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REPORT

to the

GOVERNMENT OF GUYANA

on the

Feasibility of the

Guyana

REACTIVATION OF THE PARTICLE BOARD PLANT IN

GEORGETOWN/GUY.

by

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UNIDO, Vienna

December, 1969

C O N T E N T S

FOREWORD

At the request of the Government of Guyana, an expert was appointed to carry out a feasibility study of reactivating the particle board plant located in Georgetown.

The expert, H. Mueller-Eckhardt, arrived in Guyana on 24th September, 1969 and left on 2nd December, 1969. During this time he visited the particle board plant in Surinam and logging operations in surroundings of Georgetown.

The expert wishes to express his appreciation of the co-operation and facilities offered by the Guyana Development Corporation, the Auto Supplies Limited, the U.N.D.P. Forestry experts, and all other official Departments and private Companies.

1. Introduction

The particle board mill in Georgetown was planned and designed in 1957, erected in 1958 and started production in 1959.

Throughout the years 1959 - 1963 the total net losses amounted to $273,000 which put the Company heavily in debt. As no additional financing was available the mill was closed in April, 1963.

The reasons for this development are many and they are complex. They may be summarised as follows:

- insufficient supply of electrical power during the first years of production;
- poor quality of some machinery equipment;
- unbalance of some machinery capacities;
- inadequacy of technical supervision and laboratory control;
- the economic situation in the country was depressed during 1962 - 1963 due to political unrest.

It is obvious that all these factors resulted in low efficiency of the plant, high production costs and poor quality of th board which finally, and especially during the period of economic depression in the country, caused the complete breakdown of the company.

Now that investigations into the possibilities of reactivating the existing mill are being carried out, it must be emphasised that such possibilities for a reactivation of the mill exist only if:

- a good quality of particle board can be produced;
- the constant supply of wood at economically acceptable prices is guaranteed;
- the production of at least two shifts can be sold at prices covering production costs, including a reasonable depreciation;
- a competent technical management is ensured.

The electrical power supply no longer raises any problems since considerable improvement have taken place during the past years.

The additional following limitations expressed by the factory owners have to be taken into consideration when investigating the possibilities for a reactivation of the plant:

- with regard to financing problems only necessary replacements of machinery equipment to enable production of high quality boards are to be considered. No additional equipment for increasing the total capacity of the plant or its layout is contemplated;
- with respect to marketing problems, only a 2-shift production is to be considered to start with;
- for the same reason the domestic sales prices have to be calculated 10% less than the store prices for imported board. The export prices shall be 5% under the competing C.I.F. prices within the Caribbean area.

To enable an assessment as to whether all these requirements can be fulfilled, the following investigations had to be undertaken:

- a detailed inventory of the machinery equipment and its present state;
- study of the raw material situation;
- study of the market situation for particle board in Guyana and the CARIFTA area.

On this basis it was possible to:

- assess necessary repair, replacement or change of the machinery equipment;
- assess the capital requirement;
- calculate production costs and determine costing limits for a profitable production.

Knowledge of these factors will enable the factory owners to decide whether or not the factory is to be reactivated.

2. Summary and Recommendations

The task of the expert was to assess the possibilities for a reactivation of the particle board production at the existing mill in Georgetown. For this purpose it was necessary to carry out a detailed inventory of the machinery equipment and its present state, a study of the raw material situation, i.e. mainly for wood material supply and a study of the market situation for particle board in Guyana and the CARIFTA area. Based on these investigations, it was possible to assess necessary capital investment, calculate production costs and profitability of the mill.

The results may be summarised as follows:

1) To enable a starting up of the mill in 2 shifts and ensure production of a good board quality a capital investment of approximately G$ 275,000 would be required. For a 3-shift production another G$ 100,000 would be required.

2) The minimum capital required for starting up production in 2 shifts would be G$ 200,000 which would result in poor quality of the boards and higher production costs per year of approximately G$ 15,000 to 20,000 for 2-shift production.

3) The wood material required for a 2-shift production would be approximately 276,000 Hoopus cu.ft. per year. The continued supply of these quantities at economically acceptable prices may rise some problems as the capacity of the existing logging operations are limited. No price calculation for wood material could be made. Therefore, a maximum price has been determined which ensured acceptable production costs.

4) Marketing inquiries showed that approximately 60% of a 2-shift production volume would have to be exported. As export prices were not calculable, minimum export prices ex factory have been determined ensuring a profitable 2-shift production.

5) Based on given assumptions the gross profit for a 2-shift production would be G$ 33,710./year at a turn over of G$ 1,040,662 per year.

These recommendations follow:

- detailed investigations should be carried out by the factory owners into the possibilities of a continued supply of wood raw material at a maximum price of G$-.50/Hoppus cu.ft.;
- a detailed marketing inquiry within the CARIFTA area should be carried out in order to determine the obtainable export prices which mainly influence the results of any production.

Knowledge of these factors combined with the results of this report will enable the factory owners to decide whether or not the factory is to be reactivated.

If it is decided to go ahead, this report gives necessary details for the new quotations to be demanded from machinery suppliers, the management organisation, an alternative production programme, and a model for new calculations of profitability.

If it is decided not to reactivate the mill, new investigations should be carried out whether the existing factory could be used for other wood manufacturing operations, (veneering, plywood, sawmill, etc.) which combined with production of particle board would enable the running of a profitable enterprise.

3. Status of Buildings and Machinery Equipment of the Plant

3.1 Status of the Buildings

The buildings are in good condition and adequate except for the storage facilities which are too small. Roof repairs are necessary. In order to increase the storage area the generator should be sold and the generator house then be used for conditioning storage.

3.2 Status of the Machinery Equipment

A detailed checking of every machine and auxiliary equipment has been carried out. The results are shown in Appendix I, listing in detail necessary repairs, overhaul or replacement.

The following major equipment has to be replaced owing to deterioration or poor quality:

Washing Chambers
Glue Station
Glue Spreaders
Mat forming Station
Sanding Machine.

Further details will be discussed in Section 3.4.

3.3 Capacity of the Plant

The calculations are based on the following assumptions:

1) 250 production days per year
2) 2 shifts/day = 18 h = 16.5 h effective production time
   3 shifts/day = 24 h = 22 h effective production time

3) Pressing-Cycles time:

9 min. for 5/16" density 700 kg/m^3 = 43.7 lb./cu.ft.
11 min. for 3/8" density 680 kg/m^3 = 42.5 lb./cu.ft.
12 min. for 1/2" density 670 kg/m^3 = 41.8 lb./cu.ft.
14 min. for 5/8" density 660 kg/m^3 = 41.2 lb./cu.ft.
18 min. for 3/4" density 650 kg/m^3 = 40.6 lb./cu.ft.

4) Press: 7 openings; size 4' x 8' = 32 sq.ft. net = 2.98 m^2 net.

5) Breakdown of m^3 - production volume:

5/16"	=	8 mm	= 30%	5/8"	=	16 mm	= 25%
3/8"	=	10 mm	= 10%				
1/2"	=	13 mm	= 15%	3/4"	=	19 mm	= 20%

(The figures for 1) and 2) have been obtained from the factory owners. The pressing-cycle times could theorectically be considerably lower but they correspond with the originally planned capacity of 1 metric ton/hour. The choice of thicknesses to be produced and the breakdown of m^3 - production is indicated by marketing investigations).

The detailed production figures per day are shown in Appendix II and those per year are shown in Appendix III giving the corresponding figures for 2-shift and 3-shift production in metric and British units.

These calculations show that the gross production under the above assumptions is approximately 1 metric ton/hour. The resulting net output per year is shown in Table 1.

Table 1

Net production volume per year

Unit	2-shift production	3-shift production
Metric tons	3,475	4,626
m^3	5,160	6,870
Sheets	148,680	197,977

For further details concerning the Gross and Net production figures see Appendices IV and V.

A checking ofthe installed capacity of the different production stages shows:

- undersized capacity of the chip preparing equipment;
- insufficient capacity of the heating system.

Production of 1 metric ton/hour requires approximately 790 kg bone dry chips. The core and surface chippers are balanced for $\frac{3}{4}$" board production only provided the moisture content of the raw material is high, approximately 80%. For production of any other board thickness or at a lower ingoing moisture content, the capacity of the surface flaker is insufficient. However, the added capacity of both chippers would be sufficient for the production of all board thicknesses.

The core chip dryer has a caloric consumption of 255,000 kcal/hour, the surface chip dryer 175,000 kcal/hour, totalling 430,000 kcal/hour. With an optimal ingoing moisture content for the flakers of approximately 80% and an outgoing moisture content of approximately 4%, the evaporation is approximately 600 kg water/hour. This type of dryer requires approximately 950 - 1000 kcal/kg evaporated water, i.e. a total caloric consumption of approximately 600,000 kcal/hour. It follows that the total capacity of the dryers is 2/3 of the required capacity.

The capacity of the boiler, delivering only 700,000 kcal/hour, is too low for a 3-shift production. The installation of a new dryer would consequently require the installation of a new boiler.

Since the installation of new machinery equipment is to be avoided as far as possible, the production scheme has to be changed into a balanced 2-shift production, whereas for a 3-shift production new machinery would have to be installed (see Section 7.1.2).

3.4 Change of Production Scheme and Replacement of Machinery Equipment

Taking into consideration the sufficient total capacity of the installed chippers, the insufficient capacity of the installed dryers for a balanced 2-shift production, the necessity for replacing essential parts of the production line as well as having to keep investments low, the solution of these controversial factors would be to change the production scheme from a 3-layer to a 1-layer board production.

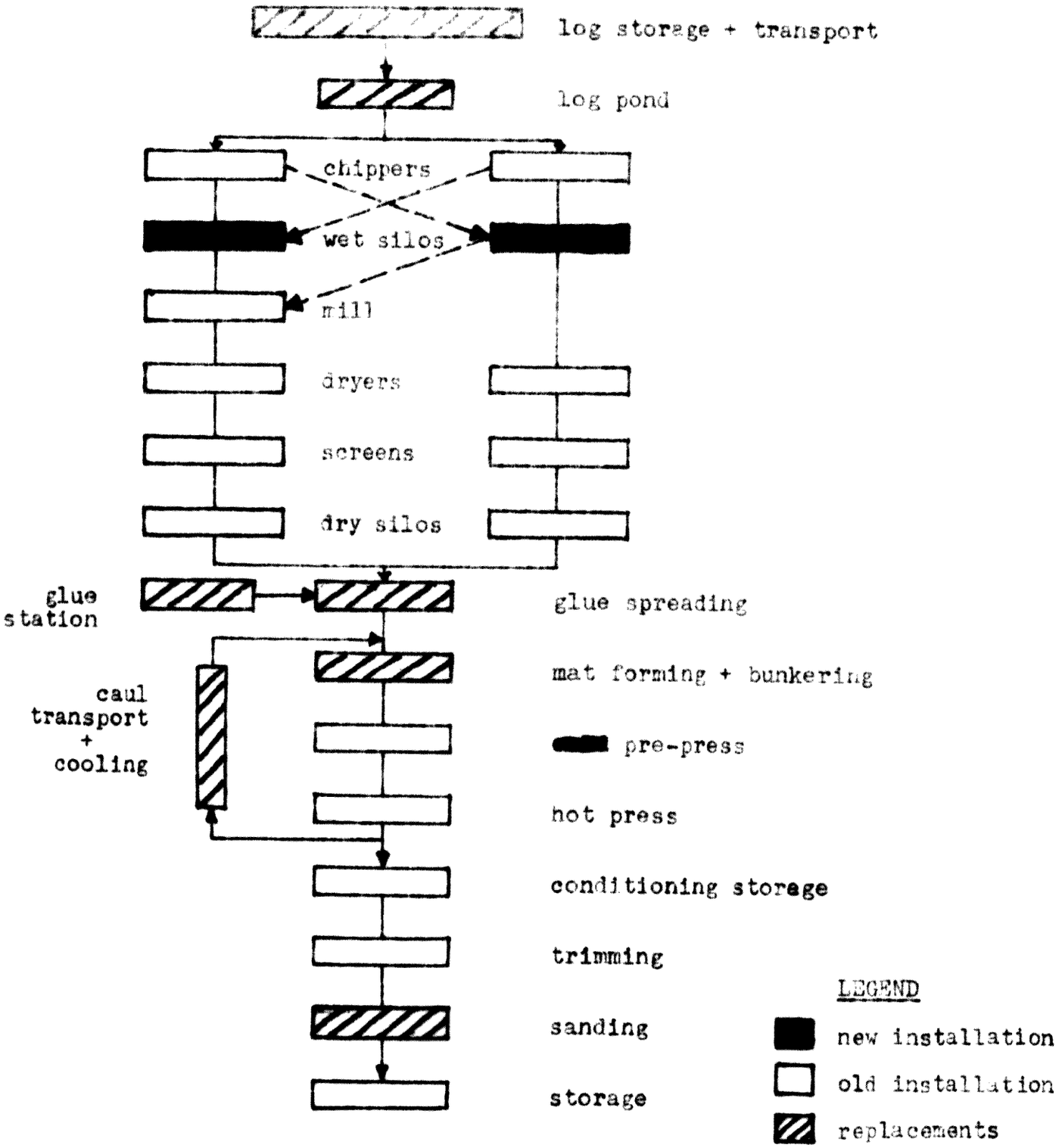
The change would give the following results:

- the flaker capacity would be sufficient;
- the dryers could be operated during the 3rd shift and would thus be sufficient (then evaporation of only 425 kg water/hour is required);
- the boiler would then be sufficient for a full 2-shift production;
- storage and transport of wood would be easier (no separation in core and surface logs);
- less new machinery equipment would be required; and consequently
- less investment capital would be needed.

The separated 1-layer board, produced for example with a "Wuertex" mat forming station, is a product of high quality and would satisfy local and export market quality demands. It may be mentioned that the products mainly sold in Guyana and the CARIFTA area are also 1-layer boards.

The following scheme gives a survey of the production flow, showing the main production steps as well as the major machinery equipment to be replaced or added:

board production, utilizing [illegible] machinery equipment which [illegible].



Log Storage and Transport Equipment

In order to ensure a continued production during shorter stops of wood supply, a wood stock adequate for 15 working days in 2 shifts is necessary. Longer storage time of the wood should be avoided because of rapid insect attacks and decay.

This involves storage of approximately 900 m^3 (stacked) = 16,600 Hoppus cu.ft. round wood which would require an area of approximately 30 x 28 m = 98' x 92' with 12 piles of approximately 28 x 2 x 1.5 m - 92' x 7' x 5' alongside. For 3-shift production this area is to be enlarged by 1/3.

The transport equipment should include log hauls, cross conveyors, infeeding device, bogies and necessary electrical equipment. A complete layout of the whole equipment can only be made after discussions with the logging operators, as to how the wood will be delivered (diameters, length, barked or not barked, etc.).

Log Pond

In order to ensure production of good chips and to keep up the capacity of the flakers, a uniform moisture content of approximately 80% is necessary. After 3 weeks of storage the moisture content may be only approximately 30%. The only way to obtain the required uniform high moisture content within a short time would be water storage. The installed washing and moisturing chambers are <u>not</u> suitable for this purpose.

Therefore a pond of approximately 17 x 10 x 1.6 m = 51' x 30' x 5' is necessary, big enough to accommodate wood material for a 3 days production in 2 shifts, corresponding to a 3 days water storage. The optimum storage time depends on the wood species and the ingoing moisture content and has to be determined through experience. After water storage the logs should be stored on the bogies for a period in order to decrease the very high moisture content at the surfaces of the logs.

The required equipment will have to be defined on the basis of the log transport layout.

Wet Chip Silos

These are necessary partly as a buffer store and partly to ensure a uniform feeding of the following machinery (mill, dryer). Irregular feeding of the mill instantly decreases its capacity and prevents a uniform drying process and the control of a dryer.

The silos should have a capacity of approximately 20 m^3 each which is big enough to ensure storage of wet chips to be dried under the 3rd shift when running the plant in 2 shifts, and they would be big enough for a 3 shift production.

Glue Station

The equipment is seriously deteriorated and requires to be replaced, including all stirring devices, pumps, valves, storage tanks, mixing vessels and piping for separate preparation of glue, hardener and additives.

Glue Spreading

The equipment is seriously deteriorated and requires to be replaced.

Only one machine is necessary with a capacity of 1 metric ton/h, including glue pump and infeed and outfeed conveyors.

Mat forming station and bunkering

The installed equipment is of very poor quality and unusable for the production of high quality board. Those intimately connected with the former operation of the plant confirmed that a difference of 6" in the thickness of the formed mat was common. 4 workers had to be employed to even-out the mat manually. After such a mat forming operation no 3-layer board can be produced. The additional production

costs were approximately $5,200./year covering wages only.

Only one new machine is to be installed with a capacity of 1 metric ton/h. Special attention should be paid that the machine delivers well formed edges of the mats.

Furthermore this machine should be equipped with a specially large bunker for glued chips in order to have a buffer and by that to ensure an equal feeding of the mat forming device.

Caul Transport and Cooling Device

The manual transportation of the cauls and their cooling has been a constant source of problems and additional production costs. Many cauls were damaged and the cauls were too hot when put into the production cycle again. The additional production costs were approximately $6,000./year for wages only.

An automatic caul returning line equipped with the necessary cooling device should be installed.

Sanding

This machine is not suitable for its purpose. From statements of former personnel every panel had to go through this machine 6 - 8 times before ready. The production of one shift could not even be sanded within two shifts.

Apart from the above mentioned machinery, the following additional auxiliary equipment is necessary:

- production control equipment (for more details see Section 6.3.4);
- fork lift for the internal transport;
- metal separator, magnetic, to avoid penetration of metal parts into the chip flow;

- control balance for the control of the mat weight;
- water spraying device to moisten the mat surfaces before pressing;
- discharging equipment for the waste silo and feeding system to the boiler;
- change of the electrical equipment according to the alteration of the production scheme;
- traps for alteration of the chip flow;
- conveyor from the flakers to the wet chip silo;
- packing equipment for export packaging;
- knive setting jig for the flaker knives;
- waste cutter for the trim saw;
- toilets and showers for male and female workers.

4. Raw material Supply

4.1 Wood Materials

For production of high quality particle board the wood species to be used should have the following specifications:

- low to medium density (approximately 400 - 700 kg/m^3 = 25 - 45 lb./cu.ft.);
- light colour (including light gray, light brown, greyish and similar);
- no inorganic deposits influencing the economics of chipping;
- no residual odour;
- a low incidence for insect or decay attack.

According to "Guyana Timber" and recent inventories made by the UNDP (SF) - Forest Industries Development Survey - there are at least 50 species of wood which, due to their density and colour can

be used for particle board production. These are listed in Appendix VI.

Final results concerning the suitability of a species or a mixture of species can only be obtained through practical tests. Some species have been tested in the factory before its closing-down, especially Dukali, Karohoro and Simarupa which are very suitable.

Unfortunately the expert could not carry out any tests as no testing facilities are available (the particle board factory cannot be operated). Furthermore it would have taken approximately 2 months to get the raw material for testing purposes.

The quantities of wood needed per year are:

for 2-shift production: 14,250 m^3 (stacked) = 276,250 Hoppus cu.ft.
for 3-shift production: 18,500 m^3 (stacked) = 357,500 Hoppus cu.ft.
assuming a consumption of approximately 2.2 m^3 (stacked) per m^3 of particle board.

The mill can use residues from th match factory, some selected residues from sawmills, and round wood from the forests.

4.1.1 Residues from the Match Factory

The factory is only using the species Karohoro which is very suitable for particle board production.

Detailed discussions with the Technical Management showed that the quantity of residues from 1970 on will be at a maximum of 10,000 Hoppus cu.ft./year.

The price for this material could not be determined. Estimations range between G$-.40 and G$-.50/Hoppus cu.ft.

4.1.2 Selected Residues from Sawmills

Light coloured sapwood from hardwood species with coloured heartwood, at present being sawnwhere only the heartwood is used, should also be tried for particle board production.

The quantities available today are very small - some 1000 Hoppus sq.ft./year - but will increase considerably when also light coloured, low and medium density hardwood species are sawn and prepared (seasoning, impregnation) for local use and export. This development of sawing these new species will mainly be concentrated on the area of the lower Essequibo River and will take at least 3 years.

The price for these residues could not be determined. Estimations range between G$-. 10 and G$-. 20/Hoppus cu.ft.

4.1.3 Round Wood from the Forests

At least 260,000 Hoppus cu.ft./year for a 2-shift production are to be supplied from the forests in the form of round wood or forest waste from logging operations.

The preferred sizes of the logs are 4' - 6' in length and 5" - 12" in diameter without bark. Debarking should be done after felling in the forests when it is easiest.

If logs bigger than 6' length and 12" diameter have to be delivered, a cutting saw and a splitting machine must be installed in order to reduce the logs to sizes suitable for the chippers.

Discussions with the experts from the Forest Department and UNDP Forest Programme showed that up to now no forest inventories are available showing exactly what quantities of which species are growing in which areas.

However, the following statement can be made:

There is sufficient raw material from suitable species within a radius of approximately 100 miles from Georgetown, especially in the area of the Upper Demerara River south of Tiger Hill.

The big problems are the transportation and the limited capacity of the existing logging companies.

To ensure a continued supply of wood material, the factory owners could either run their own logging operations or contract with loggers who are operating within the area to supply the necessary wood. In this case, it is recommended that the factory owners ensure that loggers have the necessary capacity for such considerably increased logging.

Any price calculations cannot be made due to many unknown, incalculable factors (transport distance, logging costs, species, etc.). The market investigations showed a wide difference in price, ranging between G$-. 25 to G$-. 45/Hoppus cu.ft.

Therefore, a price limit has to be established. The detailed calculation of production costs (see Section 7.2) indicate a limit of

G$-. 50 per Hoppus cu.ft., free delivered log storage, barked and cut into the right sizes.

Compared with corresponding estimations by forestry experts, this price seems to be realistic.

In order to keep the costs down it is recommended to investigate whether the particle board factory could establish, in co-operation with the match factory and other wood industries, a large logging operation to supply the different industries with the necessary raw material.

4.2 Other Pre-requisites

4.2.1 Resin and Hardener

Urea formaldehyde resin is the binder most commonly used and has been used in the factory. It is also used for the competing products in the CARIFTA area, and appears to meet in a large extent the requirements of the Caribbean climatic conditions. Therefore the use of a considerably more expensive phenolic resin should not be considered when starting up the production. A major reason for the bad quality of the latest products from the mill has been due to a decrease of the resin content to half of the normal - and required - quantity.

Detailed quotations from well known suppliers reached the factory owner recently, including all necessary mixing recipes and application descriptions. As the quality of the different products is good, the cheapest supplier should be chosen.

4.2.2 Preservatives against decay and insects

Attack of the particle board by termites is very heavy and therefore it is necessary to produce a board highly resistant against these insects and other deteriorating agents.

For preservation chemicals the factory owners have recent quotations and all necessary description for application.

4.2.3 Water repellents

Wax emulsions should be added to the board in order to substantially increase its water repellent properties.

Quotations with application descriptions have reached the factory owners recently.

5. Market Study

5.1 Quantity

All panel materials used by the wood working and building industries are at present imported i.e. mainly plywood, particle board, hardboard and insulation board.

Particle board and plywood are imported mainly from Surinam where a plant with a capacity of approximately 18,000 metric ton/year = 27,000 m^3/year for particle board is in operation. Today approximately 20,000 m^3 particle board are produced in 2 shifts, of which approximately 15,000 m^3 are sold within the Caribbean area.

The local production of sawn timber, mainly concentrated on greenheart, is complemented by imports of softwood from Canada and U.S.A.

The total imports of wood and wood products are shown in Table 2.

Table 2

Imports of wood and wood products to Guyana

Commodities	1967		1968		1.1.-31.8.1969	
	Quantity cu.ft.	Value G$	Quantity cu.ft.	Value G$	Quantity cu.ft.	Value G$
Plywood	39,540	231,077	190,253	315,408	26,505	187,263
Fibre Board	78,644	111,390	3,441	10,812	70,147**	210,441
Other wood simply shaped or worked	?	102,364	?	194,516	?	97,951
Builders woodwork (doors, etc.)	?	56,532	?	73,169	?	109,124
Douglas Fir, Pitch Pine - undressed*	380	1,454	1,050	3,881	100	864
White Pine - dressed*	53,500	158,059	61,000	214,364	31,000	116,611
White Pine-undressed*	38,800	131,896	47,400	166,701	21,000	99,883
	?	792,772	?	978,851	?	822,137

* 1,000 board feet = 83.33 cubic feet.

** According to the Statistical Department, the imports of particle board are included in this figure.

Although the statistics do not show any import of particle board, the market inquiries showed that in 1969 990 m^3 are imported by the main import companies. For more details see Appendix VII.

It must be assumed that only 80 - 90% of the actually imported particle board quantity have been registered by the market inquiries. The total quantity imported in 1969 therefore is estimated to 1100 m^3.

5.2 Prices

Imports of board materials are subject to an import duty of 53% for imports from other countries than the CARIFTA or the Commonwealth.

This results in high wholesale prices which may restrict the use of panel materials at the present time. Consumption may rise, if particle board can be produced at costs which allow a considerably lower wholesale price. At the same time, this high import duty, if maintained, or even increased, would encourage (protect) local particle board production.

The average prices for particle board in Georgetown are shown in Table 3.

Table 3

Average prices for imported board in Georgetown
(Nov. 1969)* (all prices in G$ per sheet)

Sizes	CIF Georgetown	Duty 53% Overhead 5%	Store Price
4' x 8' x 8 mm	5.13	2.98	8.11
10 mm	6.00	3.48	9.48
13 mm	7.19	4.17	11.36
16 mm	9.59	5.56	15.15
19 mm	10.69	6.20	16.89

* All figures obtained from the Importers.

C.I.F. prices for particle board sold within the CARIFTA were only obtainable from Trinidad and are shown in Table 4.

Table 4

C.I.F. Prices for particle board in Trinidad (Nov. 69), all prices in TT $ per sheet

Sizes	C.I.F. P. of Spain	Import Duty	C.I.F. + duty	Origin
4' x 8' x 8 mm	2.48	25%	3.10	Surinam
x 16 mm	4.94	"	6.16	"
x 19 mm	5.58	"	6.98	"
x 13 mm	6.40	25%	8.00	Poland
x 16 mm	8.31	"	10.39	"
x 19 mm	8.93	"	11.16	"
x 16 mm	7.71	15%	9.64	Ireland

(The import duty in Antigua is 21%, Barbados 24%, Jamaica 38%).

For particle board from Georgetown, CARIFTA importers would not have to pay import duty. Therefore the sum of C.I.F. price plus duty would be the price particle board from Guyana would have to compete with when exported to the CARIFTA area.

5.3 Estimates of the Potential Local Market for Particle Board

On the assumption that the prices and the quality are attractive, particle board could partly replace solid wood and plywood and some of the hardboard and insulation board in the manufacture of furniture, interior decoration and in the building industry. Furthermore, an active sales promotion with practical demonstrations how to use particle board will stimulate the consumption considerably. Therefore the possibilities for substituting at least 10% of the total volume of wood materials imported with particle board can be considered realistic and attainable.

Based on the statistic import figures for the period of 1st January to 31st August, the imported volume of wood materials - particle board imports deducted - in 1969 is estimated to approximately 5700 m^3 (= 200,000 cu.ft.). A substitution of this quantity of 10% with particle board gives an additional sales volume for the domestic market of 570 m^3 (= 20,000 cu.ft.).

The resulting total net sales volume per year with 2-shift production for the domestic market then is approximately 1670 m^3 (50% more than today) and 3490 m^3 are to be sold on the export market.

A detailed breakdown of the net sales volume for 2 and 3-shift production is shown in Appendix VIII.

6. Production Programme, Management and Control

6.1 Production Programme

6.1.1 Standard Boards (Sanded)

As indicated by the market inquiries, production should be confined to 8, 10, 13, 16 and 19 mm sanded board. 6 mm board should not be produced due to very high production costs/unit. The required density of the boards giving a good quality depends to a large extent on which wood species will be used. To ensure a good quality the boards should have the following densities:

700 kg/m^3	=	43.7 lb/cu.ft.	for	8 mm	= 5/16"
680 "	=	42.5 "	"	10 mm	= 1/8"
670 "	=	41.8 "	"	13 mm	= 1/2"
660 "	=	41.2 "	"	16 mm	= 5/8"
650 "	=	40.6 "	"	19 mm	= 3/4"

Practical experience and laboratory tests will show whether the densities can be decreased.

On this type of boards the calculation of production costs and profitability should be based as it will take quite a long time until detailed knowledge of the marketing possibilities for other products are gained. Based upon this, other types of boards as described below, should be developed technically so that they meet the specific demands of the market.

However, production of re-manufactured boards require investments for new machinery equipment and would result in higher production costs per unit. The whole profitability of the mill will be improved slightly, as a rough calculation has shown.

6.1.2 Unsanded boards

After a sufficient period to gain detailed knowledge of marketing possibilities for particle board, it may be worthwhile to investigate sales possibilities for unsanded boards. However, in this case the thickness variation after the hot press must be very small, which will depend to a large extent on the setting control of the hot press and the quality at mat forming station.

Such a type of board could be used for ceilings and interior walls. The production costs per unit for this grade of panel would decrease considerably.

6.1.3 Re-manufactured boards

As long as the plant is operated in 2 shifts, the presses could be used for coating of boards with plastic laminates during the 3rd shift. Co-operation with bigger furniture factories could possibly justify extension to this range of products.

It may be recommended to investigate whether veneering of boards, thickness 13 to 19 mm, veneered with 0.6, 1.0, 1.5 or 2 mm veneer on both sides, is attractive for the market (material for furniture, joinery or building industry).

Furthermore, it may be recommended to investigate the possibilities of producing 35 mm boards with low density (approximately 580 kg/m^3 = 36.2 lb/cu.ft.), veneered on both sides, for production of flush doors or elements for low costing houses. Before starting up such a production it is necessary to develop detailed constructions of doors and elements in close co-operation with architects and the building industry which meet the real demand of the market with respect to sizes, quality, quantity, etc. Production of 5,000 flush door blades 3'9" x 6'9"/year, for example, which must be considered a realistic

quantity would decrease the m^3-volume to be exported with approximately 10% (2-shift basis).

Such a use of the idle 3rd shift capacity would decrease the fixed costs per production unit, however, as mentioned above, new machinery equipment has to be installed for such types of production (glue spreading equipment, glue mixing device, veneer cutting machine, etc.), for approximately G$ 50,000 as a rough estimation.

6.1.4 Boards mixed with greenheart chips

An investigation is recommended into the possibilities of using greenheart chips from sawmill waste and planer shavings. As greenheart is termite resistant, the use of such chips could decrease the costs for chemical preservatives.

However, new machinery equipment would be necessary if planer shavings are to be used for board production.

6.2 Management Organisation

It is not possible to give exact solutions for the organisation of every production step without seeing the plant in operation and without knowing which machinery will be used in the process. However, a suggestion is made for a management organisation, showing the necessary numbers of unskilled and skilled workers in the factory and the necessary staff for the office.

In total there would be needed 46 unskilled and 8 skilled workers for the production in 2 shifts and 69 unskilled and 12 skilled workers in 3 shifts. For the office, 5 employees are required. For further details see Appendix IX.

A short job description for the skilled workers indicating the qualifications they should possess follows:

Foremen: Supervise all stages of production. Supervise and take part in production control.
Should have mechanical education, basic electrical knowledge and basic knowledge in mathematics. Special training with all machinery equipment necessary.

Workshop: Do all maintenance work. Carry out all grinding and knife setting. Control of the automatic boiler system.
Should be a good mechanic. Special training with the machinery is necessary.

Press Operators: Operate and control the production line.
Should have some mechanical knowledge. Special training by the supplier's specialist for a longer period necessary.

Sander: The skilled worker has to operate the machine and to carry out the final control of the production.
Should be consciencious and responsible. Special training necessary.

6.3 Production Control

To ensure production of a good board quality at lowest possible costs, a detailed production control is required. The control should be extended to ingoing material, production process and outgoing products. For this mill the following controls may be recommended as a minimum.

6.3.1 Control of Ingoing Material

The wood material has to be controlled when delivered with regard to quality and quantity. This control should be carried out by the foremen. Wood too hard destroyed by insect attack and/or decay is to be rejected.

The delivery of resin and hardener, waxes and preservatives should be checked concerning its quantity and external quality by the foremen. It may be renounced on chemical control which is normally done, as this requires a complete laboratory, including a chemist.

6.3.2 Control of Production Process

Wood: Before going to the chippers, the bogies and its wood contents have to be counted and the ingoing moisture content has to be controlled as random samples. These controls should be carried out by the chipper operators (counting of bogies) and the foremen (moisture content).

Chips: The ingoing and outgoing moisture content at the dryers should be controlled as random samples by the foremen or the workers at the glue station.

Glue and other pre-requisites: The charges of mixed glue used per shift should be controlled carefully by the glue station workers. Furthermore, the pot life should be checked by the Technical Manager in order to determine the time within mixed glue charges have to be used.

Mats: The weight of the formed mats should be controlled by the press operators with help of the balance to be installed behind the mat forming station.

Sanding: Before and after sanding, the thickness of every panel should be controlled by the operator. Furthermore the quality of the surface should be controlled visually. Bad surface panels should be rejected.

6.3.3. Control of the outgoing product

The following properties should be controlled: Density, bending strength, tensile strength, swelling, shrinkage and moisture content. These controls should be carried out as random samples after a fixed schedule by the foremen and the Technical Manager.

6.3.4 Required Control Equipment

To enable the above mentioned basic control operations the following equipment should be available as a minimum:

- Laboratory drying drum.
- Electric moisture controller
- Laboratory balance
- Laboratory equipment for control of bending and tensile strength
- Equipment for swelling and shrinkage control
- Laboratory gage
- Thickness control gage for production.

7. Estimates and Calculations of Capital Requirement and Production Costs

7.1 Estimates of Capital Requirement

7.1.1 Repair, Overhaul, Removal of unusable Equipment

The details of these operations are shown in Appendix I

The removal of equipment should be carried out before new machinery equipment arrives and is to be installed.

The overhaul and repair of the major machinery equipment requires assistance from the suppliers specialists. One specialist for the hot press, pre-press and chippers (2 month), 1 specialist for the boiler (1 month) and 2 highly qualified all-round mechanics for the rest of the equipment (2 month). These specialists should successively carry out repair and overhaul, installation of the new machinery and supervising the starting-up of production.

The total costs for the above mentioned operations are estimated at G$ 60,000 as a minimum including necessary spare parts.

7.1.2 New Machinery Equipment

The required new machinery equipment to be installed is listed in Section 3.4. Based on recent quotations from Germany and personal knowledge of the actual prices, the total costs for the equipment is estimated to be G$ 215,000 as a minimum including freight, insurance and erection costs. Duty free import and low financing costs (approximately 8%) are assumed. The costs for additional machinery equipment to enable a 3 shift production are estimated to be G$ 100,000 (1 boiler, 1 dryer, 1 chipper plus auxiliary equipment).

7.1.3 Working Capital

A working capital covering ½ year's production costs is considered to be necessary, i.e. approximately G$ 500,000 for a 2-shift production and approximately G$675,000 for a 3-shift production.

7.2 Calculation of Production Costs

Based on the above mentioned capital requirements and a maximum price for wood material of G$-.50/Hopnus cu.ft. and actual prices for the other pre-requisites the production costs are as follows :

Table 5

Production costs per unit (in G$)

Unit	2 Shift	3 Shift
Metric ton	268.81	268.82
m^3	181.03	181.01
Sheet 4' x 8' x 8 mm	4.75	4.76
10 mm	5.61	5.62
13 mm	6.71	6.68
16 mm	8.12	8.11
19 mm	9.32	9.31

The detailed calculations are shown in Appendix X.

8. Calculation of Profitability

8.1 Calculation of Earnings

8.1.1 Earnings through Sales on the Domestic Market

The prices on the local market for particle board are quoted in Section 5.2. As mentioned before, these prices may have to be undercut by at least 10% in order to provide an incentive to consumers to switch to the new product. The selling prices, therefore, may be as follows :

Table 6

Selling prices on the domestic market for particle board

Thickness in. = mm	Price in G$ per sq. ft.	Price in G$ per 4' x 8' sheet
5/16 = 8	0.228	7.30
3/8 = 10	0.267	8.53
1/2 = 13	0.320	10.22
5/8 = 16	0.426	13.63
3/4 = 19	0.475	15.20

Based on the net sales volume for the local market as shown in Appendix VIII, the total yearly earnings would be G$ 478,141 in 2-shift and G$ 493,338 in 3-shift production.

The detailed calculations are shown in Appendix XI.

8.1.2 Earnings through Export

The main export market for boards from Guyana will be the CARIFTA area. Export possibilities to U.S.A. or Central America are considered to be small, due to high freight rates and competition from the big mills in U.S.A. with considerably lower production costs per unit. For the same reasons export possibilities to the southern part of this continent should be considered very small.

Some export prices for Trinidad were shown in Table 4 (Page 21). The difference of prices for a 16 mm 4' x 8' sheet ranges between G$ 4.95 and G$ 8.35.

Without detailed knowledge of the export prices obtainable in the CARIFTA countries, a reliable calculation of the export prices for the mill is impossible. Unfortunately there was no possibility for the expert to carry out these on-the-spot investigations.

Therefore, minimum export prices have to be calculated which ensure a profitable 2-shift production. It is recommended that these prices are checked up by the factory owners before any decision concerning a reactivation of the plant is made.

Based on the assumptions mentioned before (breakdown of volume, capital requirement, etc.), the minimum prices are as follows:

Table 7:

Minimum prices ex factory

Thickness (in. = mm)	Price in G$ per sq. ft.	Price in G$ per 4' x 8' sheet
5/16 = 8	0.128	4.10
3/8 = 10	0.149	4.78
1/2 = 13	0.179	5.72
5/8 = 16	0.239	7.63
3/4 = 19	0.266	8.51

For further details see Appendix XI.

Provided that the export volume can be sold at the above ex factory prices, the total yearly earnings through export would be G$ 562,521 in 2-shifts and G$ 829,498 in 3-shifts production.

8.2 Profit and Loss Calculation

When calculating the profit of the mill a bonus of 5% + 2% for rejects may be subtracted from the earnings in addition to the production costs which then will give the gross profit. Taxes usually have to be paid from gross profit and are normally part of the calculation of profitability. Profits and losses per annum are shown in Table 8.

Table 8

Profit and Loss Calculation (in G$)

	2 Shifts	3 Shifts
1) Total earnings/year	1,040,662	1,322,836
- 5% bonus (discount)		
- 2% rejects and claims	72,846	92,598
REAL YEARLY EARNINGS	967,816	1,230,238
2) Yearly Production Costs	934,106	1,243,557
GROSS PROFIT ...	33,710	
LOSS		13,319

8.3 Conclusions

1) The production costs/unit are higher than the export C.I.F. prices shown in table 4, i.e. all exports will give losses.

2) At production in 2 shifts with a domestic sales volume of 1,670 m^3/year - which is 50% higher than today - at prices 10% less than today's and an export sales volume of 3,490 m^3/year at prices lower than production costs the mill makes a small profit.

3) Due to required additional investments the production costs/unit at 3-shift production are as high as at 2-shift production, i.e. still under export sales prices.

4) A 3-shift production requires export of 5,152 m^3/year which turns the small profit margin of a 2-shift production into losses.

5) Improvement of the yearly profit could be obtained if the export volume could be decreased and the production costs could be lowered.

6) To decrease the export volume would either require less production in 2 shifts, which would result in considerable higher production costs per unit, or prohibition of all imports of panel materials which should not be recommended.

7) The only possibility to lower production costs would be to decrease the investment capital considerably. Use of less resin or preservation should <u>not</u> be considered. Decrease of investment capital would require the use of equipment which should be replaced but still is operable, i.e. the mat forming station and the sander, and renunciation from cost-lowering equipment, i.e. caul transport device and fork lift. The consequence would be saving of approximately G$ 75,000 investment capital, poorer quality of the panels, and higher production costs, approximately G$ 15,000 to G$ 20,000 per year for a 2-shift production. A rough calculation showed that the cost-lowering effect by decreasing the investment capital is eliminated by the higher production costs.

8) An initial minimum investment of approximately G$ 200,000 is required for starting up of any production.

APPENDICES

Sheet 1

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Washing Chambers I & II

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Built locally

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Clean the timber and raise the moisture content from approximately 30% to approximately 80%.	Rails

STARTER LOCATION	KW	MOTORS
-	-	—

PHYSICAL STATE

Rails badly rusted. Electric lamp-wiring broken.

PARTS MISSING AND RESTORATION REQUIRED

These chambers are unusable for its purpose. A pond has to be built for water-storage of the logs.

Sheet 2

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Chipping Machine I (for core-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Hombak,
Maschinenfabrik,
BAD KREUZNACH,
W. Germany.

Type: ZOA - 26

(Capacity approx. 1500 kg. bone dry/h)

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Production of chips for the core of the boards.	Pneumatic conveyor system incl. fan, tubes and cyclone to the dryer.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel		ZOA - 26: Himmelwerk Ag. 2920 rpm, 400 V, 50 Hz. Fan: AEG, 1450 rpm, 400mV, 50 Hz.

PHYSICAL STATE

ZOA - 26: The machine is rusty but usable; the hydraulic system does not work (end switches "up" and "down" probably broken).

Conveyor: Fan rusty, usable. Frame of the cyclone destroyed by rust.

PARTS MISSING AND RESTORATION REQUIRED

ZOA - 26: No usable knives, unusable knife holders; hydraulic system must be overhauled completely; end switches to be replaced. Two cover plates missing, approx. 30 connection screws missing - to be replaced. 1 V-belt missing. Signal lamps and ampere meter must be replaced. Electric wiring connection to the motor must be renewed. Clean from rust.

Conveyor System: Hat of the cyclone missing - to be renewed; frame of the cyclone to be renewed. Clean from rust.

Sheet 3

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Chipping Machine II (for surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Hombak,
Maschinenfabrik,
BAD KREUZNACH,
W. Germany.

Type: ZOA - 16
(Capacity approx. 600 Kg. bone dry/h)

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Production of chips for the surface of the boards.	Conveyor tube to the mill.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel	29,5	Katt Motorenfabrik, Homberg/Kassel, 2900 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The machinery is rusty, but generally in good condition. Usable.

PARTS MISSING AND RESTORATION REQUIRED

Unusable knives and knife-holders - must be renewed. Hydraulic system does not work (end switches probably damaged) - must be overhauled completely. End switch for knife-changing broken - to be renewed. Tension-device for knife-change to be repaired. Ampere meter damaged - to be renewed. One signal lamp does not work. Protection lock at the infeed missing - to be renewed. Two cover-plates missing - to be replaced. Electric motor connection to be renewed. Complete overhaul of the machine is necessary.

Sheet 4

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Alpine - Omniplex - Hammer - Mill

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Alpine A.G.
Maschinenfabrik,
AUGSBURG,
W. Germany.

Type: 80/60 - 1958

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Reduce the surface chips to optimum size.	Pneumatic conveyor system including fan and cyclone to the dryer.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel.	30,0 7,4 37,4	Mill: Hinz Elektromaschinen, Braunschweig 1470 rpm, 400 V, 50 Hz. Fan: AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Mill: In good condition, some rust, but good usable.

Conveyor System: The fan is rusty(one hole in the bottom), but usable. Some of the tubes are very rusty.

PARTS MISSING AND RESTORATION REQUIRED

Sieve-sheets with different perforation are needed. Belt-protection missing - to be replaced. All connecting conveyor tubes between the mill and the fan are to be renewed. The hat-plate and the frame of the cyclone are damaged by rust - to be renewed. The hole in the bottom of the fan is to be repaired.

Sheet 5

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Ponndorf - Dryer I (Core-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Ponndorf KG.,
Maschinenfabrik,
KASSEL,
W. Germany.

Type: SP-9-H
(Capacity approx. 750 kg. bone dry/h)

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Drying of the core-chips to an equal moisture content of approx. 3-5%.	Tubes and valves from the boiler to the dryer.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel	8,0	BBC, 1430 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The dryer is working and can be used. The foundation is badly rusted. The outside of the dryer is open at one place and destroyed (fire?) at 5 places. No statement can be made concerning the quality of the tightenings and packings.

PARTS MISSING AND RESTORATION REQUIRED

The foundation is to be repaired. The outside of the dryer is to be repaired. The lock of the wet-air outlet tube is to be renewed (damaged by rust). The main valve at the inlet-side is destroyed and must be replaced. (Type: ND16 - GG). All tightenings and packings are to be overhauled carefully before starting up production.

Sheet 6

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Ponndorf - Dryer II (Surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Ponndorf KG,
Maschinenfabrik,
KASSEL,
W. Germany.

Type: SP-6-H
(Capacity approx. 520 Kg. bone dry/h

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Drying the surface chips to an equal moisture content of approx. 4-6%.	Tubes and valves from the boiler to the dryer.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel	5,5	BBC, 1435 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The machinery is usable, although the foundation is badly rusted and the outside of the dryer is severely damaged.

No statement can be made concerning the quality of the packings and tightenings.

PARTS MISSING AND RESTORATION REQUIRED

The foundation is to be repaired. The outside of the dryer is to be repaired. The wet-air outlet at the dryer must be renewed (rusted). One V-belt of the variable gear is broken - to be replaced. The main valve at the inlet-side of the dryer is destroyed and must be replaced. (Type: ND 16). All tightenings and packings are to be overhauled carefully before starting up production.

Sheet 7

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Screen I (coarse-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Siebtechnik, W. Germany. Type: V/10/20/I

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Separate the dust from the dried chips.	Conveyor system, including fan, cyclone and tubes, to the silo.

STARTER LOCATION	KW (installed)	MOTORS
Distribution Panel	1,5 7,5 9,0	Screen: 1,5 KW, SIEMENS , 1415 rpm, 400 V, 50 Hz. Fan: 7,5 KW, AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Screen: Machine rusty but in acceptable condition and usable.

Conveyor System: Fan very rusted, its lock destroyed by rust; hat and frame of the cyclone very rusty.

PARTS MISSING AND RESTORATION REQUIRED

Screen: No usable sieves - to be replaced. Electric connection of the motor to be renewed. Dust removal device not installed - to be installed.

Conveyor System: Lock and cover plate of the fan to be renewed. Hat and frame of the cyclone to be renewed.

Sheet 8

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Screen II (Surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Siebtechnik, W. Germany. Type: V/10/20/1

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Separate the dust from the dried chips.	Conveyor system, including fan, cyclone and tubes, to the silo.

STARTER LOCATION	KW	MOTORS
Distribution Panel	1,5 7,5 9,0	Screen: 1,5 KW, SIEMENS rpm, 400 V, 50 Hz. Fan: 7,5 KW, AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Screen: Machine rusty, but in acceptable condition and usable.

Conveyor System: Fan very rusted, its lock destroyed by rust; hat and frame of the cyclone very rusty.

PARTS MISSING AND RESTORATION REQUIRED

Screen: No usable sieves - to be replaced. Electric connection of the motor to be renewed. Dust removal device not installed.

Conveyor System: Lock and cover plate of the fan to be renewed. Hat and frame of the cyclone to be renewed.

Sheet 9

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Silo I (core-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. HILMA,
Hildesheimer Maschinenfabrik,
Bohrens & Co. GmbH.,
HILDESHEIM,
W. Germany.

Type: Hilma 15

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Storage and infeeding into the glueing machine of the chips.	Infeeding system to the glueing machine.

STARTER LOCATION	KW (installed)	MOTORS
At the machine	0,37	SEW D 388; 200 rpm, 400 V, 50 Hz.
	3,50	SEW
	1,50	SEW
	5,37	

PHYSICAL STATE

Machine generally in good condition. After repairing good usable.

PARTS MISSING AND RESTORATION REQUIRED

The stepless variable gear (V-belt) for the outfeeding device does not work mechanically - to be repaired. The mat for the outfeeding device is rotten - to be replaced. The transport band of the silo is not working mechanically - to be repaired. Complete overhaul required.

Sheet 10

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES L.D., (Particle Board Plant)

NAME OF EQUIPMENT

Silo II (surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. HILMA,
Hildesheimer Maschinenfabrik,
Behrens & Co. GmbH.,
HILDESHEIM,
W. Germany.

Type: Hilma 15

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Storage and infeeding into the glueing machine of the chips.	Infeeding system to the glueing machine.

STARTER LOCATION	KW (installed)	MOTORS
At the machine	0,37	SEW D 383; 200 rpm, 400 V, 50 Hz.
	3,50	SEW
	1,50	SEW
	5,37	

PHYSICAL STATE

Machine generally in good condition. After repairing good usable.

PARTS MISSING AND RESTORATION REQUIRED

The stepless variable gear (V-belt) for the outfeeding device does not not work mechanically - to be repaired. The mat for the outfeeding device is rotten - to be replaced. The transport band of the silo is not working mechanically - to be repaired. Complete overhaul required.

Sheet 11

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Glue Spreading Device I (Core-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Gebrüder Lödige, Maschinenfabrik GmbH., PADERBORN, W. Germany.

Type: FMS 1200

FUNCTION

Mix the glue with the dried chips.

AUXILIARY EQUIPMENT INCLUDED

1) Conveyor system including fan, cyclone and tubes to the spreading machine.

2) The balance.

STARTER LOCATION	KW (installed)	MOTORS
At the machine	15,0 7,5 22,5	Elektrobau Hanning, 850 rpm, 400 V, 50 Hz. AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Glue Spreading Device: Completely damaged and unusable.

Conveyor System: Fan very rusty, but usable.

PARTS MISSING AND RESTORATION REQUIRED

Glue Spreading Device: Must be replaced completely.

Conveyor System: Lock of the fan to be renewed. Frame of the cyclone is be renewed.

Sheet 12

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Glue Spreading Device II (Surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Gebrüder Lödige, Maschinenbau GmbH., PADERBORN, W. Germany.

Type: FMS 800

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Mix the glue with the dried chips.	1) Conveyor system including fan, cyclone and tubes to the spreading machine. 2) The balance.

STARTER LOCATION	KW (installed)	MOTORS
At the machine	15,0 7,5 22,5	Elektrobau Hanning, 850 rpm, 400 V, 50 Hz. AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Glue Spreading Device: Completely damaged and unusable.

Conveyor System: Fan very rusty, but usable.

PARTS MISSING AND RESTORATION REQUIRED

Glue Spreading Device: Must be replaced completely.

Conveyor System: Lock of the fan to be renewed. Frame of the cyclone to be renewed.

Sheet 13

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Chip-Spreading Machine I & II (Core-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. HILMA,
Hildesheimer Maschinenfabrik,
Behrens & Co. GmbH.,
HILDESHEIM,
W. Germany.

Type: M 125

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Spread the chips on the cauls in a flat, even mat.	Conveyor system, including fan, cyclone and tubes, for retransportation of the over-running chips from the spreading operation.

STARTER LOCATION	KW	MOTORS
Cold Press Panel	7,5	Fan: AEG, 1490 rpm, 400 V, 50 Hz.

PHYSICAL STATE

Spreading Machines: They do not work satisfactorily and they never did.

Convevor System: Fan usable, but rusty. Frame of the cyclone damaged by rust.

PARTS MISSING AND RESTORATION REQUIRED

Spreading Machines: To be replaced completely by new, modern machines.

Convevor System: Frame of the cyclone to be renewed. V-belt protection is missing - to be replaced.

Sheet 14

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Chip-Spreading Machine III (Surface-chips)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. HILMA,
Hildesheimer Maschinenfabrik,
Behrens & Co. GmbH.,
HILDESHEIM,
W. Germany.

Type: D 125

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Spread the chips on the cauls in a flat, even mat.	---------

STARTER LOCATION	KW	MOTORS

PHYSICAL STATE

The spreading machine does not work satisfactorily and it never did.

PARTS MISSING AND RESTORATION REQUIRED

The spreading device is to be replaced completely by new, modern machines.

Sheet 15

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Transport - System for the cauls

EQUIPMENT MANUFACTURER AND RESTORATION

Messrs. HILMA,
Hildesheimer Maschinenfabrik,
Behrens & Co. GmbH.,
HILDESHEIM,
W. Germany.

FUNCTION	AUXILLARY EQUIPMENT INCLUDED
Transportation of the cauls through the production process.	The balance.

STARTER LOCATION	KW	MOTORS
-	-	-

PHYSICAL STATE

Transport System: In good condition, usable.

The balance: Completely destroyed.

PARTS MISSING AND RESTORATION REQUIRED

Transport System: Must be changed electrically together with the change of the spreading machinery.

The balance: To be replaced.

Sheet 16

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Pre-Press

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Adolf Friz GmbH.,
Maschinenfabrik,
STUTTGART-HAD CANNSTATT,
W. Germany.

Type: STP - L
(Commission No. 4969/1593;
Max. spec. pressure: 20 Kg/cm^2).
2 pumps: ZF - 1000

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Pre-pressing the chip-mat.	Hydraulic equipment.

STARTER LOCATION	KW (installed)	MOTORS
Operation Panel	61	2 pumps: AEG/AM 22/2u 2930 rpm, 400 V, 50 Hz.

PHYSICAL STATE

In good condition, usable.

No statement can be made concerning tightenings and packings.

PARTS MISSING AND RESTORATION REQUIRED

Before starting production, the press is to be overhauled completely.

Sheet 17

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Loading and Unloading Devices for the Hot-Press

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Hildesheimer Maschinenfabrik, Type: 4/8 - 5
Behrens & Co. Gmbh.,
HILDESHEIM,
W. Germany.

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Infeeding and outfeeding of the cauls at the hot-press.	—

STARTER LOCATION	KW (installed)	MOTORS
Operation Panel	2,6 2,6 3,0 8,2	The pushers: S W - R 8 b - D 574 1400/38 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The machinery is in good condition, usable.

The electric wiring connections at the motors are provisionally done.

PARTS MISSING AND RESTORATION REQUIRED

The whole machinery, especially the electric part (end switches, etc.), need a complete overhaul when changing the spreading device and consequently the whole electric system.

Sheet 13

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Hot Press

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. G. Siempelkamp KG,
Maschinenfabrik,
KREFELD,
W. Germany.

Type: 4/8 - 5
7 openings
Hot-water-heated.

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
	The hydraulic system and air-evacuation fans.

STARTER LOCATION	KW (installed)	
Operation Panel	50	Hinz, 2950 rpm, 400 V, 50 Hz.
	11	Hinz, 950 rpm, 400 V, 50 Hz.
	11	Hinz, 950 rpm, 400 V, 50 Hz.
	72	

PHYSICAL STATE

The press is in good condition, but leaking of the heating pipe connections and of the hydraulic system is reported.

No statement concerning the tightenings and packings of the equipment can be made.

PARTS MISSING AND RESTORATION REQUIRED

One rubber joint of one pump is missing - to be replaced. The electric wiring connections at the motors are to be renewed.

Before starting up a complete overhaul of the whole hydraulic system and heating system is necessary.

Sheet 19

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Trim Saw

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Huellhorst, W. Germany. Type: DH 50

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Final sawing of the edges.	Sawdust removal device, including fan, tubes and cyclone to the waste silo.

STARTER LOCATION	KW (installed)	MOTORS
At the machine		Trim Saw: AEG, 1415 rpm, 400 V, 50 Hz. Fan: AEG, 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The saw is in good condition, usable.

The fan is rusty, but good usable.

PARTS MISSING AND RESTORATION REQUIRED

Carbide tipped saw blades and sharpening equipment are to be installed. Waste-cutters should be combined with the saw blades.

Sheet 20

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES TD., (Particle Board Plant)

NAME OF EQUIPMENT

The boiler and heating system

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Standardkessel - Gesellschaft,
Gebrueder Fasel,
DUISBERG,
W. Germany.

Type: SFR - 30 m^3
14 atu - Hotwater boiler
720.000 kcal/h.

FUNCTION

Deliver the necessary thermal energy for the production.

AUXILLARY EQUIPMENT INCLUDED

4 hotwater pumps KSB 85/85/86/ETA 40
1 water tank
Piping and valves.

STARTER LOCATION	KW (installed)
At the boiler	3,5
	2,5
	-
	6,0
	12,0

MOTORS

Hotwater Pumps: AEG, 1450 rpm, 400 V, 50 Hz.

Oil Pumps: (2x) AEG, 0,37 KW; 910 rpm, 400 V, 50 Hz

PHYSICAL STATE

The boiler itself looks usable. The oil burner and its auxiliaries are destroyed to a large extent. The infeeding device for dust-burning is missing completely. The connecting pipe to the steel chimney is destroyed by rust and parts of the chimney itself. No statements can be made concerning the quality of tightenings and packings, and possible incrustations and corrosions on the boiler material.

PARTS MISSING AND RESTORATION REQUIRED

The boiler and auxiliary equipment need a complete overhaul. The complete oil-burning system is to be replaced. Parts of the oil pipes are missing - to be replaced. The complete dust-feeding system is to be replaced with new, modern machinery. One motor of a circulation pump is missing - to be replaced. The chimney system has to be repaired.

Sheet 21

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Waste bunker for the boiler

EQUIPMENT MANUFACTURER AND IDENTIFICATION

1) The bunker: locally built

2) The feeding equipment: Standardkessel - Gesellschaft
Gebruedor Fasel
DUISBERG
W. Germany.

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Store the dust and waste, and feed it into the boiler.	—

STARTER LOCATION	KW	MOTORS
In the bunker	-	Missing

PHYSICAL STATE

The feeding equipment: Completely rusted and broken down. One motor missing.

The complete electrical wiring destroyed.

The bunker: Usable, only some planks rotten. The sheds rusted.

PARTS MISSING AND RESTORATION REQUIRED

The feeding equipment: The whole system must be renewed completely.

The bunker: Approximately 40 planks to be replaced.
The 3 sheds must be replaced.

Sheet 22

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Glue Station

EQUIPMENT MANUFACTURER AND IDENTIFICATION

—

FUNCTION	AUXILLARY EQUIPMENT INCLUDED
To prepare the glue and transport it to the glue-spreading machines.	—

STARTER LOCATION	KW	MOTORS
-	-	-

PHYSICAL STATE

The whole system is completely broken down and unusable.

PARTS MISSING AND RESTORATION REQUIRED

The whole system is to be replaced completely with new, modern equipment and is to be adapted to the new glue-spreading machinery.

Sheet 23

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Sanding machine

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Boetticher & Gessner,
Maschinenfabrik,
HAMBURG - BAHRENFELD,
W. Germany.

Type: US 130/60

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Equalize the thickness of the boards.	—

STARTER LOCATION	KW (installed)	MOTORS
At the machine	11,- 7,5 7,5 3,5 1,5 31,0	—

PHYSICAL STATE

The machine looks satisfactorily, however its operation could not be tested.

According to statements of former employees it did not work satisfactorily. Each panel required six to eight passes through the machine before being finished.

PARTS MISSING AND RESTORATION REQUIRED

This machine has to be replaced by a new, modern one.

Sheet 24

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Compressor - equipment

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Kompressorenfabrik,
Adolf Ehmann OHG.,
KOENGEN - NECKAR,
W. Germany.

Type: ALUP/ZKA 1500

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Deliver the necessary compressed air for the whole factory.	All piping for compressed air.

STARTER LOCATION	KW	MOTORS
At the distribution panel	10,0	AEG; 1450 rpm, 400 V, 50 Hz.

PHYSICAL STATE

The equipment is in good condition, usable.

PARTS MISSING AND RESTRATION REQUIRED

The equipment has to be overhauled before starting up.

Sheet 25

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Knife grinder

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Englert & Rabenseifner,
Maschinenfabrik,
FULDA,
W. Germany.

Type: ASM 21

Grinding length: 2100 mm.
Masch. No. 0479/53

FUNCTION	AUXILLARY EQUIPMENT INCLUDED
Sharpening the knives for the chippers.	Knife setting jig.

STARTER LOCATION	KW (installed)	MOTORS
At the machine	5,5	AEG; 1390 u/min, 400 V, 50 Hz.

PHYSICAL STATE

The machine is in an acceptable condition, usable.

The knife setting jig is broken.

PARTS MISSING AND RESTORATION REQUIRED

The pump motor does not work - to be repaired.
The feeding system does not work - to be repaired.
The knife setting jig has to be replaced by a new, modern one.
The machinery has to be overhauled completely before starting up.

Sheet 26

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Saw - Sharpener

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Loroch, W. Germany.

Type: JLM C/1958

Masch. No. 5080

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Sharpening of the saw blades for the trimming saw.	—

STARTER LOCATION	KW (installed)	MOTORS
At the machine	0,5	Siemens 400 V, 50 Hz.

PHYSICAL STATE

In good condition, usable.

PARTS MISSING AND RESTORATION REQUIRED

None

Sheet 27

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Saw-setter

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Vollmer, W. Germany.

Type: ADN - V

FUNCTION	AUXILLARY EQUIPMENT INCLUDED
—	—

STARTER LOCATION	KW (installed)	
At the machine	0,27 PS	AEG: 1400 u/min, 400 V/50 Hz.

PHYSICAL STATE

The machine is in good condition, but the motor does not work.

PARTS MISSING AND RESTORATION REQUIRED

The motor is to be repaired.

Sheet 28

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Switchboard I (Chip - Preparation side)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Metzenauer & Jung,
W. Germany.

FUNCTION	AUXILLARY EQUIPMENT INCLUDED
—	—

STARTER LOCATION	KW	MOTORS
-	-	—

PHYSICAL STATE

In good condition, usable.

PARTS MISSING AND RESTORATION REQUIRED

15 signal lamps do not work - to be replaced.
The whole switchboard has to be cleaned and overhauled before starting up.

Sheet 29

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

Switchboard II (Production Side)

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Messrs. Metzenauer & Jung,
W. Germany.

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
—	—

STARTER LOCATION	KW	MOTORS
-	-	—

PHYSICAL STATE

In good condition, usable.

PARTS MISSING AND RESTORATION REQUIRED

Some rewiring of the part that has been burning is to be done. The whole switchboard must be cleaned and overhauled before starting up.

Sheet 30

EQUIPMENT INVENTORY

of

JAMESON INDUSTRIES LTD., (Particle Board Plant)

NAME OF EQUIPMENT

The cauls

EQUIPMENT MANUFACTURER AND IDENTIFICATION

Unknown

FUNCTION	AUXILIARY EQUIPMENT INCLUDED
Bearing the mats and panels of the particle board through the production.	—

STARTER LOCATION	KW	MOTORS
-	-	—

PHYSICAL STATE

The cauls are in quite a good condition.

PARTS MISSING AND RESTORATION REQUIRED

Approximately four cauls have to be replaced.

APPENDIX II

Production Figures per Day

UNITS	2 SHIFTS					3 SHIFTS				
Net Thickness (in. = mm)	5/16 = 8	3/8 = 10	1/2 = 13	5/8 = 16	3/4 = 19	5/16 = 8	3/8 = 10	1/2 = 13	5/8 = 16	3/4 = 19
Surcharge for sanding (mm)	2	2	2	2	2	2	2	2	2	2
Gross Thickness (mm)	10	12	15	18	21	10	12	15	18	21
Trimming/Side (mm)	20	20	20	20	20	20	20	20	20	20
Loss (%)	31	27	21	18	16	31	27	21	18	16
No. of presses	110	90	82	70	55	147	120	110	94	73
No. of sheets	770	630	574	490	385	1,029	840	770	658	511
NET Weight/sheet (kg)	16.6	20.2	25.0	31.5	36.8	16.6	20.2	25.0	31.5	36.8
NET Production (metric ton)	12.8	12.7	14.4	15.4	14.2	17.1	17.0	19.3	20.8	18.8
NET Production (m^3)	18.3	18.7	21.5	23.4	21.8	24.4	25.0	28.8	31.5	29.0
NET Production (m^2)	2,300	1,880	1,715	1,460	1,150	3,060	2,500	2,300	1,960	1,525
NET Production (sq.ft.)	24,640	20,200	18,360	15,680	12,320	32,900	26,850	25,400	21,700	16,900
NET Production (cu.ft.)	511	630	765	816	770	688	866	1,060	1,130	1,050
GROSS Production (metric ton)	16.7	16.1	17.4	18.2	16.5	22.4	21.6	23.4	24.5	21.8
GROSS Production (m^3)	23.8	23.7	26.0	27.5	25.4	32.0	31.8	35.0	37.1	33.5
GROSS Production (cu.ft.)	670	800	926	963	893	900	1,100	1,283	1,334	1,218

APPENDIX III

Production Figures per Year

UNITS	2 SHIFTS					3 SHIFTS				
Net Thickness (in. = mm)	5/16 = 8	3/8 = 10	1/2 = 13	5/8 = 16	3/4 = 19	5/16 = 8	3/8 = 10	1/2 = 13	5/8 = 16	3/4 = 19
Net Production (sheet)	192,500	157,500	143,300	123,500	96,250	257,250	210,000	192,500	164,500	127,750
Net Production (metric ton)	3,200	3,180	3,600	3,850	3,550	4,270	4,250	4,850	5,200	4,700
Net Production (m^3)	4,570	4,670	5,360	5,850	5,450	6,100	6,250	7,200	7,860	7,250
Net Production (m^2)	575,000	470,000	429,000	365,000	288,000	765,000	625,000	575,000	490,000	381,000
Net Production (sq.ft.)	6,160,000	5,050,000	4,580,000	3,920,000	3,080,000	8,210,000	6,720,000	6,150,000	5,420,000	4,220,000
Net Production (cu.ft.)	127,800	157,500	191,300	204,000	192,500	172,000	216,500	265,000	282,000	262,500
Gross Production (metric ton)	4,190	4,040	4,350	4,540	4,120	5,590	5,400	5,870	6,140	5,450
Gross Production (m^3)	6,000	5,950	6,500	6,880	6,350	7,980	7,950	8,750	9,300	8,400

APPENDIX IV

Real Gross Production per Year (in metric tons)

Thickness (in.=mm)	2 Shifts			3 Shifts		
	Net Production	Losses %	Gross Production	Net Production	Losses %	Gross Production
5/16 = 8	1085	31	1421	1440	31	1886
3/8 = 10	350	27	445	469	27	596
1/2 = 13	520	21	629	694	21	840
5/8 = 16	850	18	1003	1130	18	1344
3/4 = 19	670	16	777	884	16	1025
	3475		4275	4626		5691

(Average losses 23%)

APPENDIX V

Real Net Production Volume Per Year

Board Thickness (in. = mm)	Breakdown of Volume (%)	Production time (days)	Production Volume					
			2 Shifts			3 Shifts		
			(m^3)	(metric tons)	(Sheets)	(m^3)	(metric tons)	(Sheets)
5/16 = 8	30	84.5	1550	1085	65,362	2060	1440	86,950
3/8 = 10	10	27.5	515	350	17,327	690	469	23,100
1/2 = 13	15	36.0	775	520	20,800	1035	694	27,720
5/8 = 16	25	55.0	1290	850	26,984	1725	1139	36,190
3/4 = 19	20	47.0	1030	670	18,207	1360	884	24,017
	100	250.0	5160	3475	148,680	6870	4626	197,977

(Average density = 672 kg/m^3)

Appendix VI

Wood Species

Useable for particle board production, indicated by their light colour and their density:

Local Name	Scientific Name	Colour	Weight (lb./cu.ft.)
Barabara	Diospyros ierensis	off-white	30-40
Baradan	Ocotea tomentella	pale cream	35
Baromalli	Catostemma altsonii	greyish-yellow-brown	35-45
Simarupa	Simaruba amara	whitish	25
Buruma	Pourouma guianensis	pale grey	25-30
Cedar White	Tabebuia insignis var, monophylla	creamy	40-45
Congo Pump	Cecropia angulata	whitish	20-30
Corkwood	Peterocarpus officinalis	whitish	30-35
Dalli	Virola surinamensis	pale cream	35
Duka	Tapirira marchandi[I]	off-white	25-30
Dukali	Parahancornia amapa	off-white	35-40
Duru	Apeiba echinata	off-white	25-45
Suya	Pouteria speciosa	pinkish-cream	30-40
Futui	Jacaranda copaia	dingy-white	20-30
Hachiballi	Simaba multiflora	yellowish-white	30
Haiahaia	Sapium spp.	off-white	25-35
Haiahaia	Lacmellea utilis	creamy	35-40
Haiariballi	Alexa imperatricis " leiopetala	pale-creamy brown	35-45
Halchiballi	Pouteria sp.	pale brown	40-45
Hatti	Hevea kunthiana	pale cream	30-40
Hikuribianda	Simaba cedron	yellowish-white	32-37
Hishirudan	Liriosma guianensis	creamy	35-40
Hubu	Spondias mombin	off-white	30-35
Inyak	Antonia ovata	off-white	30-35
Jack-in-the-Box	Hernandia sonora	grey-white	20

Local Name	Scientific Name	Colour	Weight (lb./cu.ft.)
Kanakudiballi	Cochlospermum orinocense	pale creamy	15-18
Karohoro	Didymopanax morototonii	off-white	30-35
Table Tree	Cordia exaltata var, melanoneura	off-white	25-35
Kumakaballi (Fig)	Ficus glaucescens	light coloured	30
Kurokai (Porokai)	Portium crenatum	pinkish-brown	30-35
Kuyana	Xylopia nitida	off-white	40-45
Long John	Triplaris surinamensis	light pink	32-38
Mabwa	Himatanthus articulatus	creamy	40-45
Maho	Sterculia prurien	whitish	30
Mahoballi	Panopsis sessilifolia	pinkish-brown	35-40
Manni	Symphonia globulifera	yellowish-brown	44
Maporokon	Inga alba	creamy	35-45
Ulu	Trattinickia demerarae	pale creamy	30
Quashi	Quassia amara	pale creamy-yellow	31
Rokoroko	Macoubea guianensis	palest cream	25-35
Dada	Fagara apiculata	greyish to pale yellow	32
Sandbox	Hura crepitans	creamy to yellow-brown	25
Shirua	Nectandra cuspidata	pale greenish-yellow	30-40
Silk Cotton	Ceiba occidentalis	greyish	20-30
Silverballi, Kereti	Ocotea puberula	pale yellow-brown	30-35
Silverballi, Kereti	Ocotea oblonga	off-white to creamy	20-28
Silverballi, Kurahara	Ocotea glomerata	greenish-yellow	45-50
Silverballi, White	Ocotea canaliculata	whitish-cream	30
Silverballi, Yellow	Aniba ovalifolia	greenish-yellow	35-45

APPENDIX VII

Imports of Particle Board to Georgetown
By the Main Importers*

Sizes	1968	1969
4' x 8' x 5/16" = 8 mm	263 m^3 = 9,290 cu.ft.	440 m^3 = 15,520 cu.ft.
3/8" = 10 mm	107 m^3 = 3,780 "	145 m^3 = 5,120 "
1/2" = 13 mm	102 m^3 = 3,600 "	85 m^3 = 3,000 "
5/8" = 16 mm	14 m^3 = 495 "	22 m^3 = 775 "
3/4" = 19 mm	255 m^3 = 9,000 "	298 m^3 = 10,520 "
	741 m^3 = 26,165 cu.ft.	990 m^3 = 34,935 cu.ft.

Thickness in % of the Volume

Sizes	1968	1969
5/16" = 8 mm =	35.5%	44.5%
3/8" = 10 mm =	14.5%	14.5%
1/2" = 13 mm =	14.0%	8.5%
5/8" = 16 mm =	2.0%	2.0%
3/4" = 19 mm =	34.5%	30.5%
	100 %	100 %

* Figures obtained from the Importers.

APPENDIX VIII

Net Sales Volume Per Year

Thickness	2 Shifts						3 Shifts					
	32.5% Domestic			67.5% Export			25% Domestic			75% Export		
	m^3	metric tons	sheets	m^3	metric tons	sheets	m^3	metric tons	sheets	m^3	metric tons	sheets
8 mm	501.0	350.5	21,110	1,047.0	733.0	44,160	515.0	360.0	21,737	1,545.0	1,080.0	65,213
10 mm	167.0	113.5	5,620	349.0	237.0	11,740	172.5	117.0	5,775	517.5	352.0	17,325
13 mm	250.5	168.0	6,720	523.5	351.0	14,040	259.0	173.5	6,930	776.0	520.5	20,790
16 mm	417.5	275.5	8,750	872.5	576.0	18,290	431.0	285.0	9,047	1,294.0	854.0	27,143
19 mm	334.0	217.0	5,900	698.0	453.5	12,330	340.0	221.0	6,004	1,020.0	663.0	18,013
	1,670.0	1,124.5	48,100	3,490.0	2,350.5	100,560	1,717.5	1,156.5	49,493	5,152.5	3,469.5	148,484

APPENDIX IX

Employees and Office Staff

1) Factory	1 Shift	2 Shifts	3 Shifts
Timber Yard	2	4	6
Timber Transport	2	4	6
Chipping	2	4	6
Glue Station	1	2	3
Cold Press Operator*	1	2	3
Hot Press Operator*	1	2	3
Unloading of Panels	2	4	6
Trimsaw	3	6	9
Sanding* (only 1 skilled)	3	6	9
Store, loading, etc.	3	6	9
Helpers for different purposes	3	6	9
Packing for export	2	4	6
Workshop and maintenance*	1	2	3
Foreman*	1	2	3
	27	54	81

2) Office	
Technical Manager (= Managing Director)	1
Sales Manager	1
Office Manager (= Bookkeeper)	1
Typist	1
Messenger	1
	5

* Skilled Workers.

All the others are unskilled.

APPENDIX X

Production Costs Per Year

I. Direct Production Costs per metric ton (in G$)

(a)	Wood: approximately 65 Hoppus cu.ft. @ -.50/Hoppus cu.ft. debarked free log storage	32.50
(b)	Urea resin: 9% of bone dry wood = 90 kg @ -.44/kg	39.60
(c)	Hardener and Conditioner: 8% of urea resin = 7.2 kg @ -.75/kg	5.40
(d)	Paraffin: 6% of urea resin = 5.4 kg @ -.80/kg	4.23
(e)	Preservatives against insects and decay 2% of bone dry wood = 15.5 kg @ 2.79/kg	43.25
(f)	Electric power: 220 - 250 kwh/ton Costs according to Guyana Electricity Corp.	4.20
	Thermal Power: 3,200,000 - 3,400,000 BTU/ton, only waste, estimated	1.00
(g)	Packing materials, estimated	6.00
(h)	Knives, sand paper, grease, etc. estimated	2.82
	Costs per metric ton	139.00

II. Direct Production Costs per year (in G$)

Gross Production	Costs per year
With 2 shifts 4275 metric tons x 139.00	= 594225
With 3 shifts 5691 metric tons x 139.00	= 791,049

III. Fixed Costs per year (in G$)

	2 Shifts	3 Shifts
a) Unskilled workers 1,300./year*		
46 workers**	59,800	-
69 workers***	-	89,700
b) Skilled workers 4,100./year*		
8 workers**	32,800	-
12 workers***	-	49,200
c) Foreman 600./month*		
2 foremen**	14,400	-
3 foremen***	-	21,600
d) Electrician from a contractor* Costs estimated 300./month	3,600	3,600
e) Administration Staff:*		
Board of Directors	15,000	15,000
1 Technical Manager (= Managing Director) 2,000./month	24,000	24,000
1 Sales Manager 1,100./month	13,200	13,200
1 Office Manager (= Bookkeeper) 700./month	8,400	8,400
1 Typist 250./month	3,000	3,000
1 Messenger 170./month	2,040	2,040
f) Office and administration overheads*	10,000	10,000
g) Sales promotion, advertising practical demonstration, etc.*	15,000	15,000
h) Maintenance and spare parts	25,000	27,500
	226,240	282,240

* All figures include labour overheads 13%
All figures have been obtained from the factory owner.

** 1 m^3 net corresponds to 24 man-hours.

*** 1 m^3 net corresponds to 23 man-hours.

	2 Shifts	3 Shifts
i) Depreciation and interests:		
Machinery: 6 years depreciation and 8% interest on $455,000	97,286	-
on $555,000	-	118,400
Buildings: 20 years depreciation and 8% interest on $120,000	11,380	11,380
j) Insurance of total investment		
of $600,000 + storage	1,600	-
of $700,000 + storage	-	1,800
k) Interest on working capital:		
½ year and 8.5% per annum of		
$550,000 for 2 shifts	23,375	-
$675,000 for 3 shifts	-	28,688
	113,641	170,268
TOTAL COST OF PRODUCTION	931,106	1,243,557

IV. Production Costs per unit

1) 2 Shifts: 3475 metric tons net = G$ 268.81/metric ton
5160 m^3 net = G$ 181.03/m^3
sheet 4' x 8' x 8mm = G$ 4.75/sheet
10mm = G$ 5.61
13mm = G$ 6.71
16mm = G$ 8.12
19mm = G$ 9.32

2) 3 Shifts: 4626 metric tons net = G$ 268.82/metric ton
6870 m^3 net = G$ 181.01/m^3
sheet 4' x 8' x 8mm = G$ 4.76/sheet
10mm = G$ 5.62
13mm = G$ 6.68
16mm = G$ 8.11
19mm = G$ 9.31

APPENDIX XI

Yearly Earnings (in G$)

I. Domestic Sales:

Thickness	2 Shifts			3 Shifts		
	Sheets	Price		Sheets	Price	
8 mm	21,110	x 7.30	= 154,103	21,737	x 7.30	= 158,680
10 mm	5,620	x 8.53	= 47,938	5,775	x 8.53	= 49,261
13 mm	6,720	x 10.22	= 68,678	6,930	x 10.22	= 70,825
16 mm	8,750	x 13.63	= 119,262	9,047	x 13.63	= 123,311
19 mm	5,800	x 15.20	= 88,160	6,004	x 15.20	= 91,261
			478,141			493,338

II. Export Sales: *)

Thickness	2 Shifts			3 Shifts		
	Sheets	Price		Sheets	Price	
8 mm	44,160	x 4.10	= 180,614	65,213	x 4.10	= 267,373
10 mm	11,740	x 4.78	= 56,117	17,325	x 4.78	= 82,814
13 mm	14,040	x 5.72	= 80,309	20,790	x 5.72	= 118,919
16 mm	18,290	x 7.63	= 139,553	27,143	x 7.63	= 207,101
19 mm	12,330	x 8.51	= 104,928	18,013	x 8.51	= 153,291
			562,521			829,498

TOTAL EARNINGS:			478,141			493,338
		+	562,521		+	829,498
			1,040,662			1,322,836

*) Basis for price calculation: Local sales price ./. 44%

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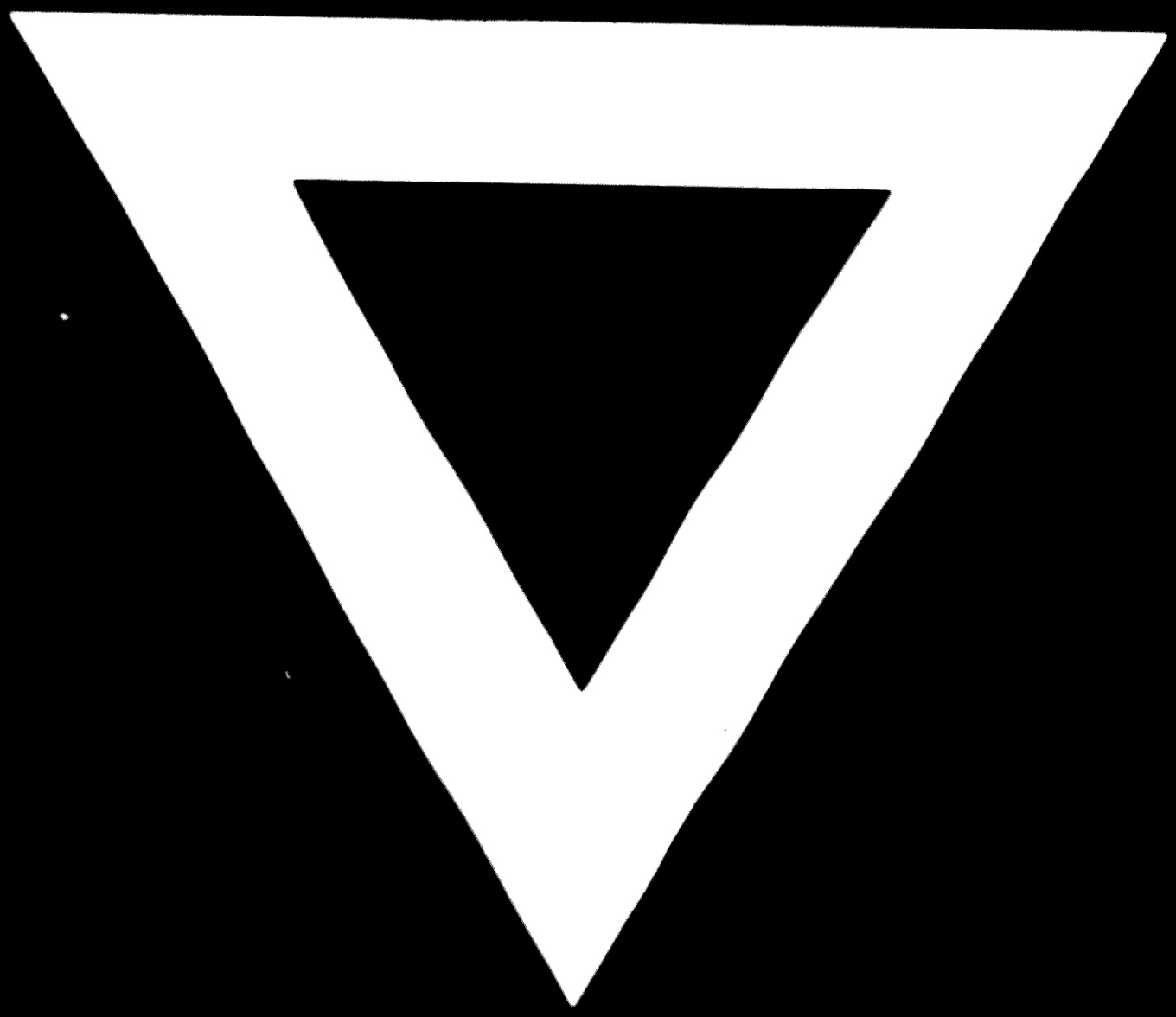

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