TFDPCL
IEA MANUAL (STANDARD OPERATING PROCEDURES)

Forest Management and Stump-to-Gate Chain-of-Custody Certification

TFDPCL INDUATRIAL ESTATE
ANANDANAGAR, WEST TRIPURA
(RUBBER WOOD PROCESSING & FURNITURE MAKING)

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1. INTRODUCTION

Tripura Forest Development and Plantation Corporation Limited is a Public Sector Undertaking of Government of Tripura. The Corporation is working for re-vegetation of degraded forestland through Rubber plantation and other forest resources to ensure development and upliftment of economically weaker sections of the society. The Corporation was registered under the Companies Act, 1956 on 26-03-1976. The main objective of the Corporation is to carry out business in plantation crops with special emphasis on Rubber plantations. Besides business activities the Corporation also takes up social responsibility for poverty alleviation through Rubber plantation for Schedule Cast, Schedule Tribe, Other Backward Caste and other rural poor families. TFDPC Industrial Estate, Anandanagar, situated 12 km away from Agartala city is one of the Division of Tripura Forest Development & Plantation Corporation Ltd having following activities

1. Processing and Treatment of Rubber Wood
2. Production of Solid Rubber Wood Board
3. Manufacturing of Rubber Wood Furniture including interior decoration
4. Manufacturing of Doors, Windows, Kitchen Shutters etc.
5. Processing & Value Addition of Bamboo including manufacturing Bamboo furniture and decorative items.

1.1 MISSION

Our mission is to furnish modern houses with natural wood products through ensuring sustainable livelihoods to the plantations communities.

1.2 VISION STATEMENT

We envision converting sustainably harvested wood into quality modern furnishing products while ensuring enhanced incomes of the planters.

2. OBJECTIVES

In order to realize its vision TFDPCL Industrial Estate, Anand nagar has set following long-term and short term objectives for itself:

2.1 LONG TERM OBJECTIVES

 a. Setting standards of manufacturing modern quality wood furnishing products
 b. Setting standards of performance of wood processing, value addition, manufacturing, branding & marketing of wood furnishing products
 c. Setting benchmarks in being environmentally and socially responsible business
2.2 **SHORT TERM OBJECTIVES**

a. Establishing operational capabilities to design and manufacture of Rubber Wood Board, Rubber Wood Furniture (Doors, Windows, Kitchen shutters) & Bamboo products to cater to the needs of the modern houses

b. Establishing modern facilities for Processing and Treatment of Rubber Wood and Bamboo

c. Establishing centre for wood product design and development

d. Developing human resource capabilities through setting high standards of working environment, health, and safety

e. Establishing waste management facilities to ensure good quality of life for both internal and external communities / people

f. Set up IT enabled MIS for smooth, accurate and timely flow of information within the unit and with other units

2.3 **TARGETS**

For achieving its above stated objectives the following specific targets are set for achievement during the next two years and five years respectively.

2.3.1 To achieve following long-term production targets (within next Five years)

To achieve following short-term production targets (within next two years)

a. Production of Treated Rubber Wood – 24000 CFT per annum

b. Production of Rubber Wood Boards – 12,000 nos per annum

c. Production of Furniture – 12,000 units per annum

d. Production of Doors – 12,000 nos per annum

e. Production of Bamboo Furniture – 1,500 units per annum

f. Achieve standards of working environment, health, and safety at par with industry norms and legal compliance

g. Recruitment, training and development of human resource as per currently sanctioned staff strength

h. Arrange training of all existing staff in their field of specialization and also for their health and safety

i. Set up HR policy which is incentive based and that promotes healthy competition among achievers and deters non-performance

j. Set up IT enabled Database Management System with computer spreadsheets for all types of records and internet based data access and transfer mechanism

2.3.2 To achieve following long-term production targets (within next Five years)

a. Production of Treated Rubber Wood – 24000 CFT per annum

b. Production of Rubber Wood Boards – 12,000 nos per annum

c. Production of Furniture – 12,000 units per annum

d. Production of Doors – 12,000 nos per annum

e. Production of Bamboo Furniture – 1,500 units per annum

f. Review the HR Needs for five years to commensurate with production targets.
3. **ASSETS**

3.1 **Land**

TFDPC Industrial Estate is situated 12 km away from Agartala city. The details of land available with the unit is given below.

- **Mouja:** Anandanagar No 25
- **Sheet No:** 5
- **Tahsil:** Srinagar
- **Revenue Circle:** Takarjola
- **Sub-Division:** Bishalgarh
- **Dist.:** West Tripura

**Land Status**
- **Khash Land:** 7.855 Ha
- **Jute Land:** 2.504 Ha
- **Total Land:** 10.357 Ha

3.2 **Building & construction**

The following physical assets are installed in the Industrial Estate:

- a. Administrative Office Building including Guest House
- b. Diosgenin factory Building including workshop
- c. Central Godown 1,2, & 3
- d. Bamboo Development Unit
- e. Central Store room
- f. Timber Treatment Plant
- g. Unakoti crafts & furniture Unit including show room
- h. Tripura Rubber wood factory
- i. Process cum Product Development unit
- j. Door Manufacturing Unit
- k. Bamboo Dormitory
- l. Carpenters barrack
- m. Water supply system including over head water tank & pipeline

4. **ACTIVITIES**

TFDPC Industrial Estate undertakes following activities:

- Processing and Treatment of Rubber Wood in Timber Treatment Plant.
- Production of Solid Rubber Wood Board in Tripura Rubber Wood factory
- Manufacturing of Rubber Wood Furniture including interior decoration in Unakoti Crafts & Furniture Unit
- Manufacturing of Doors, Windows, Kitchen Shutters etc in Door Manufacturing Unit.
- Processing & Value Addition of Bamboo including manufacturing Bamboo furniture and decorative items.
4.1 TIMBER TREATMENT PLANT

After attaining economically viable maturity i.e. Productive Line of about 24 years starting from 7th years upto 31 years of Age Rubber trees need to be felled and timber used for various end uses as described earlier. Thus the land available is to be replanted. Similarly Gaps created due to damage of plantations caused by Natural calamities e.g. cyclones, Hurricanes, Drought, Frost, Soil & Wind erosion and other Biotic factors are to be covered by Replenishement plantings in order to optimize the productivity from Rubber Plantations.

The availability of the traditional timber which are naturally durable & resistant to degradation like Sal, Teak, Rose etc are dwindling leading to emergence of other timber such as rubber wood (Hevea brasilensis) as one of the alternatives for the traditional sources of timber in the world market. The most distinctive feature of rubber wood is that it is a renewable by product of Rubber plantation, thus commercial exploitation of Rubber wood assumes added significance as it contributes to the environmental conservation. It is easily treatable and supply of rubber wood is inexhaustible in Tripura as the rubber plantation is maintained here on sustained basis. The Corporation established this TIMBER TREATMENT PLANT with the financial assistance of Indian Council for Forest Research & Education (ICFRE), Dehradum. The plant was commissioned in June 1999 having processing capacity of 1000 cum of round timber per annum. In the year 2005-06 the capacity of the industrial unit was increased from 1000 cu to 2400 cum per annum after introducing trolley saw machine and hot water circulated 1000 CFT capacity timber seasoning kiln. Presently the acceptability of the treated Rubber timber is established in the market.

4.1.1 THE TIMBER TREATMENT PROCESS

The process flow chart of TIMBER TREATMENT PLANT is

![Flowchart of TIMBER TREATMENT PLANT]

Rubber Logs → Horizontal band Saw → Vertical band Saw mill → Treatment Vessels (Boric Acid & Borax) → Hot Water Generators → Hot Water → Seasoning Kilns → Re-Saw Band Saw Machine → Final Product to Unakoti Crafts & Furniture Unit, Door Manufacturing Unit, Bamboo Development Unit and Direct sale.
4.1.2 TIMBER TREATMENT PROCESS DESCRIPTION

4.1.2.1 LOG RECEIPT

Rubber Logs are received after confirmation with the tree felling schedule and checking the following specifications
   a. Length of log between 1m to 4m
   b. Centre Girth of log not below 60cm
   c. Tapping marks not more than 10%
   d. No knots & branches
   e. Time of felling not more than 36 hrs.

Logs passing through the above quality parameters are measured and received. Stock entry of each log including volume as calculated is made in LOG RECEIPT REGISTER on daily basis. Log received are issued by Raw Material Store Keeper to shop floor supervisor for Sawing.

4.1.2.2 SAWING

Sawing of logs are done in two stages. Initially logs are sawn in HORIZONTAL BAND SAW machine to plunks of thickness 62 mm (2.5 inches) to 100mm (4 inches) depending upon the indent and log quality & size. The plunks so produces are converted to required size in VERTICAL BAND SAW machine. Conversion at this stage is 30% to 35% depending on size of Timber swan. Volume of converted timber is recorded in LOG CONVERSION REGISTER on daily basis by Raw Material Store Keeper.

4.1.2.3 CHEMICAL TREATMENT

Swan timber is treated with chemicals of definite mix and definite concentration under specific pressure and time. (Presently 1.5% Boric Acid, 2.25% Borax and 0.15% Sodium Pentachlorophenate chemical solution is used for treatment). Sawn timber is feed in TREATMENT VESSEL, closed air tight, 400 mmHg of vacuum is created and kept for 10 minutes to take out excess air from the vessel. Thereafter, the vessel is filled with chemical solution so prepared and subjected to a stable pressure of 8 kg per mm² for 2 ½ hours. Batch No is provide for each treatment quantum of timber. Periodic re-filling of chemicals to maintain concentration is done and laboratory test of each batch is done to confirm required chemicals absorption.

4.1.2.4 SEASONING

The next process is seasoning of swan timber. The treated swan timber is staked in the SEASONING KILNS in definite method and hot air at controlled temperature depending upon the humidity is allowed to pass for seasoning of swan timber.

4.1.2.5 RE-SAWING & DISPATCH

The seasoned timbers are re-sawn in RE-SAW BAND SAW MACHINE if required. The product ROUGH SWAN KILN DRIED TIMBER is ready for sale and further use in other units of the Industrial Estate for further value addition.
4.1.3 TIMBER TREATMENT MACHINE DETAILS

4.1.3.1 HORIZONTAL BAND SAW
   a. Quantity :- 1 no.
   b. Specification: - Wheel diameter – 42 inches, Saw motor 20hp, suitable for saw blade size 3 inches with necessary saw guard, lubricating system & protection gears etc with accessories

4.1.3.2 VERTICAL BAND SAW
   a. Quantity :- 1 no.
   b. Specification: - Wheel diameter – 36 inches, Saw motor 10hp, suitable for saw blade size 2.5 inches with necessary saw guard, lubricating system & protection gears etc with accessories

4.1.3.3 Components of Vacuum Pressure Impregnation Plant size 4ft 6 inches dia x 20 ft long.
   a. Quantity :- 2 no.
   b. Specification :-
      i. Impregnation Vessel Size: - Dia 3ft 6 inches x 18 ft long
      ii. Treatment Capacity: - 100 Cft/Charge
      iii. Impregnation Vessel – Horizontal cylindrical welded steel construction type fitted with wedge lock design quick opening door on one end. Other end blanked off with formed dished end cover. Material of construction of shell shall be carbon steel to IS:2062 of 16 mm thickness and dish 20 mm thick. All other steel materials shall be IS:2062. Door opening shall be by manual lever-gear arrangements. The vessel shall be capable of withstanding vacuum of 650mm Hg and pressure of 16kg/cm².
      iv. Vacuum pump set: - Vacuum pump shall be water ring type having suction capacity of approximately 170m³/hr. Pump is equipped with TEFC, squirrel cage induction motor of 5.625 KW. Pump operation shall be at 1450 RPM.
      v. Pressure Pump: - Pressure pump shall be horizontal, high pressure triplex pump, 2000 LPH, generating a head of 300 psi pressure fitted with 2.25 KW, 1440 rpm squirrel cage TEFC induction pump.
      vi. Valves: - All Valve in service shall be plug valve and tested to 250 psi.
      vii. Pipelines: - All pipelines shall be ERW construction to IS-1239(M) grade.
      viii. Control board: - control board with DOL Starter and main switch to be provided.
      ix. Internal & external tracks and trolley for loading 100 CFT timber.
      x. Drawings and Manuals for construction of storage cum mixing tank.

4.1.3.4 Components of 500 CFT capacity overhead type timber seasoning kiln capable of drying of timber upto uniform moisture content of 8% with a variation of ±2%.
   a. Quantity :- 2 nos
   b. Specification :-
      1. Chamber size: - 14 feet(L)x 15 feet (W) x 12 feet (H) (internal dimension)
2. Seasoning Capacity:-500 CFT per charge in each chamber using 1 inch planks and 1 inches crossers.

3. Components :
   i. Axial fan units (Multi bladed – fans are made of Cast Aluminum to prevent corrosion) fitted with motor (Fan motors are with Class „H” insulation for continuous running in the Kiln at scheduled temperature of seasoning) & mounted on sub ceiling (false ceiling) – 2 nos.
   ii. Top mounted aluminum finned heat exchangers, tested hydraulically at 5 kg/cm² pressure or double of working pressure, whichever in more. – 4 nos.
   iii. Exhaust unit (chimney) with opening and closing self acting flap. - 1 no.
   iv. Fresh air units with ducts opening & closing device - 2 nos.
   v. Internal construction for kiln with bracket, fan housing, baffles etc. – 1 set.
   vi. M.S. structure and sheet materials for false ceiling – 1 set
   vii. Charging door & inspection door with locking arrangements & hinges – 1 no.
   viii. Humidifying device – 1 set
   ix. Internal & external pipeline with control valves (MS pipes confirming to IS:1239) – 1 set.
   x. Electrical control board – 1 no.

4.1.3.5 Components of 1,00,000 K.Cal / Hour capacity Hot Water Generator
   a. Quantity :- 1 no.
   b. Specification :-
      1. Capacity :- 1,00,000 K.Cal Each
      2. Fuel :- Wood chips and Saw dust
      3. Temperature :- 80 ºC
      4. Hot Water Generating Tank :- 1 no
      5. Fire Box :- 1 no
      6. Chimney with guy rope & turn buckles:- 1 no
      7. Expansion tank with legs :- 1 no
      8. Hot water circulation pump :- 1 no
      9. Pipeline :- 1 set
      10. Thermometer :- 1 no
      11. Necessary insulation materials:- 1 lot
      12. Fire bricks :- 1 lot

4.1.3.6 RE-SAW BAND SAW
   a. Quantity :- 1 no.
   b. Specification :- Wheel diameter – 30 inches, Saw motor 7.5hp, suitable for saw blade size 2 inches with necessary saw guard, lubricating system & protection gears etc with accessories

4.1.4 Maintenance schedule, safety measures and minimum inventory requirement timber treatment machines

4.1.4.1 HORIZONTAL BAND SAW
a. Maintenance Schedule
Daily (after 16 hours operation) :-
- Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
- Saw Blade – 19 gauge 62mm ( 2 ½ inches) saw blade -500 RFT
- Bearings – 32212 - 4 nos
- Bearings - 32211 - 4 nos

4.1.4.2 VERTICAL BAND SAW

a. Maintenance Schedule
Daily (after 16 hours operation):-
- Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
• Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
• Workers are properly trained by the supplier of the machine

c. Inventory schedule
  • Saw Blade – 19 gauge 62mm (2 ½ inches) saw blade -500 RFT
  • Bearings –6212 - 4 nos
  • Bearings- 6213 - 4 nos

4.1.4.3 Components of Vacuum Pressure Impregnation Plant size 4ft 6 inches dia x 20 ft long.

a. Maintenance Schedule
   Daily (after 16 hours operation):
   • Check the safety valve, main door gasket and the electrical control system and mechanical system to see if any part is in safety state.
   • Oiling every part
   • Test run the machine in idle condition to inspect its function.
   • Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation) :-
   • Tighten all nuts and bolts.
   • Check gear box and other drive system.
   • Tighten all screw and connection of electrical control system.

b. Safety measures
   • Pressure safety valve is attached to the machine.
   • Emergency stop switch is located near the operator
   • All the electrical connections are through safety gears and regulators.
   • Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   • Hand gloves are provided for mixing of chemicals.
   • Workers are properly trained by the supplier of the machine

c. Inventory schedule

i. Spare for pressure pump
   a. Valve assembly 6 no
   b. V packing ring set 4 nos
   c. Seal Ring 4 nos
   d. Bimetallic bearing 4 nos
   e. Oil seal for crank shaft 4 nos
   f. Bush 4 nos
   g. Dowel Pin 4 nos
   h. Oil sea for piston rod 4 nos

ii. Spares for Vacuum Pump
   a. Gland packing set (front & Rear) 2 nos
   b. Gasket 2 nos
c. Coupling 1 no
d. Rubber Spider for coupling 4 nos

iii. Door Rubber Gasket 2 no
iv. Safety Valve 2 nos

4.1.4.4 Components of 500 CFT capacity overhead type timber seasoning kiln capable of drying of timber upto uniform moisture content of 8% with a variation of ±2%.

a. Maintenance Schedule
Daily (after 16 hours operation):
• Check water level in the overhead tank
• Check for any leakage in the water and hot water pipe line.
• Fill water in wet bulb temperature gauge tray.

Weekly (after 96 hours operation):
• Tighten all nuts and bolts.
• Check circulating fan motor and other electrical connections.
• Tighten all screw and connection of electrical control system.

b. Safety measures
• All the electrical connections are through safety gears and regulators.
• Workers are provided with uniform and industrial shoes,
• Workers are properly trained by the supplier of the machine.

c. Inventory schedule

i. Spare for circulating pump
   a. Flap valve 2 nos
   b. Impeller 2 nos
c. Coupling 2 nos
d. Rubber Spider for coupling 4 nos

ii. Temperature Gauge for seasoning kilns 2 no
iii. 1” Angular safety valve 1 no
iv. ½” Straight safety valve 1 no
v. Compound Gauge 2 nos

4.1.4.5 Components of 1,00,000 K.Cal / Hour capacity Hot Water Generator

a. Maintenance Schedule
Daily (after 16 hours operation):
• Check water level in the overhead tank
• Check for any leakage in the water and hot water pipe line.
Weekly (after 96 hours operation):
• Tighten all nuts and bolts.
Monthly

- Clean fire pipe and fire oven thoroughly

b. Safety measures
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform and industrial shoes
- Workers are properly trained by the supplier of the machine

c. Inventory schedule

i. Hot water circulating pump – 1 no
ii. Spares for circulation pump
   a. Mechanical seal - 4 no
   b. Oil seal - 4 nos
   c. Shaft - 2 no

4.1.4.6 RE-SAW BAND SAW

a. Maintenance Schedule
Daily (after 16 hours operation):
- Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation):
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine

c. Inventory schedule
- Saw Blade – 19 gauge 56mm ( 2 ¼ inches) saw blade -500 RFT
- Bearings –6232 - 4 nos
- Bearings - 6208 - 4 nos
4.2 **Tripura Rubber Wood Factory**

World Timber Trade is gaining high tech and Solid Wood Boards are in high demand in the world. In order to keep pace with modern technology and also to tap the available market, TFDPC has set up TRWF with an investment of Rs 8 crores. The total capacity of the factory is 40 solid wood boards with finger jointing technique. Presently the solid rubber wood boards produced is being used in the Unakoti crafts & furniture Unit and in the Door Manufacturing Unit situated within the Industrial Estate.
4.2.1 The Solid Wood Board Making Process

The process flow chart of Tripura Rubber Wood Factory Rubber Logs

- Log box
  - Saw mill with log carriage
    - Vertical band Saw mill
      - Multiple Rip Saw with planer 1
      - Multiple Rip Saw with planer 2
        - Jump Saw 1
        - Jump Saw 2
          - Treatment Vessel
            - Treatment Chemicals (Boric Acid & Borax)
              - 2 nos Hot Water Generators
                - Hot Water
                  - 10 nos Seasoning Kilns
                    - Jump Saw 3
                    - Jump Saw 4
                      - Five head four side planer
                        - Finger Joint Machine
                          - Six head four side planer
                            - Composer
                            - Wide belt Sender
                              - Panel Saw
                              - Beam Saw
                                - Final Product for packing

- Dust line
- Dust Collector 1
  - Dust Collector 2
  - Air Compressor

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4.2.2 The Solid Wood Board Process Description

4.2.2.1 LOG RECEIPT

Rubber Logs are received after confirmation with the tree felling schedule and checking the following specification:

- Length of log between 1m to 4m
- Centre Girth of log not below 60cm
- Tapping marks not more than 10%
- No knots & branches
- Time of felling not more than 36 hrs.

Logs passing through the above quality parameters are measured and received. Stock entry of each log including volume as calculated is made in LOG RECEIPT REGISTER on a daily basis. Log received are issued by Raw Material Store Keeper to shop floor supervisor for Sawing.

4.2.2.2 SAWING

Sawing of logs are done in two stages. Initially logs are sawn in VERTICAL BAND SAW WITH LOG CARRIAGE machine to plunks of thickness 80 mm. The plunks so produced are converted to required size in VERTICAL BAND SAW machine. Conversion at this stage is 30% to 35%. The plunks are the ripped to different width as per demand of final product dimension. Ripped timber is then cut in Jump Saw machine to reject tapping marks, knots and other defect. Volume of converted timber is recorded in LOG CONVERSION REGISTER on a daily basis by Raw Material Store Keeper.

4.2.2.3 CHEMICAL TREATMENT

Swan timber is treated with chemicals of definite mix and definite concentration under specific pressure and time. (Presently 1.5% Boric Acid, 2.25% Borax and 0.15% Sodium Pentachlorophenate chemical solution is used for treatment). Sawn timber is feed in TREATMENT VESSEL, closed air tight, 400 mmHg of vacuum is created and kept for 10 minutes to take out excess air from the vessel. Thereafter, the vessel is filled with chemical solution so prepared and subjected to a stable pressure of 8 kg per mm$^2$ for 2 ½ hours. Batch No is provide for each treatment quantum of timber. Periodic re-filling of chemicals to maintain concentration is done and laboratory test of each batch is done to confirm required chemicals absorption.

4.2.2.4 SEASONING

The next process is seasoning of swan timber. The treated swan timber is staked in the SEASONING KILNS in definite method and hot air at controlled temperature depending upon the humidity is allowed to pass for seasoning of swan timber. Hot air is generated by heat exchange between hot water and air inside the kiln. Hot water is generated in Hot Water generator using waste timber.
4.2.2.5 Planning & Sorting

Seasoned timber is then cut in Jump saw machine, if required, to reject any defective part. Then the timber is passed through four side planing machine, at times twice, and that sorted manually to different grades.

4.2.2.6 Finger Jointing

Seasoned, planed & graded timber is processed in finger joint line for production of finger jointed lamina. In Finger Jointing machine fingers of 4mm pitch and 16mm depth if done on both side of timber. Glue is applied automatically and then pressed to form lamina of 8ft (1200 mm) length. The lamina so produced in the finger joint machine is composed in composer to produce 8ft x 4ft boards of thickness 12mm, 15mm, 18mm, 22mm, 25mm, 30mm and 35mm. The final product,

4.2.2.7 Composing

The lamina so produced in the finger joint machine is again planned in six head moulder. The planned lamina is then passed through glue applicator to spread a thin layer of glue and then composed in composer to produce 8ft x 4ft boards of thickness 12mm, 15mm, 18mm, 22mm, 25mm, 30mm and 35mm.

4.2.2.8 Trimming & finishing

Finger jointed solid wood boards are then passed through beam saw for trimming and wide belt sander for sanding and then ready for further use in carpentry unit or sale.

4.2.3 Utility service & Ancillary works

The utility service and ancillary works related to boards production are

4.2.3.1 Saw blade preparation

Saw blades for both the vertical band saw machines are received in the form of steel trip with required size & shape teething. In the workshop, steel trip are cut into desired length and then joint to form circular loop. Teeth of the blade is sharpen in grinding machine before use and also periodically while the blades are in use.

4.2.3.2 Sharpening of tools

Tools like circular saw blades, finger joint cutter, Planer blades, trimming blades etc are generally procured from outside Tripura. Periodic sharpening and maintenance of tools are done in the workshop.

4.2.3.3 Dust Collection

While sawing, cutting, trimming, planning and sanding of timber or board a lot of saw dust is produced. To have a dust free environment for workers the factory has three dust collecting systems.
a. Centralized wet dust collecting system for saw dust produced at Sawing section before seasoning of timber. All the machines of sawing section are connected by pipe and dust is sucked by a centrifugal pump and dust is collected in the dust collecting chamber which is sold.

b. Centralized wet dust collecting system for dry dust produced at main process hall. All the machines of process hall except wide belt sander are connected by pipe and dust is sucked by a centrifugal pump followed by cyclone separator and dust is collected in the dust collecting chamber which is sold.

c. Individual dust collecting machine for wide bent sander collects fine dust produced at wide bent sander, collected in dust collecting bag and sold outside.

4.2.3.4 Compressed air supply

Most of the machines in the Tripura Rubber Wood Factory are pneumatically operated and for this purpose compressed air is supplied though centralized air compressor and network of pipeline.

4.2.3.5 Power supply

Main source of power for this factory is from Tripura State Electric Corporation Limited. One 500 KVA transformer is installed for this purpose. One 250 KVA Generator is alternative source of power for this factory. Sophisticated and high safety electric control panel ensures proper electrification of the machine. All machines are properly earthen and the factory is installed with lightening arresters at different locations.

4.2.3.6 Water supply

Water supply system having two nos deep tube well, Aeration Tank, Iron Removal Plant, Overhead Water tank, network of pipeline are source of required water for the plant.

4.2.3.7 Firefighting equipments

Adequate fire extinguishers are installed and checked periodically to avoid any fire hazard.

4.2.3.8 Material Handling equipment

Two nos of forklift trucks and few pallet lifters make the movement of material easy for the operation in this factory.

4.2.4 The Solid Wood Board Making Machine Details

4.2.4.1 Log Band Saw with log carriage.

a. Quantity :- 1 no.

b. Specification :- Wheel diameter – 42 inches, with log carriage (14 ft long), rail length for log carriage 45 ft with 4 clamping devices and hand lever & clutch drive for driving the log carriage on rack & pinion drive. Saw motor
25 hp, log carriage motor – 5hp, suitable for saw blade size 4 inches with necessary saw guard, lubricating system & protection gears etc.

4.2.4.2 Vertical Band Saw Machine with auto feeder

a. Quantity :- 1 no.
b. Specification :- Wheel diameter – 42 inches, Saw motor 15hp, suitable for saw blade size 3 inches with necessary saw guard, Auto feeder (Centeuro RA210/P Pneumatic Feeder), lubricating system & protection gears etc with accessories

4.2.4.3 Double Side Planner with Multi Rip Saw.

a. Quantity :- 3 no.
b. Specification :- Saw Blade Dia – 300mm, Max Working Width 200mm, Maximum Working Thickness – 75mm, heavy duty rigid steel construction, moving shaft with heavy bearing, Motor Power – 7.5 hp, 5.5 hp, 30 hp, 0.5 hp, 3 hp, 0.5 hp (46 hp).

4.2.4.4 Jump Saw

a. Quantity :- 4 no.
b. Specification :- Motor hp – 5 hp, blade diameter – 450 mm, teeth – 108 nos, pneumatically jumping blade on foot peddle control, conveyors for timber – 2 mtrs on feeding end & 1 mtr on other end with necessary saw guard, lubricating system & protection guards.

4.2.4.5 Vacuum Pressure Impregnation Plant size 4ft 6 inches dia x 20 ft long.

a. Quantity :- 1 no.
b. Specification :-
   i. Impregnation Vessel Size:- Dia 4ft 6 inches x 20 ft long
   ii. Treatment Capacity :- 150 Cft/Charge
   iii. Impregnation Vessel – Horizontal cylindrical welded steel construction type fitted with wedge lock design quick opening door on one end. Other end blanked off with formed dished end cover. Material of construction of shell shall be carbon steel to IS:2062 of 16 mm thickness and dish 20 mm thick. All other steel materials shall be IS:2062. Door opening shall be by manual lever-gear arrangements. The vessel shall be capable of withstanding vacuum of 650mm Hg and pressure of 16kg/cm².
   iv. Vacuum pump set:- Vacuum pump shall be water ring type having suction capacity of approximately 170m³/hr. Pump is equipped with TEFC, squirrel cage induction motor of 5.625 KW. Pump operation shall be at 1450 RPM.
   v. Pressure Pump:- Pressure pump shall be horizontal, high pressure triplex pump, 2000 LPH, generating a head of 300 psi pressure fitted with 2.25 KW, 1440 rpm squirrel cage TEFC induction pump.
   vi. Valves: - All Valves in service shall be plug valve and tested to 250 psi.
   vii. Pipelines: - All pipelines shall be ERW construction to IS-1239(M) grade.
viii. Control board: - control board with DOL Starter and main switch to be provided.
ix. Internal & external tracks and trolley for loading 150 CFT timber.
x. Drawings and Manuals for construction of storage cum mixing tank.

4.2.4.6 Components of 500 CFT capacity overhead type timber seasoning kiln capable of drying of timber upto uniform moisture content of 8% with a variation of ±2%.

a. Quantity :- 10 nos
b. Specification :-
   1. Chamber size:- 14 feet(L) x 15 feet (W) x 12 feet (H) (internal dimension)
   2. Seasoning Capacity:- 500 CFT per charge in each chamber using 1 inch planks and 1 inch crossers.
   3. Components :-
      i. Axial fan units (Multi bladed – fans are made of Cast Aluminum to prevent corrosion) fitted with motor (Fan motors are with Class „H” insulation for continuous running in the Kiln at scheduled temperature of seasoning) & mounted on sub ceiling (false ceiling) – 2 nos.
      ii. Top mounted aluminum finned heat exchangers, tested hydraulically at 5 kg/cm^2 pressure or double of working pressure, whichever in more. – 4 nos.
      iii. Exhaust unit (chimney) with opening and closing self acting flap.- 1 no.
      iv. Fresh air units with ducts opening & closing device - 2 nos.
      v. Internal construction for kiln with bracket, fan housing, baffles etc. – 1 set.
      vi. M.S. structure and sheet materials for false ceiling – 1 set
      vii. Charging door & inspection door with locking arrangements & hinges – 1 no
      viii. Humidifying device – 1 set
      ix. Internal & external pipeline with control valves (MS pipes confirming to IS: 1239) – 1 set.
      x. Electrical control board – 1 no

4.2.4.7 Components of 5,00,000 K.Cal / Hour capacity Hot Water Generator

a. Quantity :- 2 no.
b. Specification :-
   i. Capacity :- 5,00,000 K.Cal Each
   ii. Fuel :- Wood chips and Saw dust
   iii. Temperature :- 80°C
   iv. Hot Water Generating Tank :- 1 no
   v. Fire Box :- 1 no
   vi. Chimney with guy rope & turn buckles:- 1 no
   vii. Expansion tank with legs :- 1 no
   viii. Hot water circulation pump :- 1 no
ix. Pipeline :- 1 set
x. Thermometer :- 1 no
xi. Necessary insulation materials:- 1 lot
xii. Fire bricks :- 1 lot

4.2.4.8 **Four Side Planner (five head)**

a. Quantity :- 1 no.
b. Specification :- Five head moulder – two no top planner, 1 bottom planner & 2 on each side.

i. Should be capable of planning minimum length of timber 200mm and minimum width of timber 25mm and minimum thickness 6mm.

ii. Feed speed variable from 5m/min to 25m/min.

iii. Maximum width of feed – 180 mm

iv. Maximum thickness of feed – 130mm

v. Motor hp-10 Hp for each head.

vi. Pneumatic up down movement for thickness adjustment

vii. Cutting circle for the cutter – 125 to 180 mm

viii. Cutting head of four blade type

ix. Spare parts – with two horizontal and two vertical cutter block for spindle, 4 pneumatic cylinders, 4 universal joints, 1 set blades setting device and appropriate tools like spanners, Allen Keys, Screw Driver, Grease Gum and Oil Can.

4.2.4.9 **Finger Joint Machine**

a. Quantity :- 1 no

b. Specification

1. Finger shaper:-
   i. With cut off saw, automatic gluing attachment & brushing attachment
   ii. The feed table 600mm width & 800 mm long with necessary suction goods.
   iv. Necessary pitch adjustment on the second side.
   v. Shaping cycle speed 30 to 40 sec.
   vi. Spares - 4 sets of finger cutter, glue combs, 4 nos of cutoff saw, brushes, one set pneumatic valves & cylinders with other standard spares.

2. Hydraulic Finger assembler
   i. Total length – 6 m with provision for intermediate length cutting, double push seat operation.
   ii. Minimum thickness - 12mm
   iii. Minimum width - 30 mm
   iv. Maximum thickness - 75 mm
   v. Maximum width - 150 mm
   vi. Hydraulically operated
   viii. Motors – 5 to 7.5 Hp for hydraulic pump, 3 Hp for cutter saw
4.2.4.10 **Composer**

a. Quantity : 1 no.

b. Specification :
   - Hydraulically operated upward opening surface press cover type rotary composer.
   - i. Working station : 4 (four)
   - ii. Working Length : 5200mm
   - iii. Working width : 1300mm
   - iv. Working thickness : 150 mm.
   - v. Automatic selector and special detaching cycle after pressuring and Double micro contact pressure gauge to set working pressure for each hydraulic unit.

4.2.4.11 **Glue Spreader**

a. Quantity : 1 no.

b. Specification :
   - i. Roller type glue spreader with chain driven conveyor table.
   - ii. Two side gluing mechanism.
   - iii. Width of the roller : 610 mm
   - iv. Length of the table : min. 3000 mm
   - v. Glue spreading capacity should be controlled on 250 to 300 gm per sqm.

4.2.4.12 **Panel Saw**

a. Quantity : 1 no.

b. Specification :
   - Panel saw with sliding attachment
   - i. Length of Sliding table : min. 3200 mm
   - ii. Diameter of Saw blade : min. 300 mm
   - iii. Depth of cut : 90 mm
   - iv. Cutting tolerance : ± 2 mm
   - v. Saw tilt : 45 degree
   - vi. Speed of Saw Blade : 2800 RPM to 5600 RPM
   - vii. Main Motor Hp : 5 Hp
   - viii. Diameter of Scoring Saw : 120 mm
   - ix. Speed of Scoring Saw : 8500 RPM
   - x. Scoring Motor Power : 1 Hp
   - xi. Dust collector of appropriated design.
   - xii. Mechanism should be provided to raise, lower the saw blades and canted up to 45 deg.
   - xiii. Sliding mechanism should be provided with linear guide rollers

4.2.4.13 **Four Side Planner ( Six head )**

a. Quantity : 1 no.

b. Specification :
   - Six head moulder – two no top spindles, two bottom spindles & two side spindle.
   - i. Feed speed variable from 6m/min to 30m/min.
   - ii. Maximum width of feed : 230 mm
   - iii. Maximum thickness of feed : 120 mm
iv. Motor hp-10Hp each for three spindle heads, 15hp each for three spindle heads and 5.5 hp feed motor.

4.2.4.14 Auto Wide Belt Planer Sander

a. Quantity :- 1 no.
b. Specification :-
   i. Working width – 1300 mm, Working thickness – 125 mm.
   ii. Feed speed – 4-16 m/mim
   iii. Main Motor 40,30,20hp, Feed motor 7.5 Hp, Table hoist motor 1 hp
   v. Micro computer for high accuracy and thickness setting,
   vi. Anti kickback fingers
   vii. Auto brake
   viii. Safety guards
   ix. Spiral cutter head

4.2.5 Maintenance Schedule, Safety schedule & Minimum Inventory for Solid Wood Board Making Machines

4.2.5.1 Log Band Saw with log carriage.

a. Maintenance Schedule
   Daily (after 16 hours operation):-
   • Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
   • Oiling every part
   • Test run the machine in idle condition to inspect its function.
   • Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation) :-
   • Tighten all nuts and bolts.
   • Check gear box and other drive system.
   • Tighten all screw and connection of electrical control system.

b. Safety measures
   • Saw blade safety guard is attached to the machine.
   • Emergency stop switch is located near the operator and other easy reach positions.
   • All the electrical connections are through safety gears and regulators.
   • Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   • Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. Trolley motor chain size 16mm double chain with chain lock – 1 set of 4 pices
   ii. Limit switch for saw guide People make -1EC-947-5-1 - 1 no
   iii. Top end of lead-screw for up and down support - 1 no
   iv. Voltage regulator transformer for panel board. - 1 no
v. Roll Bearing 4 nos each
   a. 3611 (55x120x43)
   b. 8205 (25x47x15 d1=25.2)
   c. 38025(25x47x28 d1=25.2, d2=20)
   d. 3612 (60x130x46)
   e. 3615 (75x160x55)
   f. 8107 (35x52x12 d1=35.2)
   g. L390509 (45x85x56.3)
   h. 7208 (40x80x20)
   i. 7210 (50x90x22)
   j. 102 (15x32x9)
   k. 206 (30x62x16)
   l. 310(50x110x27)
   m. 1308 (40x90x28)
   n. 111309(45x100x25)
   o. 1310(50x110x27)

vi. V-Belt 6 nos each
   a. C type L in = 3105
   b. A type L in = 800
   c. A type L in = 1600

Vii Saw Blade 19 gauge 100mm 1500 RFT

4.2.5.2 Vertical Band Saw Machine with auto feeder

a. Maintenance Schedule
   Daily (after 16 hours operation) :
   - Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation) :
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Saw blade safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. Saw Blade 19 gauge 75mm (3 inches) 1000 RFT
4.2.5.8 **Double Side Planner with Multi Rip Saw.**

a. **Maintenance Schedule**  
Daily (after 16 hours operation) :-  
- Check the electrical control system and mechanical system to see if any part is in safety state.  
- Check the tension of all driving belts, sharpness of blades etc.  
- Oiling every part  
- Test run the machine in idle condition to inspect its function.  
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.  
Weekly (after 96 hours operation) :-  
- Tighten all nuts and bolts.  
- Check gear box and other drive system.  
- Tighten all screw and connection of electrical control system.

b. **Safety measures**  
- Circular Saw Blades and Planner Saw blade safety guard is attached to the machine.  
- Emergency stop switch is located near the operator and other easy reach positions.  
- All the electrical connections are through safety gears and regulators.  
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.  
- Workers are properly trained by the supplier of the machine.

c. **Inventory schedule**

i. Rubber Roller  
   20 pcs  
ii. Voltage regulator transformer  
   1 no  
iii. Ball Bearings  
   a) Deep Groove Ball Bearing 6011-2Z  
      2 no  
   b) Deep Groove Ball Bearing 6210-2Z  
      2 no  
   c) Deep Groove Ball Bearing 6009-2Z  
      4 nos  
   d) Deep Groove Ball Bearing 6306-2Z  
      2 nos  
   e) Deep Groove Ball Bearing 6006-2RS  
      6 nos  
   f) Deep Groove Ball Bearing 6005-2RS  
      10 nos  
   g) Trust Ball Bearing 51104  
      2 nos  
   h) Trust Ball Bearing 51102  
      6 nos  
iv. V-Belt  
   a) Narrow SPA2182 Dactum length  
      8 nos  
   b) Wide V belt 1922V/281  
      2 no  
v. Circular Saw Blade (300mm x 3.5 mm x 50 mm)  
   50 nos  
vi. HSS Planner Blades  
   100 nos
4.2.5.4 Jump Saw

a. Maintenance Schedule
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Circular Saw blade safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. FRL unit (air pressure regulator and filter set) 4 sets
   ii. Saw blade lift and fall cylinder 4 sets

4.2.5.5 Vacuum Pressure Impregnation Plant size 4ft 6 inches dia x 20 ft long.

a. Maintenance Schedule
   Daily (after 16 hours operation):
   - Check the safety valve, main door gasket and the electrical control system and mechanical system to see if any part is in safety state.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Pressure safety valve is attached to the machine.
• Emergency stop switch is located near the operator
• All the electrical connections are through safety gears and regulators.
• Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
• Hand gloves are provided for mixing of chemicals.
• Workers are properly trained by the supplier of the machine

c. Inventory schedule

i. Spare for pressure pump
   i. Valve assembly 6 no
   j. V packing ring set 4 nos
   k. Seal Ring 4 nos
   l. Bimetallic bearing 4 nos
   m. Oil seal for crank shaft 4 nos
   n. Bush 4 nos
   o. Dowel Pin 4 nos
   p. Oil sea for piston rod 4 nos

iii. Spares for Vacuum Pump
   e. Gland packing set (front & Rear) 2 nos
   f. Gasket 2 nos
   g. Coupling 1 no
   h. Rubber Spider for coupling 4 nos
   iii. Door Rubber Gasket 2 no
   iv. Safety Valve 2 nos

4.2.5.6 Components of 500 CFT capacity overhead type timber seasoning kiln capable of drying of timber upto uniform moisture content of 8% with a variation of ±2%.

a. Maintenance Schedule
   Daily (after 16 hours operation) :-
   • Check water level in the overhead tank
   • Check for any leakage in the water and hot water pipe line.
   • Fill water in wet bulb temperature gauge tray..

   Weekly (after 96 hours operation) :-
   • Tighten all nuts and bolts.
   • Check circulating fan motor and other electrical connections.
   • Tighten all screw and connection of electrical control system.

b. Safety measures
   • All the electrical connections are through safety gears and regulators.
   • Workers are provided with uniform and industrial shoes,
   • Workers are properly trained by the supplier of the machine

c. Inventory schedule

i. Spare for circulating pump
4.2.5.7 Components of 5,00,000 K.Cal / Hour capacity Hot Water Generator

a. Maintenance Schedule
Daily (after 16 hours operation) :
- Check water level in the overhead tank
- Check for any leakage in the water and hot water pipe line.

Weekly (after 96 hours operation): •
- Tighten all nuts and bolts.

Monthly
- Clean fire pipe and fire oven thoroughly

b. Safety measures
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform and industrial shoes,
- Workers are properly trained by the supplier of the machine

c. Inventory schedule
  i. Hot water circulating pump – 1 no
  ii. Spares for circulation pump
    a. Mechanical seal - 4 no
    b. Oil seal - 4 nos
    c. Shaft - 2 no
    d. Fire bricks : - 1 lot

4.2.5.9 Four Side Planner (five head)

a. Maintenance Schedule
Daily (after 16 hours operation) :
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Circular saw Blades & Planner Saw Blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and mask.
- Workers are properly trained by the supplier of the machine

c. Inventory schedule
   i. Deep Channel Ball Bearing
      - 6009-2Z/P5 - 8 nos
      - 6306-2Z/P5 - 8 nos
      - 6007-2RS - 4 nos
      - 6005-2RS - 4 nos
      - 6006-2RS - 4 nos
   ii. Single centripetal ball bearing
       - 6005-2RS - 2 no
   iii. Trust Ball Bearing
       - 51102 - 4 no
       - 51104 - 2 no
   iv. FRL unit (air pressure regulator and filter set)
       - 4 sets
   v. Saw blade lift and fall cylinder
       - 4 sets
   vi. Flat Belt
       - 900 x 55 x 3.5mm - 6 nos
       - 1070 x 55 x 3.5mm - 4 no
       - 1450 x 55 x 3.5mm - 4 no
   vii. V-Belt 2322V 421/306
       - 2 no
   viii. Rubber feeding Roller 140
       - 8 no

4.2.5.9 Finger Jointing Machine

a. Maintenance Schedule
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.
b. Safety measures
   - Circular Saw Blade & Planner Saw Blades safety guard is attached to the machine.
   - Emergency stop switch is located near the operator
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine

c. Inventory schedule

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rachet Handle 10mm</td>
<td>10 pcs</td>
</tr>
<tr>
<td>2</td>
<td>100mm bore hydraulic cylinder oil seal</td>
<td>4 pcs</td>
</tr>
<tr>
<td>3</td>
<td>Solinoid valve single acting (hydraulic) HD-3C6-403 LWF</td>
<td>3 Pcs</td>
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<tr>
<td>4</td>
<td>Solinoid valve Dovel acting (hydraulic) HD-2B3B-G02-2WF</td>
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<td>5</td>
<td>Pneumatic Solinoid Valve 220V Doval Action</td>
<td>2 pcs</td>
</tr>
<tr>
<td>6</td>
<td>Pneumatic Solinoid Valve 3/8” Doval Action</td>
<td>2 pcs</td>
</tr>
<tr>
<td>7</td>
<td>Pneumatic Solinoid 1/4” 220V Doval Action</td>
<td>2 pcs</td>
</tr>
<tr>
<td>8</td>
<td>Pneumatic Solinoid Valve 3/8” 220V single Action</td>
<td>1 pc.</td>
</tr>
<tr>
<td>9</td>
<td>Auto feed belt chain for conveyor</td>
<td>1 set</td>
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<tr>
<td>10</td>
<td>Gluing roller</td>
<td>2 set</td>
</tr>
<tr>
<td>11</td>
<td>Voltage regulator transformer for finger cutting section</td>
<td>1 no</td>
</tr>
<tr>
<td>12</td>
<td>Voltage regulator transformer for assembly section</td>
<td>1 no</td>
</tr>
<tr>
<td>13</td>
<td>Finger joint cutter (160mm x 50mm x 4mm)</td>
<td>120 Pcs</td>
</tr>
<tr>
<td>14</td>
<td>Cut off saw blade (12inches x 80teeth x 3.2 x 1 inches)</td>
<td>2 nos</td>
</tr>
</tbody>
</table>

4.2.5.10 Composer

a. Maintenance Schedule
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check Hydraulic oil content & pressure
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

   Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Emergency stop switch is located near the operator
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Hand gloves are provided for mixing of chemicals.
• Workers are properly trained by the supplier of the machine. c. Inventory schedule

1. Hydraulic Oil 200 Ltrs
2. Oil seal & o Ring 1 set

4.2.5.11 Glue Spreader

a. Maintenance schedule
i. Check the tension of the chain.
ii. Clean glue after work thoroughly
b. Inventory
i. Chain for glue applicator.

4.2.5.12 Panel Saw

a. Maintenance Schedule
Daily (after 16 hours operation):
• Check the electrical control system and mechanical system to see if any part is in safety state.
• Check the tension of all driving belts, sharpness of blades etc.
• Oiling every part
• Test run the machine in idle condition to inspect its function.
• Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation):
• Tighten all nuts and bolts.
• Check gear box and other drive system.
• Tighten all screw and connection of electrical control system.

b. Safety measures
• Circular Saw blade safety guard is attached to the machine.
• Emergency stop switch is located near the operator and other easy reach positions.
• All the electrical connections are through safety gears and regulators.
• Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
• Workers are properly trained by the supplier of the machine.

c. Inventory schedule
i. Saw Blade - 1 set

4.2.5.13 Four Side Planner (Six head)
a. Maintenance Schedule
Daily (after 16 hours operation):
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation):
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Circular Saw blade and planner saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
1. Flat Belt 875 x 50 NE26 2 no
2. Flat Belt 980 x 50 NE22 2 no
3. Flat Belt 1480 x 50 NE22 2 no
4. Flat Belt 1060 x 50 NE22 2 no
5. Deep Groove Ball Bearing 6009 C3 NI3DA L75 6 nos
6. Deep Groove Bearing 6306 Z 3 nos
7. Deep Groove Ball Bearing 6012-2RDS 2 nos
8. Deep Groove Ball Bearing 6210-2RSD 6 nos
9. Rubber Feed Roller 140x50x35 60shore 2 nos
10. Pressure Regulator 1/4 with Gauge 0-6 Bar 2 nos
11. Roller chain 083-1X 50 E 1 no
12. Collar for Lock nut (locking collar)
   (5mm, 8mm, 10mm, 16mm, 25mm, 40mm, 63mm) 1 each

4.2.5.14 Auto Wide Belt Planer Sander
a. Maintenance Schedule
Daily (after 16 hours operation) :-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule

<table>
<thead>
<tr>
<th>Sl</th>
<th>Description of Tools/ spares</th>
<th>Qty</th>
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<tbody>
<tr>
<td>1</td>
<td>V-Belt B84</td>
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<tr>
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<td>V-Belt A81</td>
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<tr>
<td></td>
<td>V-Belt A78</td>
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<tr>
<td>2</td>
<td>Sanding Belt Tracking Sensor</td>
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<td>Limit for Conveyor Belt Tracking</td>
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<td>7</td>
<td>Planner Tips</td>
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4.2.5.14 Fork lift truck

Inventory control

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<th>Description of Tools/ spares</th>
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<td>Copper washer – M14</td>
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<td>Accelerator cable –s4 &amp;3R</td>
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<td>Hose Eng to Rad</td>
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<td>Hose HYD V/V to Piston end</td>
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<td>Hose Pump TO FYD V/V PRES PO</td>
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<td>Hose Husco valve to T retu</td>
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<td>Connector Husco ret to hose</td>
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4.3 Unakoti Crafts & Furniture Unit

The products of Timber treatment plant and Tripura Rubber Wood Factory is used as raw material for this unit. The timber and boards are process to different dimensions and requisite shape for manufacturing furniture and doors by use of machineries of the units. Work pieces of definite shape and size are assembled for mass production of furniture & doors which are then polished and varnished in the finishing line spray booth. Other consumable used for furniture making are Fevicol, Glue, Touch wood, polyurethane, fittings, nails etc. are used as and when required and quantity depends on the size, number, quality, design of the furniture. The products are than ready for sale.
4.3.1 THE UNAKOTI CRAFTS & FURNITURE MAKING PROCESS

The process flow chart of Unakoti Crafts & Furniture Unit are

- Treated Rubber Timber and Solid Rubber Wood Boards
  - Radial Arm Saw
    - Dust Collector 1
  - Double side planer
  - Tilting Arbor Saw
    - Mortiser
      - Dust Collector 2
    - Spindle Shaper
      - Dust Collector 3
    - Band Saw
      - Dust Collector 4
  - Wood Working Machine
    - Dust Collector 6
  - Wood Working Lathe
  - Tennor
    - Dust Collector 5
  - Multi Drill Machine
  - Thickness Planer
  - Dowel Milling Mill
  - Horizontal & Vertical Sponge Sander
  - Air Compressor
  - Dowel Cross Cut
    - Assembling
  - Glue & Fittings
  - Spray Booth
  - Water
    - Finishing
  - Final Product for packing
4.3.2 THE UNAKOTI CRAFTS & FURNITURE MAKING PROCESS DESCRIPTION

The process involves shaping, sizing, sharpening, sanding, polishing and finishing of treated rubber timber of different size to make furniture, crafts items and door & window shutters & frames. There is no distinct process flow as the machineries used for processing of different kind of furniture are different. The assembling job is done manually by expert carpenters.

4.3.3 THE UNAKOTI CRAFTS & FURNITURE Machines Details

4.3.3.1 Spindle Shapers
a. Quantity :- 1 no.
   b. Specification :-
      i. Make of the Machine :- Holytek Industrial Corporation, Taiwan
      ii. Model no :- HS-625TS
      iii. Spindle diameter :- 30 mm
      iv. Spindle speed :- 3000 rpm, 4500 rpm, 6,000 rpm, 10,000 rpm MK5
      vi. Spindle Motor :- 7.5 Hp
      vii. Spindle travel :- 130mm
      viii. Table size :- 1050mm x 800 mm

4.3.3.2 High Speed Router
a. Quantity :- 1 no.
   b. Specification :-
      i. Make of the Machine :- Holytek Industrial Corporation, Taiwan
      ii. Model no :- HP-750
      iii. Throat clearance :- 750 mm
      iv. Spindle speed :- 10,000 rpm / 2000 rpm
      v. Spindle Motor :- 7.5 Hp
      vi. Spindle vertical stroke:- 100mm
      vii. Table size :- 905mm x 765 mm

4.3.3.3 Rectangular round end Tenoner.
   a. Quantity :- 1 no.
   b. Specification :-
      i. Make of the Machine :- Yow Cherng Machinery Co. Ltd.
      ii. Model :- YRT-115
      iii. Spindle speed :- 6000 rpm
      iv. Maximum tenon width :- 115 +2R mm
      v. Maximum tenon depth :- 10 – 45 mm ( with standard tools)
       6-90 mm ( with special tools)
      vi. Production rate :- 12 pcs./min.
      vii. table tilt upward :- 0-15°
viii. table tilt downward : 0-30°
ix. table tilt side     : 0-20°
  x. spindle motor      : 5 hp
  xi. cutter cycle motor: 1 hp

4.3.3.4 Oscillation Mortiser

a. Quantity : 1 nos
b. Specification :
   i. Make of the Machine : Yow Cherng Machinery Co. Ltd.
   ii. Model             : YOM-120
   iii. Maximum width of mortise: 120mm
   iv. Maximum depth of mortise: 50mm
   v. Oscillation rate    : 6.6-400 stroke per min.
   vi. Table vertical adjustment: 3“
   vii. Cutter speed      : 9500 rpm
   viii. Spindle motor    : 2 hp
    ix. Cutter cycle motor: ½ hp
   x. Maximum clamp thickness: 4“

4.3.3.5 Radial Arm Saw

a. Quantity : 1 no.
b. Specification :
   i. Make of the Machine : Holytek Industrial Corporation, Taiwan
   ii. Model no           : BS-888
   iii. Motor             : 4.5 hp
   iv. Motor speed        : 2900 rpm
   v. Spindle bore        : 25.4 mm
   vi. Blade diameter     : 305 mm
   vii. Head swiveling    : 0-180°
   viii. Head tilting     : 0-90°
   ix. Maximum trimming width: 860mm
   x. Maximum cross cutting length: 620 mm
   xi. Table area         : 900 mm x 1100 mm

4.3.3.6 Tilting Arbor Saw

a. Quantity : 1 no.
b. Specification :
   i. Make of the Machine : Holytek Industrial Corporation, Taiwan
   ii. Model no           : TBS - 350
   iii. Saw blade dia     : 14”
   iv. Arbor dia          : 30mm
   v. Maximum depth of cut at 90°: 125mm
   vi. Maximum depth of cut at 45°: 88mm
   vii. Arbor speed       : 3750 rpm
   viii. Main table size  : 1220mm x 965mm
    ix. Sliding table size: 760mm x 660mm
x. Sliding table stroke :- 1525 mm  
xi. Maximum rip to right of blade :- 1245 mm  
1xii. Motor :- 5 hp

4.3.3.7 Band Saw
a. Quantity :- 1 no.
b. Specification :-  
   i. Make of the Machine :- Holytek Industrial Corporation, Taiwan  
   ii. Model no :- HB-600R  
   iii. Saw wheel diameter :- 600 mm  
   iv. Table size :- 800 mm x 605 mm  
   v. Cutting capacity :- 350mm x 580mm  
   vi. Motor :- 5 hp

4.3.3.8 Dowel Milling Machine
a. Quantity :- 1 no.
b. Specification :-  
   i. Make of the Machine :- Holytek Industrial Corporation, Taiwan  
   ii. Model no :- CF-18  
   iii. Diameter range :- 6-18mm  
   iv. Length range :- 240mm to unlimited  
   v. Motor Drive :- 1 hp  
   vi. Feed speed :- 6m/min

4.3.3.9 Dowel Cross-cut and Chamfering
a. Quantity :- 1 no.
b. Specification :-  
   i. Make of the Machine :- Holytek Industrial Corporation, Taiwan  
   ii. Model no :- CF-36  
   iii. Diameter range :- 6-18mm  
   iv. Length range :- 20mm – 150mm  
   v. Motor Drive :- ½ hp  
   vi. Feed speed :- cutting rate 36 pieces/min

4.3.3.10 Wood Turning Lathe
a. Quantity :- 1 no.
b. Specification :-  
   i. Height of Centre :- 200 mm  
   ii. Distance between centres :- 1200 mm  
   iii. Spindle Bore :- 20mm with MK3 Internal taper  
   iv. Range of Speeds :- 425 to 2800  
   v. Motor Drive :- 2 H.P

4.3.3.11 Double side planer
a. Quantity :- 1 no.
b. Specification :-
i. Surface planer width :- 610 mm
ii. Thickness width :- 15-150 mm
iii. Spindle speed :- 5000 rpm
iv. Feed speed :- 7-16 m/min
v. Motor Drive :- 15hp, 10hp, 3 hp & ½ hp
vi. Cutting knife :- 4 pcs.

4.3.3.12 Combined Wood Working Machine

a. Quantity :- 1 no.
b. Specification :-
   i. Surface planer width :- 300 mm
   ii. Surface planer motor power :- 3 hp
   iii. Thickness planer range :- 6-240 mm
   iv. Saw blade dia :- 250mm
   v. Saw motor power :- 3 hp
   vi. Moulder speed :- 1750 rpm, 3500 rpm and 6700 rpm.
   vii. Moulder Motor Drive :- 3 hp
   viii. Scorer blade dia :- 90 x 3 x 20 mm
   ix. Scorer Rotating Speed :- 7000 rpm
   x. Drilling Dia (self centring) :- 3-16mm

4.3.3.13 Water curtain spray booth

a. Quantity :- 1 no.
b. Specification :-
   i. Water curtain spray booth - 10 feet 1 no
   Fresh Air supply for 10” x 6 „ spray
   ii. booth 1 no
   Infra Red Drying Oven – 12” x 12” x 8
   iii. ” ht 1 no
   iv. Diaphragm pump with spray gun 2 nos
   v. Air Curtain – 6 ft 1 no

4.3.4 Maintenance Schedule, Safety measures & Minimum Inventory for Furniture Making Machines

4.3.4.1 Spindle Shapers

a. Maintenance Schedule
   Daily (after 16 hours operation):
   • Check the electrical control system and mechanical system to see if any part is in safety state.
   • Check the tension of all driving belts, sharpness of blades etc.
   • Oiling every part
   • Test run the machine in idle condition to inspect its function.
   • Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation):
   • Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Sharp tools safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
i. FRL unit (air pressure regulator and filter set) 4 sets
ii. Tools 4 sets

4.3.4.2 High Speed Router

a. Maintenance Schedule
Daily (after 16 hours operation):-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Sharp tools safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
i. FRL unit (air pressure regulator and filter set) 4 sets
ii. Tools 4 sets
4.3.4.3 **Rectangular round end Tenoner.**

a. **Maintenance Schedule**
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. **Safety measures**
   - Sharp tools safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. **Inventory schedule**
   i. FRL unit (air pressure regulator and filter set)  4 sets
   ii. Tools  4 sets

4.3.4.4 **Oscillation Mortiser**

a. **Maintenance Schedule**
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. **Safety measures**
• Sharp tools safety guard is attached to the machine.
• Emergency stop switch is located near the operator and other easy reach positions.
• All the electrical connections are through safety gears and regulators.
• Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
• Workers are properly trained by the supplier of the machine.

c. Inventory schedule
  i. FRL unit (air pressure regulator and filter set)  4 sets
  ii. Tools  4 sets

4.3.4.5 Radial Arm Saw

a. Maintenance Schedule
   Daily (after 16 hours operation):
   • Check the electrical control system and mechanical system to see if any part is in safety state.
   • Check the tension of all driving belts, sharpness of blades etc.
   • Oiling every part
   • Test run the machine in idle condition to inspect its function.
   • Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation):
   • Tighten all nuts and bolts.
   • Check gear box and other drive system.
   • Tighten all screw and connection of electrical control system.

b. Safety measures
   • Circular Saw blade safety guard is attached to the machine.
   • Emergency stop switch is located near the operator and other easy reach positions.
   • All the electrical connections are through safety gears and regulators.
   • Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   • Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. FRL unit (air pressure regulator and filter set)  4 sets
   ii. Tools  4 sets

4.3.4.6 Tilting Arbor Saw
a. Maintenance Schedule

Daily (after 16 hours operation) :-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Circular Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
i. FRL unit (air pressure regulator and filter set) 4 sets
ii. Tools 4 sets

4.3.4.7 Band Saw

a. Maintenance Schedule
Daily (after 16 hours operation) :-
- Check and adjust the tension of blade and the electrical control system and mechanical system to see if any part is in safety state.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
Workers are properly trained by the supplier of the machine.

4.3.4.8 **Double Side Planner**

a. Maintenance Schedule

   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures

   - Circular Saw blade safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. Inventory schedule

   i. Saw Blade 19 gauge 38mm (1.5 inches) 1000 RFT

4.3.4.9 **Combined Wood Working Machine**

a. Maintenance Schedule

   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
   - Sharp tools safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. FRL unit (air pressure regulator and filter set) 4 sets
   ii. Tools 4 sets

4.4 Door Manufacturing Unit

The Rubber Timber & Solid Rubber Wood Boards produced in the Timber Treatment Plant and Tripura Rubber Wood Factory respectively of the same TFDPC Industrial Estate, Anandanagar will be used in the Door Manufacturing Unit.
4.4.1 The DOOR MANUFACTURING Process
Flow chart of DOOR MANUFACTURING UNIT

Rubber Timber

- JUMP SAW
- RIP SAW
- PLANER
- ROUTER
- MOULDER
- TENNONER
- MORTISER
- DRILLING BEAM SAW
- WIDE BELT SANDER
- UNEVEN SANDER
- HYDRAULIC ASSEMBLER
- CNC ROUTER
- MULTI BORING
- DUST COLLECTOR
- HOT PRESS
- EDGE BANDING
- SPRAY BOOTH

Air Compressor

Finished Product for Packing
4.4.2 The DOOR MANUFACTURING Process Description

Rubber Timber received from Timber Treatment Plant will be processed in JUMP SAW (CUT-OFF-SAW) for cross cutting, STRAIGHT LINE RIP SAW for straight line cutting, DOUBLE SIDE PLANER for planning, HIGH SPEED ROUTER WITH AUTO FEEDER, SPINDLE MOULDER WITH TILTING SPINDLE AND SLIDING TABLE WITH AUTO FEEDER (FOUR ROLLERS), SINGLE END(5 SPINDLES) TENONING MACHINE, COMBIND CHAIN AND HOLLOW CHISEL MORTISER, MULTI DRILL BORING MACHINE AND UNIVERSAL SINGLE HEAD VERTICAL HORIZONTAL BORING MACHINE for further processing to get required sized of definite dimension for making Door, Window & kitchen-shutter Frame and structure for Doors, window and kitchen-shutter shutters. Thereafter sized Timbers will be joined by nailing & stapling as and where require applying glue at the joints after being compressed in HYDRAULIC DOOR AND WINDOW ASSEMBLING MACHINE. The frame so produced will be passed though the PAINTING BOOTH after necessary sanding and polishing for applying coatings of paints or varnish.

Structure for shutters will be used for two types of products. For Solid Rubber Wood Doors, Boards received from Tripura Rubber Wood Factory after cutting to required size in BEAM SAW MACHINE will be inserted in the structure to produced shutters. Then the shutters will be passed through the WIDE BELT SANDER for sanding. After sanding, design will be engraved by CNC ROUTER MACHINE and than passed through UNEVEN SURFACE SANDER for final sanding and polishing. Then shutters will be painted / varnished in the FINISHING LINE 8” SPRAY BOOTH WATER CURTAIN PAINTING BOOTH.

For production of skin doors, the intermediate space of structure for door shutters will be filled by small pieces of timber or other filling materials like block boards. Skin of various quality & design will be used on both sides of the shutters after applying glue. The shutters will be than passed though HOT PRESS for fixing of glue. Thereafter, they will be taken to BEAM SAW for trimming to final size. Trimmed door shutters will be taken for edge banding in the THROUGHFEED EDGE BANDING MACHINE.

Centralized AIR COMPRESSOR will supply compressed air for pneumatic controllers of machines which are connected through network of air pipe line. CENTRALIZED DUST COLLECTOR, installed outside the main process hall, will suck dust from most of the machines. INDIVIDUAL DUST COLLECTORS are installed for wide belt sander, uneven sander and CNC Router.

4.4.3 The Door Manufacturing Machines Details

4.4.3.1 CUT-OFF-SAW MODEL VM2610

- Saw Blade Diameter: Ø610x Ø25.4x5x120T
- Working Thickness(Height of Saw): 5-155mm
- Working Width: 10-530mm
- Saw Spindle Rotation Speed: 2400rpm
- Air Pressure: 0.6Mpa
- Motor power: 5KW
- Spindle Speed: 2900rpm
- Air Cylinder: Ø80x280
- Machine Dimension: 3000x1190x1370mm
- Auxiliary table length: 1170mm
- Machine Weight: 700kg
- Waste Outlet Size: Ø100x2(4”)
- Air Delivery: $1000m^3/h$
- Packing Dimension: 1290x1120x1600mm

### 4.4.3.2 STRAIGHT LINE RIP SAW MODEL MJ154 2 machines
- Saw Blade Diameter: Max.455mm(18”) Min.355(14”)
- Maximum working thickness: 100 mm
- Planning Width: 660mm
- Spindle Rotation Speed: 3000r/min
- Feeding Speed: 11-26m/min
- Feeding Motor Power: 1.5KW
- Main Motor Power: 11KW
- Lubricate Pump Motor Power: 20W
- Total Power: 12.5KW
- Working Table Size: 2000x1160mm
- Dimension: 1920mmx1200mmx1400mm
- Net Weight: 1740KG

### 4.4.3.3 DOUBLE SIDE PLANNER MODEL SDSP-610 1 Machine
- Maximum Working Width: 610mm
- Maximum Working Thickness: 150mm
- Maximum Working Thickness: 15mm
- Maximum Working Length: 320mm
- Cutter Knife: 8pcs
- Spindle Rotation Rate: 4500 r/min
- Feeding Speed: 7-16 m/min
- Top Spindle Power: 15/20 KW/HP
- Bottom Spindle Power: 7.5/10 KW/HP
- Feeding Motor Power: 2.2/3KW/HP
- Elevation Motor Power KW: 0.37/0.5KW/HP
- Lubricate Pump Motor Power: 20/0.03W/HP
- Total Power: 25.27/33.7KW/HP
- Dimensions: 2700mmx1168mmx1680mm

### 4.4.3.4 HIGH SPEED ROUTER WITH AUTO FEEDER MODEL MX506 1 Machine
- Working Table: 1000x800mm
- Throat: 750mm
- Table Tilts: 45˚
- Collet Size: 1.27mm(1/2)
- Spindle Travel: 75mm
- Spindle Rotation: 10000/20000 rpm
- Spindle Drive Motor: 4KW

TFDPCL MGMT PLAN – III IEA Management Manual 249
• Table Travel 140mm
• Net Weight 630KG
• Overall Size 1350x1000x1860mm(LxWxH)

4.4.3.5  SPINDLE MOULDER WITH TILTING SPINDLE AND SLIDING TABLE WITH AUTO FEEDER (FOUR ROLLERS) MODEL SMXQ5118H

1 set
• Spindle Diameter 31.75mm
• Spindle Motor 4KW(5HP)
• Spindle Stroke 130mm
• Tilting Angle -5°~90°~+45°
• Maximum Table Insert Dia. Ø250mm
• Table Size(LxW) 1150x850mm
• Sliding Table Size 1150x300mm
• Sliding Table Stroke 1070mm
• Net Weight 940KG
• Overall Size(LxWxH) 1150x1015x1130mm

4.4.3.6  SINGLE END(5 SPINDLES) TENONING MACHINE MODEL SSET-115

1 Machine
• Will admit timber upto 5mmx115mm
• Will cut tenons at one operation 127mm long
• Fence may be swiveled 45° for angular tenons top cutter head will rise 1085mm above table will take 1525mm between shoulders of tenons using turnover stop
• Size of table 760mmx405mm
• Height of table from floor 840mm
• Diameter of cutting-off saw 305mm
• Diameter of horizontal and scribing Spindles 31.7mm
• Speed of all motors, RPM 3000(Approx)
• Horse Power of motors for horizontal cutter heads 2x5 H.P
• Horse Power of motors for scribing heads 2x2 H.P
• Horse Power of Motor for rear cut-off saw 1.5H.P
• Total Connected Load of this machine 15.5 H.P
• Floor Space approx 1525mmx1450mm
• Shipping Dimensions 3.5c.m.

4.4.3.7  COMBIND CHAIN AND HOLLOW CHISEL MORTISER MODEL

SCCMII 1 Machine
• Will take timber up to 150mm width(180 on request)
• Maximum size of mortise chain(width) 28mm
• Maximum size of chisel in hard wood 20mm
• Maximum size of chisel in soft wood 25mm
• Will Bore upto 25mm Diameter
• Table size 680mmx200mm
• Longitudinal Movement 610mm
- Traverse Movement 100mm
- Vertical Movement 200mm
- Horse power of motor of chain Head 3HP
- Horse power of motor of chisel head 2HP
- Air Pressure required Mpa0.6-0.8
- Floor Space 1200x1000mm
- Net Weight 500 Kg(Approx)

<table>
<thead>
<tr>
<th>4.4.3.8</th>
<th>BEAM SAW</th>
<th>1 machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Bed</td>
<td>2600mm</td>
<td></td>
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<tr>
<td>Cutting Height</td>
<td>70mm</td>
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<tr>
<td>Diameter of Main Saw Blade</td>
<td>350mm</td>
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<tr>
<td>Motor Power of Main Saw Blade</td>
<td>7.5 KW</td>
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<tr>
<td>Diameter of Scoring Blade</td>
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<tr>
<td>Motor Power of Scoring Saw Blade</td>
<td>1.2 KW</td>
<td></td>
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<tr>
<td>Main Spindle Rotation</td>
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<tr>
<td>Scoring Spindle Rotation</td>
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<tr>
<td>Control</td>
<td>PLC</td>
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<tr>
<th>4.4.3.9</th>
<th>UNIVERSAL SINGLE HEAD VERTICAL HORIZONTAL BORING MACHINE</th>
<th>1 Machine</th>
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<tbody>
<tr>
<td>Work table size</td>
<td>1000x450mm</td>
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<tr>
<td>Maximum Hole Diameter</td>
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<tr>
<td>Maximum Hole Depth</td>
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<tr>
<td>Qty. of Spindles</td>
<td>6 pcs.</td>
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<tr>
<td>Rotating Speed</td>
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<tr>
<td>Installed Power</td>
<td>2.2K.W.</td>
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<tr>
<td>Overall Size</td>
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<td>Net Weight</td>
<td>350KG</td>
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<tr>
<th>4.4.3.10</th>
<th>MULTI DRILL BORING MACHINE MODEL SM I</th>
<th>1 Machine</th>
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</thead>
<tbody>
<tr>
<td>Center distance of spindles</td>
<td>32mm</td>
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<tr>
<td>Spindles Number</td>
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<td>Maximum Boring Depth</td>
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<td>Working pneumatic power</td>
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<td>Installed power</td>
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<tr>
<td>Rotation Speed of the Spindle</td>
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<tr>
<td>Noise Level(Maximum Allowed 90db)</td>
<td>82db</td>
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<td>Drilling Head Tilts</td>
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<tr>
<td>Pneumatic Clamps</td>
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<tr>
<td>FRL Unit</td>
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<td></td>
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<tr>
<td>Net Weight</td>
<td>250KG</td>
<td></td>
</tr>
</tbody>
</table>
• Overall Dimensions required when fitted (LxWxH)
  1200mmx3200mmx1200mm

4.4.3.11 **HOT PRESS MACHINE MODEL STHP48X120T/1** 1 machine
• Platen Sizes 2500mmx1300mm
• Maximum Pressure of Platen/Total Thrust 120t (3.1Kg/cm²)
• Maximum Temperature of platen’s 120°C-150°C
• Maximum Opening of the platen/Stroke/Day Light 300mm
• Hydraulic Cylinder’s 100mm Diameter
• Nos of Cylinders 6 nos
• Hydraulic power pump (imported) 5.5 Kw
• Hot Oil pump power (imported) 2.2 Kw
• Heaters for thermo fluid Oil 4 x 6 = 24 Kw
• Weight 6500 Kg (Approx)
• Dimensions of the Machine 3300 x 1650 x 2050 mm
• Voltage 415 Volts, 3 Phase, 50 Hz

4.4.3.12 **THROUGHFEED EDGE BANDING MACHINE MODEL SMFB60C**
  1 Machine
• Panel length Minimum 120mm (PVC)
• Panel width Minimum 60mm
• Panel thickness 10-60 mm
• Edge Width 15-65 mm
• Edge Thickness 0.4 – 15 mm
• Feeding Speed 12 / 18 m/ min
• Input Voltage 380 V
• Total Power Consumption 8.18 Kw
• Required Air Pressure 0.7 Mpa
• Net Weight 1450 Kg
• Overall Dimensions 3860 x 850 x 1380 mm

4.4.3.13 **Finishing Line 8’ Spray Booth Water Curtain** 1 set

8 feet Water curtain Booth with stainless construction along with suitable pressurized air supply system, 2 nos. spray pumps with guns and one drayer along with pneumatic sanders, down draft table – 1 lot
• Effective area 8ft x 5 ft x 6 ft
• Extraction system One number of Centrifugal blower with electric motor having capacity of 9000 m³/hr
• Water circulation system suitable centrifugal pump, flow capacity 12000 LPH with 12 meter head, spray nozzles with baffle system.
• Infra Red Drying Oven 12ft x 12ft x 8 ft height
• Temperature control 40 to 60°C
• Temperature Distribution 4 circulation fans.
4.4.3.14 CENTRALISED DUST COLLECTOR MODEL SMF 902001 set

- SUITABLE FOR 20 WORKING POINTS
- COMPLETE WITH DUCTING AND CONNECTION IN THE DOOR FACTORY BUILDING AS PER DRAWING.
- Engine power: 11 Kw
- Rotation speed: 1120 rpm
- Air delivery: 20723 m$^3$/hr
- Air pressure: 1138.8 Pa
- Filter Bags: D150 x 1800 x 110 pcs
- Inlet size: D550
- Collection Tank: 15 m$^3$
- Overall dimension: 4200 x 2200 x 4000 mm
- Net weight: 1580 Kg

4.4.3.15 HYDRAULIC DOOR AND WINDOW ASSEMBLING MACHINE 1 MACHINE

- Max assembled size: 1220 x 2440 mm
- Oil pump power: 4 Kw
- Up pressure cylinder: Ø50 x 250st x pcs 4
- Up pressure: 4t x 4 pcs
- Side pressure cylinder: Ø50 x 250 st x pcs 2
- Side pressure: 4t x 2 pcs
- Overall dimensions: 3230 x 1900 x 1620 mm
- Net weight: 1300 Kgs

4.4.3.16 Air Compressor with line 1 set

- Make: ELGI
- Model: E22-10
- Capacity: 108 CFM
- Maximum pressure: 10kg/cm$^2$
- Nos of stage: single stage
- Drive: 22 Kw
- Including air line fitted in the entire factory building (each pillar should have arrangement so that any equipment is connected from any point)

4.4.3.17 Wide Belt Sander 1 no

- Width of the sanded panel: 40-1300 mm
- Thickness of sanded panel: 2.5 – 80 mm
- Speed of Abrasive belt – 1$^{st}$ unit: 19.5 m/s
- Speed of Abrasive belt – 3$^{rd}$ unit: 16 m/s
- Feeding speed: 4-18 m/min
- Total Motor Power: 69.9 kW
4.4.3.18 **Uneven surface sanding Machine**  1 no

- Width of the Door  1250mm
- Maximum Height  150mm
- Conveyor speed  5-25m/min
- Speed of ruler  600-1500rpm
- Total power  5 KW

4.4.4 **Maintenance schedule, Safety Measures & Inventory schedule of Door Manufacturing Machines**

4.4.4.1 **CUT-OFF-SAW MODEL VM2610**  1 Machine

b. Maintenance Schedule
   Daily (after 16 hours operation):
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Circular Saw blade safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. FRL unit (air pressure regulator and filter set)  4 sets
   ii. Saw blade lift and fall cylinder  4 sets

4.4.4.2 **STRAIGHT LINE RIP SAW MODEL MJ154**  2 machines
Maintenance Schedule
Daily (after 16 hours operation) :-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Circular Saw blade and planner saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. Rubber Roller 20 pcs
   ii. Voltage regulator transformer 1 no
   iii. Circular Saw Blade (300mm x 3.5 mm x 50 mm) 50 nos
   iv. HSS Planner Blades 100 nos

4.4.4.3 DOUBLE SIDE PLANNER MODEL SDSP-610 1 Machine

a. Maintenance Schedule
   Daily (after 16 hours operation) :-
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Planner Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule
   i. Rubber Roller 20 pcs
   ii. HSS Planner Blades 100 nos

4.4.4.4 HIGH SPEED ROUTER WITH AUTO FEEDER MODEL MX506

a. Maintenance Schedule
   Daily (after 16 hours operation) :-
   - Check the electrical control system and mechanical system to see if any part is in safety state.
   - Check the tension of all driving belts, sharpness of blades etc.
   - Oiling every part
   - Test run the machine in idle condition to inspect its function.
   - Through cleaning of saw dust from every corner of machine especially in the electric control equipment.
   Weekly (after 96 hours operation) :-
   - Tighten all nuts and bolts.
   - Check gear box and other drive system.
   - Tighten all screw and connection of electrical control system.

b. Safety measures
   - Sharp tools safety guard is attached to the machine.
   - Emergency stop switch is located near the operator and other easy reach positions.
   - All the electrical connections are through safety gears and regulators.
   - Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
   - Workers are properly trained by the supplier of the machine.

4.4.4.5 SPINDLE MOULDER WITH TILTING SPINDLE AND SLIDING TABLE WITH AUTO FEEDER (FOUR ROLLERS) MODEL SMXQ5118H
   1 set
a. Maintenance Schedule

Daily (after 16 hours operation) :-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test runs the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Sharp tools safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

4.4.4.6 SINGLE END(5 SPINDLES) TENONING MACHINE MODEL SET-
I Machine

Maintenance Schedule

Daily (after 16 hours operation) :-
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation) :-
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures
- Sharp tools safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.
4.4.4.7 BEAM SAW

1 machine

a. Maintenance Schedule

Daily (after 16 hours operation):

- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):

- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures

- Saw blade safety guard is attached to the machine.
- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule

i. Saw Blade- 1 set

4.4.4.8 Wide Belt Sander

1 no

a. Maintenance Schedule

Daily (after 16 hours operation):

- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation):

- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures

- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule

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<tr>
<th>No.</th>
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<tr>
<td></td>
<td>V-Belt A81</td>
<td>8 no</td>
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<tr>
<td></td>
<td>V-Belt A78</td>
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<td>2</td>
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<td>3</td>
<td>Limit for Conveyor Belt Tracking</td>
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<tr>
<td>4</td>
<td>Contractor 110V-AC, 15A Conveyor Up/Down 3 pole + INC2 pcs</td>
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</tr>
<tr>
<td>5</td>
<td>Graphite Pad</td>
<td>2 nos</td>
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<tr>
<td>6</td>
<td>Graphite Felt</td>
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<tr>
<td>7</td>
<td>Planner Tips</td>
<td>425Pcs</td>
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</table>

**4.4.4.9 Uneven surface sanding Machine**

1 no

a. Maintenance Schedule

Daily (after 16 hours operation): -
- Check the electrical control system and mechanical system to see if any part is in safety state.
- Check the tension of all driving belts, sharpness of blades etc.
- Oiling every part
- Test run the machine in idle condition to inspect its function.
- Through cleaning of saw dust from every corner of machine especially in the electric control equipment.

Weekly (after 96 hours operation): -
- Tighten all nuts and bolts.
- Check gear box and other drive system.
- Tighten all screw and connection of electrical control system.

b. Safety measures

- Emergency stop switch is located near the operator and other easy reach positions.
- All the electrical connections are through safety gears and regulators.
- Workers are provided with uniform, industrial shoes, helmet, eye protection goggles and musk.
- Workers are properly trained by the supplier of the machine.

c. Inventory schedule

<table>
<thead>
<tr>
<th>No.</th>
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<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
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<td>V-Belt B84</td>
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<td></td>
<td>V-Belt A81</td>
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<td></td>
<td>V-Belt A78</td>
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<tr>
<td>2</td>
<td>Sanding Belt Tracking Sensor</td>
<td>4 nos</td>
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<tr>
<td>3</td>
<td>Limit for Conveyor Belt Tracking</td>
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<tr>
<td>5</td>
<td>Graphite Pad</td>
<td>2 nos</td>
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<tr>
<td>6</td>
<td>Graphite Felt</td>
<td>2 nos</td>
</tr>
<tr>
<td>7</td>
<td>Planner Tips</td>
<td>425Pcs</td>
</tr>
</tbody>
</table>
5. ORGANIZATION SETUP

The TFDPC Industrial Estate is headed by General Manager. He is assisted by Unit in-charges, shop floor supervisors, technical personals, Quality control, marketing, administrative, accounts, HR section in-charges for fulfilling target & discharging duties. Accounts staff, clerical staff, mechanics, machine operators, trained workers & carpenters etc comprises the workforce of the Estate.

Organogram of TFDPC Industrial Estate
5.1 TFDPC INDUSTRIAL ESTATE

5.1.1 Status of Human Resource at TFDPC IE (Management & Supervision level)

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Present status</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Manager</td>
<td>Overall management of the Industrial Estate</td>
<td>General Manager Posted</td>
</tr>
<tr>
<td>Marketing Manager</td>
<td>Marketing of the Products</td>
<td>General Manager directly monitor the marketing of Products</td>
</tr>
<tr>
<td>Accounts Manager</td>
<td>Accounts &amp; billing and budget</td>
<td>Dy. Manager is functioning as DDO</td>
</tr>
<tr>
<td>Quality Control</td>
<td>Raw Material, In process Parameters &amp; product quality</td>
<td>Dy. Manager (Quality Control)</td>
</tr>
<tr>
<td>HR, Training &amp; safety Manager</td>
<td>Human Resource Development, Training &amp; safety operation including labour welfare</td>
<td>General Manager is monitoring the function</td>
</tr>
</tbody>
</table>

5.2 TIMBER TREATMENT PLANT

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>Overall management of the Unit including Production</td>
<td>Dy. Manager</td>
</tr>
<tr>
<td>Maintenance Manager</td>
<td>For Utility service and maintenance of all factories</td>
<td>Sr. Manager</td>
</tr>
<tr>
<td>Quality Control</td>
<td>Raw Material, In process Parameters &amp; product quality</td>
<td>Dy. Manager (Quality Control)</td>
</tr>
</tbody>
</table>

5.3 TRIPURA RUBBER WOOD FACTORY

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>Overall management of the Unit including Production</td>
<td>Sr. Manager</td>
</tr>
<tr>
<td>Maintenance Manager</td>
<td>For Utility service and maintenance of all factories</td>
<td>Sr. Manager</td>
</tr>
<tr>
<td>Quality Control</td>
<td>Raw Material, In process Parameters &amp; product quality</td>
<td>Controlled centrally by Dy. Manager (Quality Control)</td>
</tr>
<tr>
<td>Production and maintenance Supervisor</td>
<td>For shop floor supervision of production &amp; maintenance activities</td>
<td>Sr. Manager</td>
</tr>
</tbody>
</table>

5.4 UNAKOTI CRAFTS AND FURNITURE UNIT

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>Overall management of the Unit including Production</td>
<td>Dy. Manager</td>
</tr>
<tr>
<td>Maintenance Manager</td>
<td>For Utility service and maintenance of all factories</td>
<td>Dy. Manager</td>
</tr>
<tr>
<td>Quality Control</td>
<td>Raw Material, In process Parameters &amp; product quality</td>
<td>Controlled centrally by Dy. Manager (Quality Control)</td>
</tr>
<tr>
<td>Production and maintenance Supervisor</td>
<td>For shop floor supervision of production &amp; maintenance activities</td>
<td>Dy. Manager</td>
</tr>
</tbody>
</table>

5.5. DOOR MANUFACTURING UNIT

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>Overall management of the Unit including Production</td>
<td>Sr. Manager</td>
</tr>
</tbody>
</table>
### 5.6 BAMBOO DEVELOPMENT UNIT

<table>
<thead>
<tr>
<th>Position</th>
<th>Function &amp; responsibly</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Manager</td>
<td>Overall management of the Unit including Production</td>
<td>Dy. Manager (QCO) as additional duty</td>
</tr>
<tr>
<td>Quality Control</td>
<td>Raw Material, In process Parameters &amp; product quality</td>
<td>Controlled centrally by Dy. Manager (Quality Control)</td>
</tr>
<tr>
<td>Production and maintenance Supervisor</td>
<td>For shop floor supervision of production &amp; maintenance activities</td>
<td>Supervisor Technical</td>
</tr>
<tr>
<td>Production and maintenance Supervisor (2 nos)</td>
<td>For shop floor supervision of production &amp; maintenance activities</td>
<td>Managed by Machine operators</td>
</tr>
</tbody>
</table>

### 6. Training Schedule

6.1 Safety & Fire Drill – April every year  
6.2 Health Camp – May and November every year  
6.3 Training for technical competency - as and when required.

### 7. Material flow

7.1. **Tree felling schedule:** Based on the production target Division/Plantation Centre wise  
Rubber Tree felling schedule is fixed in the Annual Action Plan. The parameters like Age of Tree, Tree density -Nos of tree per hectare, Yield per Block per year, re-plantation schedules etc. are considered while preparing Tree Felling Schedule.

7.2. **TREE FELLING & TRANSPORTATION**: Tree felling & transportation is done by Division Manager of respecting divisions. Rubber logs to be felled as per Tree felling Schedule and transported to Factory within 36 hours.

7.3. **RECEIPT OF RUBBER LOG**: Logs passing through the quality parameters are measured and received at TTP & TRWF. After receipt, Stock entry of each log including volume is made in LOG RECEIPT REGISTER on daily basis. The following parameters are checked while receiving of logs.

- The felling schedule  
- Length of log between 1m to 4m  
- Centre Girth of log not below 60cm  
- Tapping marks not more than 10%  
- No knots & branches  
- Time of felling not more than 36 hrs
Raw Material Store keeper. Daily monitoring by shop floor supervisor and monthly monitoring by in-charge of the unit. Rejection decision by Unit in-Charge.

7.4. **Sawing of log:-** Log received are issued by Raw Material Store Keeper to shop floor supervisor for conversion. Volume of converted timber is recorded in LOG CONVERSION REGISTER on daily basis by Raw Material Store Keeper based on daily report submitted by Machine Operator duly authenticated by Shop Floor Supervisor. Production planning is done by General Manager based on demand. Conversion at this stage is 30% to 35% depending on size of Timber swan. Sizing & resizing as per production planning by General Manager Raw Material Store keeper. Daily monitoring by machine operator duly countersigned by shop floor supervisor and monthly monitoring by in-charge of the unit. Rejection decision by Unit in-Charge.

7.5. **Treatment of Timber:-** Swan timber is treated with chemicals of definite mix and definite concentration under specific pressure and time. Batch No is provide for each treatment quantum of timber. Periodic re-filling of chemicals to maintain concentration is done and laboratory test of each batch is done to confirm required chemicals absorption. 1.5% boric acid equivalent of Concentration of treatment Chemicals solution. 6-8 Kg of chemicals absorption per Cubic Mtrs of Timber. Machine Operator is responsible for maintenance of time schedule of treatment at specific pressure. (8 Kg/cm² for 2.5 Hrs). Quality Control in-charge confirms the treatment.

7.6. **Seasoning of Timber**

Timber is loaded to seasoning kilns once treatment is confirmed by Quality control in-charge. Hot air under controlled temperature and moisture is circulated in the kilns for seasoning of timber. The temperature and moisture in maintained as per schedule. The moisture content of seasoned timber is kept at 10%.

Hot water Generator & Kiln Operators are responsible for maintaining 24 hours temperature schedule. The machine operator for maintaining quantity and moisture content of the timber.

7.7. **Finger jointing of Timber:** - Timber from kiln are taken to process hall and sorted for defect. Defect portion is removed by cross cut saw. Then timber passed through 4 side planer. 4 side planed timber is sorted to different categories. Then lamina of required length is produced in the Finger Joint Unit. Sorting of Three categories namely
   A- both side clear
   B- one side clear and one side taping mark
   C- both side tapping mark
   D- Pin hole not more than 5% and broken finger not more than 1%.

7.8. **Board Composing:** - Lamina produced are planed through six head planer and then composed in the composer to produced 8ft x 4 ft boards. No gap between two lamina. No matching of different categories of lamina.

7.9. **Finishing & Sizing:** - The lamina so produced in the finger joint machine is again planned in six head moulder. The planned lamina is then passed though glue applicator to spread a thin layer of glue and than composed in composer to produce 8ft x 4ft boards of thickness 12mm, 15mm, 18mm, 22mm, 25mm, 30mm and 35mm. The boards produced are than graded according to the size and category.

7.10. **Furniture & Door Making:** - The product of Tripura Rubber Wood Factory and Timber Treatment Plant and issued to Unakoti Crafts & Furniture Unit And Door
manufacturing Unit by Challan as per worksheet issued to Carpenter Self Help Groups or Work Order issued to PPP model partners. The quality of the furniture / doors produced is certified by Quality Control Manager.

Furniture making process is monitored as follows.

a. Estimate for cost of production of furniture and doors as per design, which includes cost of timber, boards, wages, materials, supervision charges, machine rent, profit component etc are prepared by a committee comprising carpenters, PPP model partners and official of TFDPC Industrial Estate headed by Dy. Manager, Quality control.

b. The estimated cost of furniture is submitted to the Managing Director for approval.

c. The Dy. Manager, UCF prepares worksheet as per estimate mentioning quantity of furniture to be prepared, quantity of timber and boards requires, wages component, materials in details, name of SHG etc.

d. General Manager Issue worksheet

e. Timber and Boards are issued by TRWF and TTP as per worksheet

f. Machining of timber or boards is done in UCF and Door Unit.

g. Dy. Manager, QCO checks the quality of furniture after assembling and finishing of furniture.

h. Stock entry of furniture manufactured is done by Dy. Manager, UCF.

i. Payment of wages and other materials to SHG is made by Estate Manager after deducting machine rent.

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