.

II. RECOMMENDATIONS

In compiling these recommendations the writer has had to consider the factory as a whole and decide how the direct-moulded sole process would fit into the existing factory layout. At the moment there are four lasting or assembly lines plus one hand-lasting section for army boots. Each of these production lines is producing well under its capacity.

Production layout and productivity

It is recommended that the production lines be concentrated into three instead of five. This will be achieved by combining the McKay Shoes Department 242 and the McKay Boots Department 241 with the Cement Lasting Department 240 and using the cement lasting conveyor which is a power conveyor capable of transporting 1,200 pairs per eight-hour shift. The total production on this conveyor will then be about 690 pairs a day, 340 pairs of what were formerly McKay boots and shoes, which will now be vulcanized, plus the existing 350 pairs a day of cement-lasted footwear.

The other two production lines will then produce sewn welts on one and sandals and slippers on the other.

The essential lasting machinery is already available in the factory, i.e. two pull toelasters and two seatlasters, of which one will be sufficient for 690 pairs per day.

The reason for this recommendation is that a satisfactory method of lasting the toes of the vulcanized production must be found. The pull toelasters should be able to produce perfectly-shaped toes for vulcanizing provided that the correct wiper plates and toe bands are purchased.

It is suggested that the vulcanized production is cement forepart-lasted only. Then, at side lasting, which will be tack-lasted for the vulcanized production only, tacks can be put in at the toe as reinforcement to prevent adhesive failure at vulcanizing.

The vulcanized production must stay on the last overnight to set and dry out. If the lasting of the vulcanized production were started at 1.45 p.m., by 5.00 p.m., the end of the working day, all of the production should be lasted and would stay on the last overnight.

The main problem will be to obtain the production target. For this production line a maximum of 30 workers will be required. At present there are at least 85 workers producing the same output. The expert feels that some form of incentive system will have to be introduced to encourage the workers to be more productive.

The layout of the production line and the sequence of operations are contained in annex III along with machinery requirements, the sequence of operations for separated production lines and the number of workers required.

Additional machinery requirements

To improve the quality and to increase the production output, the purchase of the following additional machinery is recommended:

Upper splitting machine

As already stated, the upper materials must be made to closer tolerances for vulcanizing. It will be necessary to split the upper materials to ensure that the correct substances are obtained. The machine already in the factory is not in a good enough condition to ensure accurate splitting.

Scouring and roughing machine

The sole bond in the vulcanizing process depends on a high standard of roughing and flat bottoms. A scouring and roughing machine will produce excellent results.

In roughing and scouring, where tacks and adhesives are used, there is a fire hazard. It is important that a special type of extractor unit is used with the scouring and roughing machine which employs water (e.g. the British United Shoe M/C Co. No. 3 Hydromatic Dust Control Unit).

Pre-finishing machine for micro rubber

This machine will improve production and quality and reduce the labour content. It will be able to produce enough finished units a day to supply both the sandals and the cement-lasting production and will eliminate all of the existing sole-finishing operations.

Vulcanizing machinery

The expert recommends that the vulcanizing machinery be purchased from CIC Ralphs Ltd. CIC Ralphs are a subsidiary of Clarks, one of the largest shoe manufacturers in Europe. They were one of the pioneers of this process and used the machines themselves. Their machinery takes up less space and is cheaper than the equipment offered by Desma. Also, the expert has worked with CIC Ralphs machinery and has obtained very good results.

It is further recommended that the lasts be obtained from Avalon Shoe Supplies which is also a subsidiary of Clarks. This will ensure that as few problems as possible arise. They also have rubber and adhesive factories and will supply chemical formulae for vulcanizing compounds and vulcanizing adhesives free of charge, if required. They will also provide, free of charge, upper patterns for the army boot.

Improvement of quality

The quality can be improved not only by better materials but also by instilling a pride of work in the workers. More thought should be given to the product; e.g., when white work is done, the operators should see that their hands are clean and lasts should be cleaned from time to time.

Improvements should be implemented quickly and the Quality Control Department should ensure this. One of the most common faults is the use of heels of the wrong height. Many products do not stand properly because the heels are too high or too low. The last manufacturer should inform the design office for what height of heel the last was made and only this height should be used.

Materials

Leather

The shoe factory should ensure that it is supplied with the quality of leather it requires and not with what the tannery can supply. This applies mainly to insole leather, which is far too hard and rigid.

Stiffeners and toe puffs

The leather toe puffs and stiffeners which are used mainly for the heavier products appear to be satisfactory. They have, however, some drawbacks: they take a long time to dry and set, are affected by the climate and are relatively expensive.

While celastic is very good for toe puffs, it is recommended that it should not be used for stiffening, because owing to the climate in Sri Lanka it dries out before seatlasting and does not give good seats.

In this connection the expert recommends that the possibility of starting a leather-board factory be looked into. Leather-board is widely used in the Western footwear industry for stiffeners and insoles. There are several tanneries and footwear factories in Sri Lanka, all producing leather waste, but there is no leather-board factory.

Shanks

In the heavy-sole vulcanized production steel shanks rather than wood shanks should be used and it should be ensured that the shanks fit. The wooden ones in use at the moment do not fit.

Follow-up

It is expected that if the findings of this project are accepted the machinery will not be available in the factory before the beginning of 1979. The expert would recommend that either he himself or another expert returns to Sri Lanka at that time for two or three weeks to assist in the setting-up of the machinery.

The project is a feasible proposition and if the production targets can be obtained it will make a profit as can be seen from the financial analysis given in annex IV.

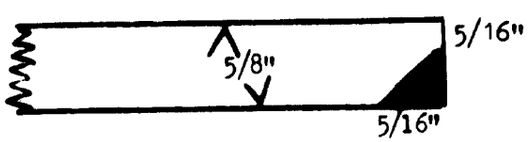
Annex I

VULCANIZED MATERIAL SPECIFICATION

A. Army boot, design 20 S

Last:	British army boot, 6 - 11 whole sizes only
Upper material:	Dug grain vamp and quarters I.9 - 2.1 mm Dug grain tongue and eyelet facing I.4 - I.6 mm Dug grain backstrap I.4 - I.6 mm Smooth leather toe cap I.9 - 2.1 mm Toe cap lining textile 0.3 mm
Eyelets:	Size 6 - 24 eyelets at 1 pair No. 48 long Sizes 7, 8 - 32 eyelets at 1 pair No. 48 long Sizes 9, 10 - 32 eyelets at 1 pair No. 48 long Sizes 11, 12 - 36 eyelets at 1 pair No. 48 long
Skive:	Cap and vamp lap to be skived to maximum of 1 mm each
Toe puff:	Bark-tanned leather 2.3 - 2.5 mm; lasting edges skived to 0.9 - 1 mm; thickness 17 mm
Stiffener:	Bark-tanned leather 2.3 - 2.5 mm; lasting edges skived to 0.9 - 1 mm; thickness 17 mm
Insole:	Bark-tanned leather 3.0 - 3.5 mm
Heel:	Vulcanized 1 3/8" high thread pattern to be $\frac{1}{4}$" deep
Sole:	Vulcanized 9/16" thick, 11/32" thick in waist, tread on forepart 7/32" deep
Heel block:	Wood, 5/8" thick, chamfered at back at 45° to 5/16" in height (see sketch below); wood block pattern to be $\frac{1}{4}$" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shank:	Steel 3/4" x 0.032" double-ribbed; size 6-7 boot $4\frac{1}{2}$" shank; 8-9 boot 4 3/4" shank; 10-11 boot 5" shank
Lace:	Bark-tanned leather, 100 cm
Sole size stamp:	$\frac{1}{4}$" size symbols
Trade mark:	

Army wood block specification



B. Navy boot, design 21/S

Last:	British Army Boot, 6 - 11 whole sizes only
Upper material:	Plain black chrome vamp and quarters 1.9 - 2.1 mm Plain black chrome tongue and eyelet Facing 1.4 - 1.6 mm Plain black chrome backstrap 1.4 - 1.6 mm Textile vamp lining 0.3 mm Plain black chrome backstrap 1.4 - 1.6 mm Textile vamp lining 0.3 mm
Eyelets:	Size 6 - 24 eyelets at 1 pair No. 48 long Sizes 7, 8 - 32 eyelets at 1 pair No. 48 long Sizes 9, 10 - 32 eyelets at 1 pair No. 48 long Sizes 11, 12 - 36 eyelets at 1 pair No. 48 long
Toe puff:	Bark-tanned leather 2.3 - 2.5 mm; lasting edges skived to 0.9 - 1.1 mm; thickness 17 mm
Stiffener:	Bark-tanned leather 2.3 - 2.5 mm; lasting edges skived to 0.9 - 1.1 mm; thickness 17 mm
Insole:	Bark-tanned leather 3.0 - 3.5 mm
Heel:	Vulcanized 1 3/8" high tread pattern to be $\frac{1}{4}$" deep
Sole:	Vulcanized 9/16" thick, 11/32" thick in waist, tread on forepart 7/32" deep
Heel block:	Wood, 5/8" thick, chamfered at back at 45° to 5/16" in height (see army boot specification); wood block pattern to be $\frac{1}{4}$" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shank:	Steel 3/4" x 0.032" double ribbed; size 6 - 7 boot 4$\frac{1}{2}$" shank, 8-9 boot 4 3/4" shank, 10-11 boot 5" shank
Lace:	Bark-tanned leather
Sole size stamp:	$\frac{1}{4}$" size symbols
Trade mark:	

C. Work boot, design 21 CC

Last:	British army boot, 6-11 whole sizes only
Upper material:	Nappa leather vamp and quarters 1.9 - 2.1 mm Eyelet lining waste leather 1.3 mm Nappa leather backstrap 1.4 - 1.6 mm Textile vamp lining 0.3 mm

Eyelets:	48 long, 16 pieces per 1 pair; colour to match
Toe puff:	Celastic 10 SC, 1.0 mm thick
Stiffeners:	Celastic 10 SC, 1.0 mm thick
Insole:	Bark-tanned leather 3.0 - 3.5 mm
Heel:	Vulcanized 1 3/8" high, tread to be $\frac{1}{4}$" deep
Sole:	Vulcanized 9/16" thick, 11/31" thick in waist, tread on forepart 7/32" deep
Heel block:	Wood, 5/8" thick, chamfered at back at 45° to 5/16" in height (see army boot specification); wood block pattern to be $\frac{1}{4}$" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shanks:	Steel 3/4" x 0.032", doubled ribbed; size 6 - 7 boot $4\frac{1}{2}$" shank, 8 - 9 boot 4 3/4" shank, 10 - 11 boot 5" shank
Lace:	55 cm 2 pieces cord
Sole size stamp:	$\frac{1}{4}$" size symbols
Trade mark:	

D. Navy and air force shoe, design 40 MRP

Last:	British army boot, 6 - 11 whole sizes only
Upper material:	Pebble grain chrome sides, vamp and quarters 1.9 - 2.1 mm Pebble grain chrome sides backstrap 1.4 - 1.6 mm Textile vamp lining 0.3 mm Facing pebble chrome waste, tongue and eyelet facing 1.4 - 1.6 mm
Eyelets:	16 pieces 9 RR (brass Japan)
Toe puff:	Celastic 10 SC 1.0 mm; colour to match
Stiffener:	Bark-tanned leather 2.3 - 2.5 mm; lasting edges skived to 0.9 - 1.0 mm; thickness 17 mm
Insole:	Bark-tanned leather 3.0 - 3.5 mm
Heel:	Vulcanized 9/16" thick, 11/32" thick in waist, tread on forepart 7/32" deep
Sole:	Vulcanized 9/16" thick, 11/32" thick in waist, tread on forepart 7/32" deep

Heel block:	Wood, 5/8" thick, chamfered at back 45° to 5/16" height (see army boot specification); wood block to be ¼" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shank:	Steel, 3/4" x 0.032" double ribbed, size 6 - 7 boot 4½ shank, 8-9 boot 4 3/4" shank, 10-11 boot 5" shank
Lace:	55 cm 2 pieces round cord
Sole size stamp:	¼" size symbols
Trade mark:	

E. Post office shoe, design 61 RC

Last:	New police last 5 fitting combined whole ½ sizes
Upper material:	Chrome leather sides vamp 1.7 - 1.9 mm, quarters 1.4 - 1.6 mm toe cap 1.4 - 1.6 mm; tongue 1.4 - 1.6 mm Textile toe cap lining 0.3 mm Counter lining natural chrome split 1.2 - 1.4 mm Eyelet lining chrome waste
Eyelets:	20 pieces blind
Toe puff:	Celastic 10 SC 1.0 mm
Stiffener:	Celastic 10 SC 1.0 mm
Heel:	Vulcanized 1" total height, actual heel height 3/4", pattern tread to be 3/32" deep
Sole:	Vulcanized, 7/16" thick, including 1/16" initiation beading; sole edge 3/8" thick; maximum thickness under ball to be ¼" including 3/32" tread pattern; waist to be 11/32"
Heel block:	Wood, 5/8" thick, chamfered at back at 45° to 5/16" in height (see army boot specification); wood block pattern to be 3/16" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shank:	Wood
Lace:	55 cm, 2 pieces cord
Sole size stamp:	¼" size symbols
Tade mark:	

F. Police shoe, design 63 MR

Last:	New last 5 fitting, 5-10½ sizes combined whole ½-sizes
Upper material:	Chrome side 1.4 - 1.6 mm vamp and quarters Chrome side 1.4 - 1.6 mm toe cap Textile vamp lining 0.3 mm Leather quarter linings 1.2 - 1.4 mm Chrome side tongue 1.4 - 1.6 mm
Eyelets:	9 RR 20 to 1 pair, colour to match
Toe puff:	Celastic 10 SC 1.0 mm
Stiffener:	Celastic 10 SC 1.0 mm
Insole:	Bark-tanned leather 2.6 - 3.0 mm
Heel:	Vulcanized, 1" total height, actual heel height 3/4", pattern tread to be 3/32" deep
Sole:	Vulcanized, 7/16" thick, including 1/16" initiation beading; sole edge 3/8" thick; maximum thickness under ball to be ¼" including 3/32" tread pattern, waist to be 11/32"
Heel block:	Wood, 5/8" thick, chamfered at back at 45° to 5/16" in height (see army boot specification); wood block pattern to be 3/16" smaller than heel pattern all round
Bottom filler:	Scrap upper leather
Shank:	Wood
Lace:	60 cm 2 pieces cord
Sole size stamp:	¼" size symbols
Trade mark:	

Annex II

ECONOMY IN MACHINERY AND LABOUR THROUGH CONVERSION
FROM MCKAY TO DIRECT-MOULDED PROCESS

Redundant machinery		Labour saved
Machine No.	Type of machine	
Department 241, McKay boots:		
419	Blake stitching machine	1
94	Screwing machine	½
92	Loose nailer	½
186	Heel attaching machine	1
181	Edge trimming machine	1
381	Heel pairing machine	½
22	Sole lock-stitch machine	1
263	Rough rounder	½
	Total	6
Department 242, McKay shoes		
73	Middle tacking machine	1
291	Blake stitching machine	1
65	Rough rounder	1
417	Sole look stitching	1
107	Levelling machine	1
385	Loose nailer	1
487	Heel trimming machine	1
265	Edge trimming machine	1
268	Heel scouring machine	1
321	Heel trimming machine	-
211	Edge burnishing machine	1
	Total	10

Redundant machinery		Labour saved
Machine No.	Type of machine	
Department 210, bottom stock		
	Large bottom press	1
	Clicking press	1
	Heel moulding machine	½
	Heel breast scouring machine	1
	Heel cupping machine	½
	Heel building (hand)	3
	Total	7
	Grand total	23

Annex III

SEQUENCES OF OPERATIONS AND CONVEYOR LAYOUT

A. Combined lasting and finishing process for vulcanized and cemented production

Planned for a minimum production of 690 pairs per day. Number of workers required: 30.

Sequence of operations

1. Tack on insoles
2. Cement insoles and uppers
3. Insert toe puffs and stiffeners
4. Back tack
5. Cement last foreparts
6. Cement last sides (hand)
7. Tack last sides and reinforce toes (vulcanized only)
8. Seat last
9. Remove insole tacks and pass
10. Pound
11. Scour and rough
12. Attach shanks and bottom fill
13. Attach heel blocks (hand-vulcanized only)
14. Cement bottoms
15. Cement soles (cement lasted)
16. Attach sole (cement lasted)
17. Last slip
18. Vulcanize
19. Trim flash (vulcanized only)
20. Examine
21. Insert socks
22. Clean and dress uppers
23. Box

Machinery required

Machine requirements correspond to the numbers on combined conveyor lay-out.

1. Machine (existing)
2. Hand and machine (existing)
3. Hand
4. Machine (existing)
5. 2 machines (existing)
6. 2 hand
7. Machine (existing)
8. Machine (existing)
9. Hand
10. Machine (existing)
11. Machine (new)
12. Hand
13. Hand
14. Hand
15. Hand
16. Machine (existing)
17. Machine (existing)
18. 4 machines (new) (vulcanizing)

18 A. 2 preheaters (new)

18 B. 1 pressure unit (new)

19. Hand

All other operations carried out by hand.

B. Cement lasting and finishing

Sequence of operations

Planned for 350 pairs per day, using pre-finished sole units. Number of workers required: 18.

1. Tack on insole
2. Cement insole and upper
3. Insert toe puff and stiffener

4. Back tack
5. Cement last forepart
6. Cement side last (hand)
7. Seat last
8. Remove insole tacks and pass
9. Scour and rough
10. Attach shanks and bottom fill
11. Cement shoe bottoms
12. Cement soles
13. Attach sole
14. Last slip
15. Examine
16. Insert socks
17. Clean and dress uppers
18. Box

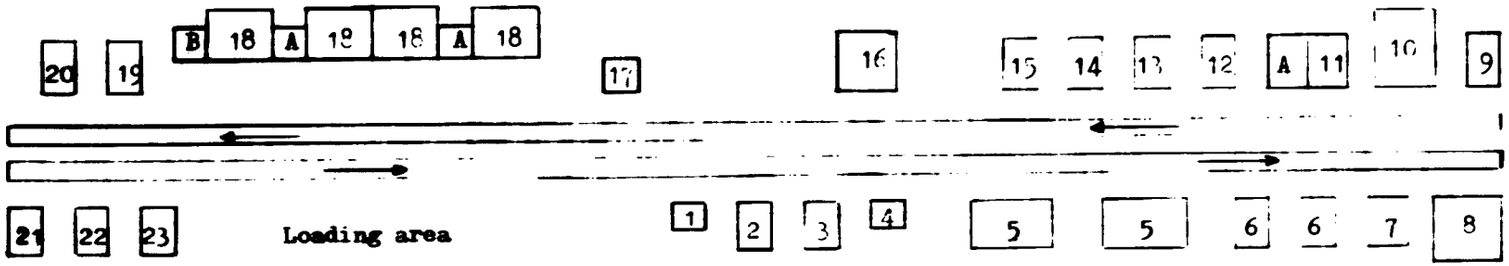
C. Vulcanized lasting and vulcanizing

Sequence of operations

Planned for 340 pairs per day. Number of workers required: 20.

1. Tack on insoles
2. Cement insoles and uppers
3. Insert toe puffs and stiffeners
4. Back tack
5. Cement last foreparts
6. Tack last sides and reinforce toes
7. Seat last
8. Remove insole tacks and pass
9. Pound
10. Scour and rough
11. Attach shanks and bottom fill
12. Last slip
13. Attach heel blocks
14. Cement bottoms
15. Vulcanize
16. Trim flash
17. Examine
18. Insert socks
19. Clean and dress uppers
20. Box

Conveyor layout for combined lasting and finishing process for vulcanized and cemented production



Annex IV

FINANCIAL ANALYSIS AND FEASIBILITY OF THE DIRECT-MOULDED SOLE PROJECT

A. Estimated requirement of machine capacity

Equipment	Capacity per year (pairs)		Capacity allocated for production of 27 000 pairs of heavy shoes	Capacity allocated for production of 55 000 pairs of light shoes	Total requirements	Utilization of total capacity (%)	
	1 shift	2 shifts				1 shift	2 shifts
Vulcanizing machines	48 000	96 000	1/3 of total capacity	2/3 of total capacity	4 machines	-	85
Pressure Unit	96 000	192 000	1/3 of total capacity	2/3 of total capacity	1 unit	85	43
Heating units	48 000	96 000	1/3 of total capacity	2/3 of total capacity	2 units	-	85
Lasts for heavy shoes			320 pairs		320 pairs		
Lasts for light shoes	48 000	96 000		650 pairs	650 pairs		85
Moulds			6 sets	8 sets	14 sets		

B. Requirement of fixed assets

Machinery and equipment	f.o.b. value a/ (£)	Freight and insurance (£)	Foreign exchange requirements in (£)	Foreign exchange requirements in (SRs) b/	Local costs (FEEC, duty, clearing charges etc.) (SRs)	Total cost (SRs)
4 vulcanizing machines at £5,075 each	20 300	1 625	21 925	276 250	207 200	483 450
1 pressure unit	2 425	200	2 625	33 070	24 800	57 870
2 heating units at £412 each	825	69	894	11 260	8 400	9 660
320 pairs of lasts at £8.43 each	2 700	219	2 919	36 780	27 600	64 380
650 pairs of lasts at £7.50 each	4 875	400	5 275	66 460	49 900	116 360
14 sets of moulds at £2,125 each	29 750	2 387	32 137	404 930	303 700	708 630
	60 875	4 900	65 775	828 750	621 750	1 450 350
Contingencies 10%	6 125	475	6 600	83 250	62 400	145 650
Total	67 000	5 375	72 375	912 000	684 000	1 596 000

a/ The prices indicated are equal to the lowest quotation received plus 25%.

b/ Conversion rate £1 = SRs 12.60 plus FEEC.

C. Requirement of funds
(in thousand SRs)

	Foreign exchange	Local expenditure	Total requirement
Fixed assets	912	684	1 596
Working capital	54	155	209
	966	839	1 805

D. Working capital requirement for each design

Item	Requirement for	Thousand SRs						
		Total requirement	For 15,000 pairs of 20 S	For 1,000 pairs of 21 S	For 7,780 pairs of 21 CC	For 3,250 pairs of 40 MRP	For 8,000 pairs of 61 RC	For 47,000 pairs of 63 MR
Vulcanising cement	3 months	21.3	21.1	0.1	10.9	0.5	1.1	6.6
Steel shanks	9 months	40.4	22.5	1.5	11.6	4.8	-	-
Wooden blocks	3 months	10.3	1.9	0.1	1.0	0.4	1.0	5.9
Vulcanising compound	3 months	122.9	22.5	1.5	11.6	4.8	12.0	70.5
Other material	3 months	14.3	2.2	0.1	1.1	.5	1.2	9.2
		209.2	51.2	3.3	36.2	11.0	15.3	92.2

E. Allocation of fixed assets costs to cost centres
(in SRs)

Machinery and equipment	Total cost allocated to production of 82 000 pairs per year	Costs allocated to production of 27 000 pairs of heavy shoes	Cost allocated to production of 55 000 pairs of light shoes
4 vulcanising machines	483 450	161 150	322 300
1 pressure unit	57 870	19 290	38 580
2 heating units	19 660	6 560	13 100
320 pairs of lasts for heavy shoes	64 380	64 380	-
650 pairs of lasts for light shoes	116 360	-	116 360
14 sets of moulds	708 630	303 720	404 910
	1 450 350	555 100	895 250
Contingencies	145 650	55 900	89 750
Total	1 596 000	611 000	985 000
Depreciation per annum[a/]	159 600	61 100	98 500

a/ The economic life of the machines is estimated to be 10 years.

F. Cost comparison of MacKay and vulcanized construction
(in SRs)

	Cost per pair			Saving in cost	
	McKay	Vulcanized			
		Stage 1	Stage 2	Stage 1	Stage 2
1. Weighted average cost of all shoes (annual production: D 210S = 15 000, 21S = 1 000 21CC = 7 750, 4CMRP = 3 250 61RC = 8 000, 53MR = 47 000)					
Cost of material					
Upper leather	13.58	13.58	13.58	-	-
Bottom leather	0.75	2.69	2.69	5.06	5.06
Other material	11.15	13.06	13.06	(1.91)	(1.91)
	32.48	29.33	29.33	3.15	3.15
Direct labour	7.01	7.01	5.33	-	1.68
Factory overhead	13.58	15.52	12.38	(1.94)	1.20
	53.07	51.86	47.04	1.21	6.03
Process loss	1.06	1.04	.94	0.02	0.12
Total cost/cost saving per pair	54.13	52.90	47.98	1.23	6.15
Total cost per year	4 439 000	4 338 000	3 934 000		
Total cost saving per year				101 000	505 000

	Cost per pair			Saving in cost	
	MacKay	Vulcanized			
		Stage 1	Stage 2	Stage 1	Stage 2
2. **Weighted average cost of heavy shoes** (annual production: D 20S = 15 000, 21S = 1 000, 21CC = 7 750, 40MRP = 3 250 pairs)					
Cost of material					
Upper leather	15.08	15.08	15.08	-	-
Bottom leather	12.08	3.93	3.93	8.15	8.15
Other material	11.90	12.97	12.97	(1.07)	(1.07)
	39.06	31.98	31.98	7.08	7.08
Direct labour	9.00	9.00	6.87	-	2.13
Factory overhead	17.42	19.68	15.72	(2.26)	1.70
	65.48	60.66	54.57	4.82	10.91
Process loss	1.31	1.22	1.09	0.09	0.22
Total cost/cost saving per pair	66.79	61.88	55.66	4.91	11.13
Total cost per year	1 803 000	1 671 000	1 503 000		
Total cost saving per year				132 000	300 000
3. **Weighted average cost of light shoes** (annual production: D61RC = 8 000, 63MR = 4 700 pairs)					
Cost of material					
Upper leather	12.84	12.84	12.84	-	-

	Cost per pair			Saving in cost	
		Vulcanized			
	MacKay	Stage 1	Stage 2	Stage 1	Stage 2
Bottom leather	5.63	2.08	2.08	3.55	3.55
Other material	10.78	13.10	13.10	(2.32)	(2.32)
	29.25	28.02	28.02	1.23	1.23
Direct labour	6.04	6.04	4.58	-	1.46
Factory overhead	11.69	13.48	10.74	(1.79)	0.95
	46.98	47.54	43.34	(0.56)	3.64
Process loss	.94	.95	.86	(0.01)	0.08
Total cost/cost saving per pair	42.92	48.49	44.20	0.57	3.72
Total cost per year	2 636 000	2 667 000	2 431 000		
Total cost saving per year				(31 000)	205 000

4. **Weighted average cost for each design**

(a) Design 20 S (annual production 15 000 pairs)

Cost of material					
Upper leather	16.57	16.57	16.57	-	-
Bottom leather	18.63	5.20	5.20	13.43	13.43
Other material	12.75	12.87	12.87	(0.12)	(0.12)
	47.95	34.64	34.64	13.31	13.31
Direct labour	11.11	11.11	8.18	-	2.93

	Cost per pair			Saving in cost	
		Vulcanized			
	MacKay	Stage 1	Stage 2	Stage 1	Stage 2
Factory overhead	21.44	23.70	18.27	(2.26)	3.17
	80.50	69.45	61.09	11.05	19.41
Process loss	1.61	1.39	1.22	0.22	0.39
Total cost/cost saving per pair	82.11	70.84	62.31	11.27	19.80
(b) Design 21 S (annual production 1 000 pairs)					
Cost of material					
Upper leather	15.50	15.50	15.50	-	-
Bottom leather	10.14	5.20	5.20	4.94	4.94
Other material	10.38	13.76	13.76	(3.38)	(3.38)
	36.02	34.46	34.46	1.56	1.56
Direct labour	9.76	9.76	7.94	-	1.82
Factory overhead	18.95	21.21	17.81	(2.26)	1.14
	64.73	65.43	60.21	(0.70)	4.52
Process loss	1.30	1.31	1.20	(0.01)	0.10
Total cost/cost saving per pair	66.03	66.74	61.41	(0.71)	(4.62)
(c) Design 21 CC (annual production 7 750 pairs)					
Cost of material					
Upper leather	12.91	12.91	12.91	-	-
Bottom leather	2.08	2.08	2.08	-	-

		Cost per pair			Saving in cost	
		MacKay	Vulcanized			
			Stage 1	Stage 2	Stage 1	Stage 2
	Other material	11.21	13.10	13.10	(1.89)	(1.89)
		26.20	28.09	28.09	(1.89)	(1.89)
	Direct labour	5.99	5.99	5.15	-	.84
	Factory overhead	11.68	13.94	12.38	(2.26)	(.70)
		43.87	48.02	45.62	(4.15)	(1.75)
	Process loss	0.88	0.96	0.91	(.08)	(.03)
	Total cost/cost saving per pair	44.75	48.98	46.53	(4.23)	(1.78)
(d)	Design 40 MRP (annual production 3 250 pairs)					
	Cost of material					
	Upper leather	13.25	13.25	13.25	-	-
	Bottom leather	6.24	2.08	2.08	4.16	4.16
	Other material	10.09	12.92	12.92	(2.83)	(2.83)
		28.58	28.25	28.25	1.33	1.33
	Direct labour	6.24	6.24	4.62	-	1.62
	Factory overhead	12.05	14.31	11.28	(2.26)	0.77
		47.87	48.80	44.15	(0.93)	3.72
	Process loss	0.96	0.98	0.88	(0.02)	0.08
	Total cost/cost saving per pair	48.83	49.78	45.03	(0.95)	3.80

	Cost per pair			Saving in cost	
	MacKay	Vulcanized			
		Stage 1	Stage 2	Stage 1	Stage 2
(e) Design 61 RC (annual production 8 000 pairs)					
Cost of material					
Upper leather	9.88	9.88	9.88	-	-
Bottom leather	2.08	2.08	2.08	-	-
Other material	7.88	11.64	11.64	(3.76)	(3.76)
	19.84	23.60	23.60	(3.76)	(3.76)
Direct labour	4.89	4.89	4.36	-	.53
Factory overhead	9.57	11.36	10.35	(1.79)	(.78)
	34.30	39.85	38.31	(5.55)	(4.01)
Process loss	0.68	0.80	0.77	(0.12)	(0.09)
Total cost/cost saving per pair	34.98	40.65	39.08	(5.67)	(4.10)
(f) Design 63 MR (annual production 7.000 pairs)					
Cost of material					
Upper leather	13.34	13.34	13.34	-	-
Bottom leather	6.24	2.08	2.08	4.16	4.16
Other material	11.27	13.35	13.35	(2.08)	(2.08)
	30.85	28.77	28.77	(2.08)	(2.08)
Direct labour	6.24	6.24	4.62	-	1.62
Factory overhead	12.05	13.84	10.81	(1.79)	1.24
	49.14	48.85	44.20	0.29	4.94

	Cost per pair			Saving in cost	
	MacKay	Vulcanized			
		Stage 1	Stage 2	Stage 1	Stage 2
Process loss	0.98	0.97	0.88	0.01	0.10
Total cost/cost saving per pair	50.12	49.82	45.08	0.30	5.04

G. Profitability of the project

1. **Break even point**
(Presuming the percentage production of the six designs will be as shown in schedule F)

	Stage 1	Stage 2
Total saving in variable cost per pair (see schedule F)	SRs 3.17	4.95
Annual increase (decrease) in fixed costs (see schedule E)	SRs 159 600	(98 400)
Number of pairs required to recover all additional fixed costs	50 300	-

Effect of changes in product mix on profitability

	Mix A: 20 S - 82 000 pairs other - nil		Mix B: 20 S - 27 000 pairs 63 MR - 82 000 pairs other - nil		Mix C: 63 MR - 82,000 pairs other - nil	
	Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
Total saving in variable cost/pair	SRs 13.53	16.63	5.86	8.03	2.09	3.80
Annual increase/saving in	SRs 159 600	(286 000)	159 600	(154 000)	159 600	(89 000)
Number of pairs required to recover additional fixed costs	11 800		27 200		76 400	
Total cost saving in producing 82 000 pairs	SRs 950 000	1 650 000	321 000	812 000	12 400	400 000

2. Discounted cash flow (in thousand SRs)

Year		Amount	Index	Present value	Accumulative saving
0	Payment of foreign exchange	(966)			
	Payment of FEEC, duty etc.	(684)			
	Purchase of raw material locally	(155)			
		(1 805)	1.000	(1 805)	(1 805)
1.	Net income	665	0.909	604	(1 201)
2.	Net income	665	0.826	549	(652)
3.	Net income	665	0.751	499	(153)
4.	Net income	665	0.683	454	301
5.	Net income	665	0.621	413	714
6.	Net income	665	0.564	375	1 089
7.	Net income	665	0.513	341	1 430
8.	Net income	665	0.467	310	1 740
9.	Net income	665	0.424	282	2 022
	Disposable value of fixed assets	874	0.386	337	2 359

The return on capital employed in the project is 28% at stage 2.

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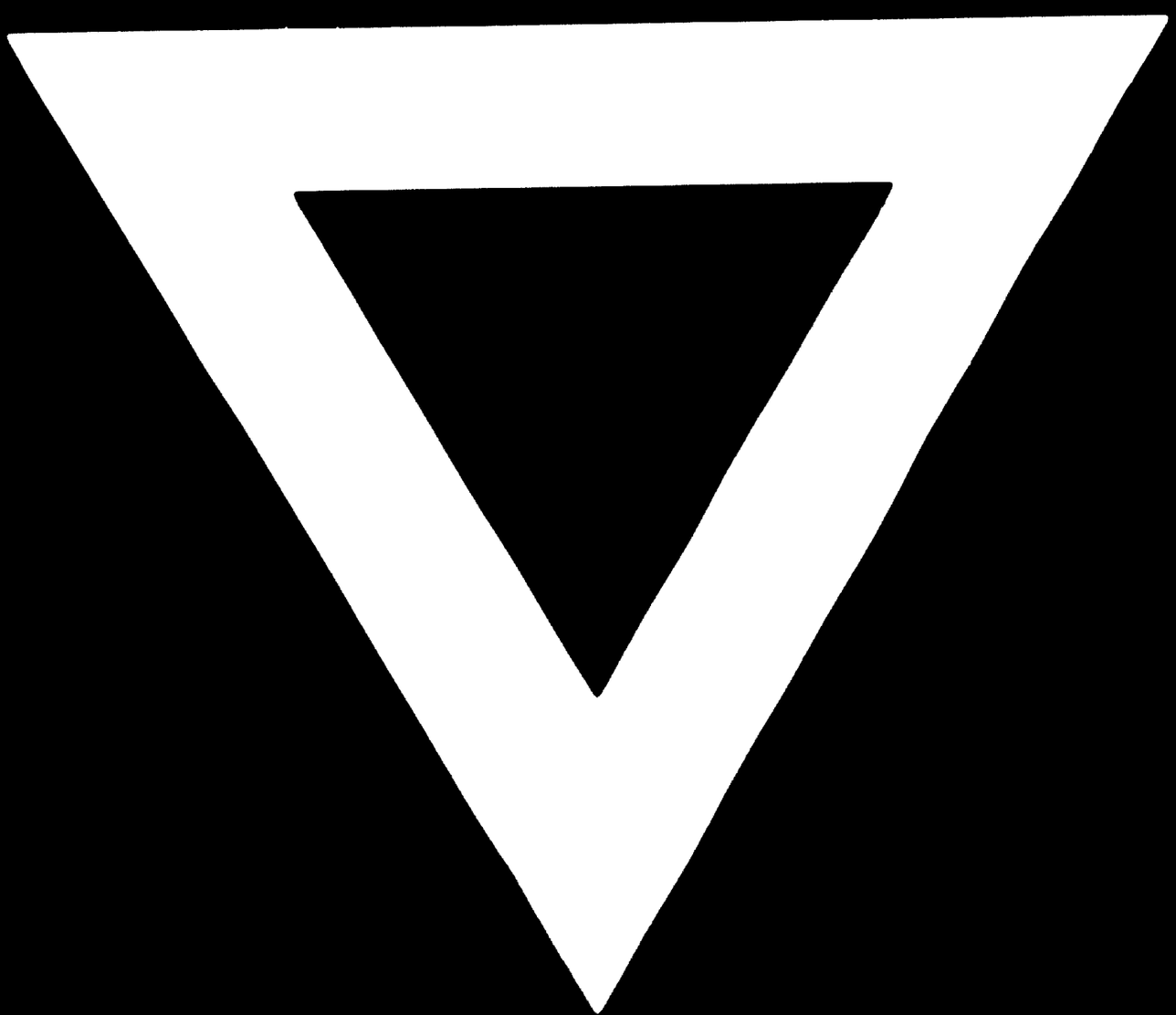

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