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ASSISTANCE IN THE INSTALLATION OF A RUBBER PLANT FOR USE IN THE FOOT-WEAR INDUSTRY

SRI LANKA .

IS/SRL/74/069

Mission report

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

Based on the work of N. C. Thakuria, rubber technologist with experience in footwear industry

id.76-1781

Explanatory notes

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

The monetary unit in Sri Lanka is the rupee (SRs). During the period covered by this report, the value of the rupee in relation to the United States dollar was $US 1 = SRs 7.41.

In the tables, the figures in brackets are negative. References to "tons" are to metric tons, unless otherwise specified.

Totals may not add precisely because of rounding.

The following technical abbreviations are used in this publication:

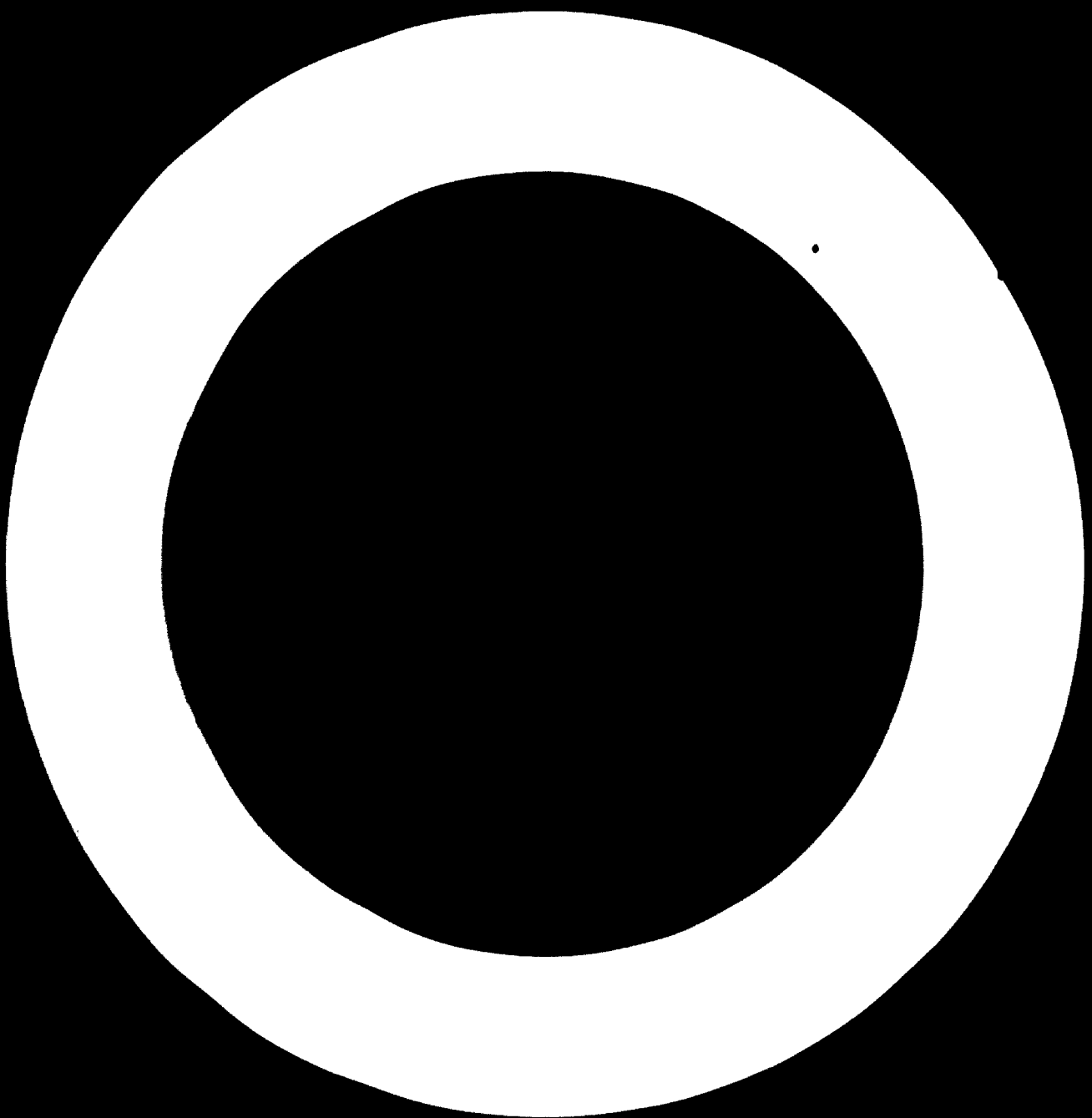
atm	atmosphere
c/s	cycles per second
c.i.f.	cost, insurance, freight

ABSTRACT

A rubber technologist with experience in the foot-wear industry was sent to Sri Lanka to make a feasibility study for the project "Assistance in the Installation of a Rubber Plant for use in the Foot-wear Industry" (IS/SRL/74/069) of the United Nations Development Programme (UNDP). The mission lasted three months starting on 21 October 1975. The United Nations Industrial Development Organization (UNIDO) was the executing agency.

The Ceylon Leather Products Corporation presently obtains rubber components from private rubber producers on annual tenders. Recently deliveries from the producers have been erratic, poor in quality and subject to constant price increases. This has resulted in a drop in the production and profits of the shoe factory and for some time it has been felt that the Corporation should set up its own rubber plant; assistance with this project is now required. The raw material, natural rubber, is abundantly available in Sri Lanka. The expert was attached to the Ministry of Industries and Scientific Affairs (Ceylon Leather Products Corporation) and his duties were (a) to assist and advise on the installation of a rubber plant for manufacturing rubber components used in the foot-wear industry; and (b) to advise on the moulds used in this industry.

He concluded that the proposed plant would be economically viable and is essential for the development for the foot-wear industry in Sri Lanka. Among other advantages, its establishment will increase employment and will enable the Corporation to expand into direct-moulded sole production of vulcanized rubber.



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INTRODUCTION

The Ceylon Leather Products Corporation is engaged in the manufacture of leather-cum-rubber foot-wear and obtains its rubber components from private-sector producers who make annual tenders. The estimated annual requirements of rubber components are as follows:

		SRs
Micro-cellular and hard rubber	52,300 sheets	881,150
Rubber heels and soles	140,000 pairs	214,150
Total		1,095,300

Most of the private-sector producers manufacture rubber components primarily to fulfil their own requirements for the production of foot-wear. Any surplus is made available on the open market for the Corporation and private-sector foot-wear manufacturers. Consequently, the components obtained by the Corporation are poor in quality and subject to constant price increases; also, deliveries are erratic and uncertain. The result is a drop in the production and profits of the Corporation.

This dependence on producers of components who are also competitors in the foot-wear market leads to enormous difficulties in maintaining production plans and time schedules.

The products of the Corporation have become less economical due to the following reasons:

(a) High cost of raw materials;

(b) Additional cost of unplanned production;

(c) Low price due to poor quality of foot-wear produced;

(d) Increase of stocks of unsalable foot-wear;

(e) Tendency to produce static designs;

(f) Unsuccessful innovations and an inability to carry out research and development programmes.

Also, the local availability of natural leather is gradually declining whereas natural rubber, which is the basic raw material for foot-wear components, is abundantly available in Sri Lanka.

I. FINDINGS

A. The proposed rubber unit

For the foregoing reasons, the Corporation has decided to set up a Rubber Unit to cater primarily to the needs of the Corporation and to sell any excess production to other manufacturers of foot-wear.

The rubber industry, particularly the foot-wear section, has a high employment potential. The proposed plant, if operated with two shifts, will provide employment for about 110 persons.

The total cost of fixed assets will be in the range of SRs 3.8 million out of which SRs 1.4 million would be foreign exchange required for the purchase of machinery and equipment (annex I, A). Assuming that working capital will be provided from a bank loan or overdraft the total Government/Corporation funds required will be equal to the cost of fixed assets.

Specific efforts have been made to trace any locally-made rubber plant machinery, moulds, chemicals etc. These are not available at present and a machine section and a lubrication and mould-making section need to be developed to ensure availability of spares and moulds and to replace imports.

B. Market potential and plant capacity

It was initially proposed to set up a full-scale plant to cater not only to the existing needs of the Corporation's shoe industry but also to existing and future needs of the local market for tropical slippers, beach slippers and swimming shoes. However, considering the high investment required it was later decided to design a smaller plant requiring less capital and less foreign exchange.

The available statistics show that the annual production of foot-wear in Sri Lanka in 1972 was approximately 8 million pairs of which 11% were of leather.

There is a need to produce more foot-wear in Sri Lanka particularly cheap shoes for the poor. This will require constant effort and successful research but is possible if rubber or rubber-cum-canvas foot-wear is substituted for costly leather. The latter may be reserved for expensive shoes and garments made especially for foreign markets.

C. Technical aspects

Quantitative data on the fixed assets required for the project are given in annex I, A-M. The selection of some machinery has been made after considering the need for labour-intensive processes (annex II).

The capacity of the unit has been decided on the basis of an annual production of 300,000 pairs of shoes for which 53,300 micro-cellular and hard-rubber sheets and 140,000 pairs of soles and heels are required. There will also be an additional annual production of 180,000 pairs of Hawaii slippers.

There is also scope for utilizing leather scraps from the shoe factory and the tannery and leather goods factory to produce leather boards for insole making in the shoe factory. This would reduce the cost of shoes and bring in an additional income from leather scraps.

A crumbing plant should be established to utilize the spews resulting from the production of rubber components. This is needed especially for the production of Hawaii sheets and micro-cellular sheets. Roughly about 30% of input will be waste which can be reprocessed to reduce costs and improve abrasion resistance. However, there is no crumbing plant at present in the country.

There is also scope to produce cutting boards, a very hard rubber product made from waste material such as textile and canvas scraps produced at the shoe factory. These are presently imported.

Mould making is a complicated process and high precision rubber foot-wear moulds are not locally manufactured. Moulders Engineering Company Ltd at Ratmalana is well equipped with the necessary machines. However, it has not so far undertaken manufacture of rubber moulds although it is capable of making designed moulds for the rubber foot-wear industry.

In view of the present level of production of the Corporation of approximately 300,000 pairs of shoes per annum and the planned additional production of 180,000 pairs of Hawaii slippers per annum, machinery and equipment (annex I, C) have been recommended assuming an operation of two shifts of eight hours each.

The machinery recommended should be maintained by a competent staff as the machines are delicate and serious breakdowns, dislocating production, may result from carelessness in proper maintenance. Also, spare parts have to be imported and may not be easily available.

The weights of the present components have been taken as a basis for estimating production capacities, and allowing a margin, it is estimated that approximately 1,000 kg or 1 ton of compounds will be required daily.

A TND mill, 42 in. x 16 in., with premasticated rubber, mixing for 30 minutes can give 800 kg in 8 h at the rate of 50-kg batches of 1.40 specific gravity every 30 minutes. Therefore 600 kg per 8 h shift is a conservative base for calculating capacity and two shifts should be able to produce 1,200 kg of which only 1,000 kg are required at the moment. From the profits, 25% margin should be kept for maintenance and social obligations to workmen.

The capacities of hydraulic presses have been ascertained in the same manner. In order to utilize the maximum capacity of these presses, two men should operate each press from both sides with a double set of moulds. One set will always be ready for curing inside the press and the other set should be opened, released of the finished product, cleaned and filled up with new blanks for feed-back to the presses. The moulding should not take more than 6 to 8 minutes at 150°C to 160°C, although it may take up to 10 minutes for thicker soles and heels depending upon the availability of chemicals.

Moulds should be of mild steel with hard chromium plating which gives a better, glossy, finish to the vulcanized product. As there is no hard chromium plating industry on the island it is desirable that one be started. Moulds should have a uniform height so that, if necessary, combined production can take place. It may not always be possible but with great care good results can be obtained by combinating production of different components.

Boiler capacity required has been over-estimated so that further investment will not be necessary in case of future expansion as, for instance, of ethyl vinyl acetate soles - already on the market - which require a temperature of 175°C to produce.

A separate "carbon-black room" is recommended to avoid the contamination of sensitive coloured compounds. This may seem expensive but is worth the money in the long run.

Careful selection of a site will contribute to the profitability of the project. It should be selected after considering its nearness to the sources of raw materials and to the consumer, and the availability of labour, power, fuel, water and transport.

In order to maintain internationally accepted standards, well-planned quality-control measures need to be introduced. Under no circumstances should these be overlooked.

D. Financial aspects

The viability of the project has been considered at two different levels of production: one with two shifts and the other with three shifts.

Expected profit per annum (annex I, N) with two shifts operating will be in the range of SRs 0.48 million after taxation or SRs 1.19 million before taxation.

If the money value is discounted at 10% per annum the net present value of the project to the Corporation would be SRs 0.58 million for a 10-year operation with two shifts assuming that income tax is payable at the rate of 60% on the profit earned each year (annex I, P).

The present value of the operation (annex I, Q) on the same basis as mentioned above, would be SRs 4.98 million before taxation.

The return on capital invested in the project (annex I, R) will be 12.7% with two shifts operating or 23.6% with three shifts operating.

The investment can be paid back in 4.7 years with a two-shift operation or 3.1 years with a three-shift operation.

II. CONCLUSION

The proposed plant in Sri Lanka for the manufacture of rubber foot wear components and slippers is economically viable and is essential for the development of the foot-wear industry in Sri Lanka.

Annex I

ESTIMATED COSTS OF THE PROPOSED RUBBER UNIT OF THE CEYLON LEATHER PRODUCTS CORPORATION

	Thousand SRs		
	Total costs	Foreign costs	Local costs
A. Fixed assets			
Land and buildings	1,144		1,144
Machinery, tools, moulds and spares, auxiliary equipment			
Purchase price	1,404	1,404	
PMBCs 65% c.i.f.	913		913
Duty 05% c.i.f.	70		70
Installation 15% c.i.f.	210		210
Office equipment and furniture	20		20
Total fixed assets	3,761	1,404	2,357

B. Land and building	Thousand SRs
Land, legal fees and other incidental expenditure - 160 perches at SRs 800 per perch	128
Access roads and fences	12
Survey fees, site clearing and factory building - 15,000 ft^2 at SRs 60 per ft^2	900
Contingencies - 10% of the costs specified	104
Total land and building	1,144

C. Machinery and equipment (Foreign expenditure - c.i.f.)	
Production machinery	
4 mixing mills 42 in. x 16 in. with chilled cast rolls, reduction gears, 40 hp motors with all other accessories	320
Rubber bale culled 20 hp motor	30
Hydraulic press (800 mm x 800 mm)	100
3 small hydraulic presses	70
Steam boiler	100
Heating chamber (post curing)	30

	Thousand SRs	
3 hole-making drilling machines	25	
Crumbing plant (1 cutter, 1 grinder, 2 sieves)	200	
2 clicking machines	90	
Transformer (250 kVA)	40	
Pump and plumbing etc.	15	
Subtotal		1,020
Auxiliary equipment		
Testing equipment	100	
Weighing-machine	5	
Subtotal		105
Tools and moulds		
Miscellaneous tools	10	
Moulds	150	
Subtotal		160
Contingencies		119
Total machinery and equipment		1,404

D. **Funds required**

	Thousand SRs	
	2 shifts	3 shifts
Fixed assets	3,761	3,761
Working capital	488	712
Total	4,249	4,473
Less: bank loan for working capital	488	712
Total capital required (Government/Corporation funds)	3,761	3,761

E. **Working capital**

	Months	2 shifts (SRs)	3 shifts (SRs)
Raw material	3	292,100	438,200
Wages	2	53,000	67,600
Salaries	2	27,900	32,000
Electricity, water and furnace oil	1	5,100	7,600
Spares and maintenance material	6	36,000	72,000
Insurance	12	25,000	25,000

	Months	2 shifts (Rs)	1 shift (Rs)
Telephone rental	12	800	800
Telephone calls	2		
Stationery	6	3,000	3,000
Postage and sundry expenditure	2	1,000	1,000
Subtotal		443,900	647,200
Contingencies including interest on bank loan/overdraft (10% of the specified costs)		44,400	64,700
Total		488,300	711,900

	Price (Rs/kg)	Monthly quantity in kg		Monthly cost in Rs	
		2 shifts	1 shift	2 shifts	1 shift
F. **Raw materials**					
Natural rubber	3	9,000	13,500	27,000	40,500
Styrene-butadiene rubber	5	3,500	5,250	17,500	26,250
High styrene	6	2,000	3,000	12,000	18,000
Captax	1.50	150	225	225	338
Denax	1.50	50	75	77	115
Hermat	1.60	30	45	48	72
Zinc oxide	6	1,000	1,500	6,000	9,000
Stearic acid	6	400	600	2,400	3,600
Paraffin wax	2	190	285	380	570
Rosin (wood)	3	375	563	1,125	1,688
China clay	0.30	9,000	13,500	2,700	4,050
Aluminium silicate	3	3,000	4,500	9,000	13,500
Vulacal BN	20	320	480	6,400	9,600
Anticxidant	15	65	98	975	1,462
Crumb	0.20	9,000	13,500	1,800	2,700
Carbon black	1	2,000	3,000	2,000	3,000
Titanium oxide	10	200	300	2,000	3,000
Red oxide	3	50	75	150	225
Sulphur	2	300	450	600	900
Packing materials	2			5,000	7,500
Total raw materials				97,380	146,070

	Salary/ month (Rs)	Allowances (Rs)	E.P.F. employees' contribution 9% (Rs)	No. of workers a/ 2 shifts	No. of workers a/ 1 shift	Monthly costs in Rs 2 shifts	Monthly costs in Rs 1 shift
G. **Wages**							
Skilled workers	255	75	22.95	36	36	12,706.20	12,706.20
Semi-skilled workers	215	75	19.35	24	40	7,424.40	12,374.00
Unskilled workers	180	68.50	16.20	24	33	6,353.80	8,735.10
Total wages						26,484.40	33,815.30
H. **Salaries**							
Factory manager	1,350		121	1	1	1,471	1,471
Assistant factory manager	935		84	1	1	1,019	1,019
Factory assistant	600	75	54	2	3	1,458	2,187
Clerks	330	75	30	1	1	435	435
Typists	330	75	30	1	1	435	435
Storekeeper	500	75	45	1	1	620	620
Assistant storekeeper	330	75	30	1	2	435	870
Accounts clerks	330	75	30	2	2	870	870
Maintenance officer	1,150		103	1	1	1,253	1,253
Mechanic	350	75	31	4	5	1,824	2,280
Electrician	350	75	31	2	3	912	1,368
Laboratory assistants	350	75	31	1	1	456	456
Peons	210	74	19	2	2	606	606
Telephone operators	330	75	30	2	2	870	870
Watchers	225	75	20	4	4	1,280	1,280
Total salaries						13,944	16,020

a/ This schedule is based on the production of 300,000 pairs of shoes. The recommended set-up of machinery which is more labour-oriented and less capital-intensive, can complete the production in 1.5 shifts, leaving an excess production capacity of 0.5 shift for two-shift operation. The number and salaries of skilled workers remain the same, but the numbers of semi-skilled and unskilled workers vary according to the types of products.

		Monthly costs			
		2 shifts (SRs)		3 shifts (SRs)	
J. Electricity					
Consumption charges:					
10,000 kWh at 12 cents/kWh		1,200		1,200	
20,000 kWh at 11 cents/kWh (2 shifts)		2,200			
35,000 kWh at 11 cents/kWh (3 shifts)		———		3,850	
Subtotal			3,400		5,050
Maximum demand charge:					
1st 100 kVA at 8 SRs/kVA		800		800	
Remaining 150 kVA at SRs 7.50/kVA		1,125		1,125	
Subtotal			1,925		1,925
Total			5,325		6,975
Actual electrical load	(65%)	3,461	(75%)	5,231	
Water					
200 kl/m at 50 cents/kl			100		
300 kl/minute at 50 cents/kl					150
Furnace oil			1,500		2,250
Total			5,061		7,631
K. Spares and maintenance					
5% of cost of machinery and equipment			6,000		
10% of cost of machinery and equipment b/					12,000
L. Insurance					
Building, workmen's compensation and personal accidents			2,090		2,090

	Cost of assets (thousand SRs)	Depreciation per annum (%)	Annual depreciation (thousand SRs)
M. Depreciation			
Land	154		
Buildings	990	2½	25
Machinery and equipment	2,297	10	230
Tools and moulds	320	20	64
Total depreciation	3,761		319

b/ Machines running non-stop suffer greater wear and tear than machines that shut-down or get serviced for 8 hours out of 24 hours.

N. **Profitability**

	Thousand SRs	
	2 shifts	3 shifts
Net income/transfer price	3,509	5,416
Variable costs:		
Raw material	1,169	1,753
Wages (on piece rates)	318	406
Contingencies, 5%	75	106
Subtotal	1,562	2,265
Semi-variable costs:		
Electricity, water and furnace oil	83	112
Repair and maintenance	72	144
Interest on bank loan/overdraft	48	70
	10	16
Subtotal	213	342
Fixed costs:		
Salaries	167	192
Insurance	25	25
Telephone, stationery, postage and sundry expenditure	8	8
Depreciation	319	319
Contingencies, 5%	19	21
Subtotal	538	565
Total	2,313	3,172
Net profit/year before taxation	1,192	2,244
Taxation, 60%	715	1,358
Net profit/year after taxation	477	886

O. **Estimated income**

Present requirements for shoe factory:

		Annual production and income			
		2 shifts 9/		3 shifts	
		Quantity	Amount (SRs)	Quantity	Amount (SRs)
Micro-cellular and hard rubber	Sheets	53,300	881,150	53,300	881,150
Rubber soles and heels	Pairs	140,000	214,150	140,000	214,150

9/ One-and-a-half shifts are sufficient to meet the nominal output target (300,000 pairs). The excess production figures show the additional output possible in the remaining half or one-and-a-half shifts.

		Annual production and income			
		2 shifts c/		3 shifts	
		Quantity	Amount (SRs)	Quantity	Amount (SRs)
Anticipated additional requirements in 1976:					
Hawaii slippers	Pairs	180,000	480,000	180,000	480,000
Hawaii straps	Pairs	180,000	360,000	180,000	360,000
Excess production:					
Micro-cellular sheets			474,600		1,381,800
Hard rubber and high styrene sheets d/			308,000		508,000
Soles e/			94,920		324,920
Heels f/			456,000		1,026,000
Crumbs			240,000		240,000
Total estimated income			3,508,820		5,416,020

		Thousand SRs				Thousand SRs	
Year	Description	Cash inflow	Cash outflow	Net inflow	Index	Discounted inflow	Cumulative discounted inflow
P.	Present value of net income after taxation from a two-shift operation for 10 years						
-2	Cost of land and building		1,144	(1,144)	1,210	(1,384)	(1,384)
-1	Purchase of machinery and equipment		2,617	(2,617)	1,100	(2,879)	(4,263)
0	Bank loan	488					
	Utilization of working capital		488		1,000		(4,263)
1-5	Net income from production	796		796	3,790	3,017	(1,246)
5	Replacement of tools and moulds		320	(320)	621	(199)	(1,445)

d/ Leather boards can be substituted.

e/ Cutting boards can be substituted.

f/ Adhesives can be substituted.

Year	Description	Thousand SRs Cash inflow	Cash outflow	Net inflow	Index	Thousand SRs Discounted inflow	Cumulative discounted inflow
6-10	Net income from production	796		796	2,353	1,873	428
10	Repayment of bank loan		488				
	Realisable value of:						
	Land	154					
	Building	742		408	386	157	585

Net present value SRs 585,000

Q. Present value of net income before taxation from a two-shift operation for 10 years

-2	Cost of land and building		1,144	(1,144)	1,210	(1,384)	(1,384)
-1	Purchase of machinery and equipment		2,617	(2,617)	1,100	(2,879)	(4,263)
0	Bank loan	488					
	Utilization of working capital		488		1,000		(4,263)
1-5	Net income from production	1,511		1,511	3,790	5,727	1,464
5	Replacement of tools and moulds		320	(320)	621	(199)	1,265
6-10	Net income from production	1,511		1,511	2,353	3,555	4,820
10	Repayment of bank loan		488				
	Realisable value of fixed assets:						
	Land	154					
	Building	742		408	386	157	4,977

Net present value SRs 4,977,000

	Thousand SRs	
	2 shifts	1 shifts
B. **Net profit after taxation**		
Capital invested	3,761	3,761
Profit before depreciation but after taxation	796	1,205
Depreciation	319	319

	Thousand SRs	
	2 shifts	1 shifts
Net profit after taxation	477	886
Return of capital invested	12.7%	23.6%
Pay-back period	4.7 years	3.1 years

Annex II

MACHINERY REQUIRED

Three D Baubury (high speed) with a 60 in. mill for sheeting.

One oil-fired steam boiler with super-heating arrangement (capacity 2,000 lb/h to aohieve a temperature in the hydraulic press of up to 180° C to cure rubber and EVA sheets.

One rubber-mill 550 mm x 1,500 mm with 100 hp 960 rpm, Slipring induction motor for warming and mixing sulphur for Hawaii, micro-cellular and press-goods production. Surface speed of back roll is approximately 109 ft/min, surface speed of front roll is approximately 77 ft/min loading 50 to 60 kg of 1.2 to 1.4 specific gravity. Mixing time is normally 30 minutes with premasticated rubber.

One three-bowl calender machine (68 in.) for sheeting Hawaii and micro-cellular (colour combinations and canvas frictioning for rubberized cloth.)

Two 300 x 600 mm mills. One for carbon black batch and one for warming and mixing sulphur for component sheeting 25 hp, 1,460 rpm 400/440 V, 3-phase, 50 c/s.

Front roll 16 rpm, back roll 20 rpm
Cooling water 6 l/min at 1-3 atm
Heating, steam consumption 6 kg/h at 3 atm
Capacity 10 to 15 kg in 15-20 minutes.

Two 600 x 600 mm hydraulic vulcanised presses for pressing soles and heels and other components:

Working pressure	300 atm
Total pressure	162 tons
Specific platen pressure	46 kg/cm^2
Size of platen	600 x 600 mm
Thickness of platen	50 mm
Number of platens	7
Number of day light	6
Clearance	75 mm
Maximum stroke of main ram	450 mm

Diameter of ram	260 mm
Closing time (platens)	18 seconds
Opening time (platens)	14 seconds
Raising time (tables)	6 seconds
Lowering time (tables)	2.5 seconds
Motor	5 hp, 1,430 rpm, 400/440 V 3 phase, 50 c/s
Oil tank capacity	125 litres
Floor space	2,110 x 2,000 mm
Height above floor	2.65 meter
Total weight	6 tons (approximately)

Two hydraulic vulcanised presses 800 x 800 mm for pressing Hawaii, micro, and plain rubber sheets:

Working pressure	300 atm
Total pressure	619 tons
Specific platen pressure	100 kg/cm^2
Size of platens	800 x 800 mm
Thickness of platens	55 mm
Number of platens	7
Number of day lights	6
Clearance	90 mm
Maximum stroke	540 mm
Diameter of ram	508 mm
Closing time	18 seconds
Opening time	14 seconds
Motor	10 hp, 1,440 rpm, 410/440 V 3 phase, 50 c/s
Oil tank capacity	270 litres
Floor space	2,960 x 1,525 mm
Height above floor	2.62 m
Total weight	14 tons approximately

One dri-heating chamber for post-curing of micro sheets to control shrinkage size - 18 x 8 x 6 ft. at 110° C.

An extruder for production of randing, rubber bands, garden pipes, hoses, Hawaii straps, refrigerator door panels, car door packings etc.

3 hp, 940 rpm	
Variable speed pulley	ratio 3:1
Worm reduction gear	ratio 44:1
Transformer	air cooled, single phase 400/24 V, 0.5 kW, 50 o/s
Heating element	24 V x 180 W

One crumbing plant to make crumbs from Hawaii, micro and press goods wastes 16.20 mesh with one cutter, grinder and two seives.

Two clicking machines to cut blanks for unit sole moulding. One clicker to cut vulcanized Hawaii and micro soles.

Motor	2 hp, 1,430 rpm, 400/440 V 3 phase, 50 o/s
Sizes of cutting table	560 x 650 mm
Width of cutting beam	300 mm
Stroke	45 mm
Over-all height	2,060 mm
Floor space	1,880 x 2,110 mm
Net weight	1,200 kg
Cutting impact (force)	10,000 kg
Maximum day light (table to beam)	305 mm

Two sets of 3-hole-making drilling machines for drilling Hawaii soles thonging.

One grinding machine (all purpose).

Water supply 200 l/min.

Equipment storage trolleys may be made locally according to diagram.

Moulds for unit soles, heels, Hawaii, micro, leather boards etc.

Miniature laboratory testers: T. strength/elongation, Mooney plastometer flexibility tester, ageing tester, scale etc.

For rubber and canvas built-up production the following additional machines are required.

Five bowl Calender 150 x 500 mm for rolling rubber mixture to produce sheets either plain or with design for upper, sole or heel in footwear.

Features:

(a) Four hardened, ground, chilled cast iron rolls and one steel roll with design, two being easily replaceable;

(b) Attachment of both steam heating and water cooling of rolls;

(c) Feeding conveyor and power driven take-off belt conveyor combined with a zinc stearate solution tank;

(d) Easily adjustable gadget for thickness of rubber sheet.

Specification:

Motor	10 hp, 1,450 rpm, 400/440 V
Worm-reduction gear unit	speed ratio 16:1
Over-all height	1,550 mm
Floor space	1,495 x 940 mm
Weight	2,370 kg approximately
Shipping space	2.5 m^3

Welman sole-cutting machine with adjustable format to cut different sizes of soles.

Three weigh-scales of up to 100 kg with units of $\frac{1}{2}$ kg and two small weigh-scales for fine chemicals with units in grams up to 3 to 5 kgs.

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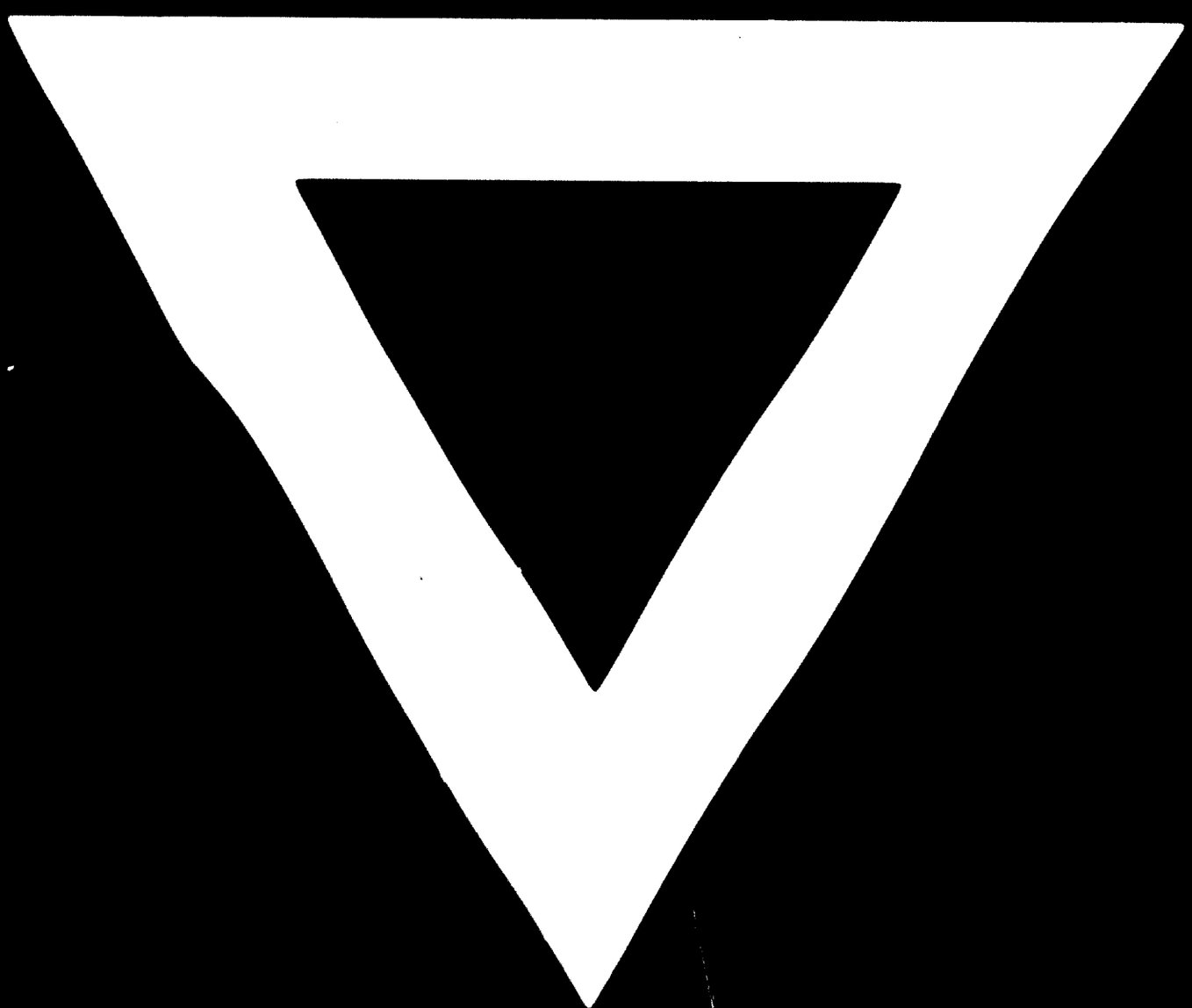

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