

The background features several large, overlapping, colorful swirls in shades of purple, green, and blue. Scattered throughout are numerous small, yellow, triangular shapes that resemble confetti or starbursts.

**TECHNOLOGY DEVELOPMENT FOR**

**THE MANUFACTURE OF PARTICLE BOARD**

**USING TENDER COCONUT FIBRE**



# THE PROJECT

- Implementing agency

PSG Polytechnic College  
Peelamedu  
Coimbatore

- Collaborator

Coir Board  
Coir House, M.G.  
Road,  
Ernakulam  
Kochi – 682 016  
Ph:0484-2351807

# OBJECTIVES

- **TO DEVELOP LOW COST AND ECOFRIENDLY COIR PRODUCTS FROM TENDER COCONUT.**

**TO DEVELOP SUITABLE POLYMERS FOR THE MANUFACTURE OF PARTICLE BOARD**

- **TO DEVELOP PROCESS AND TECHNIQUES FOR MASS PRODUCTION**

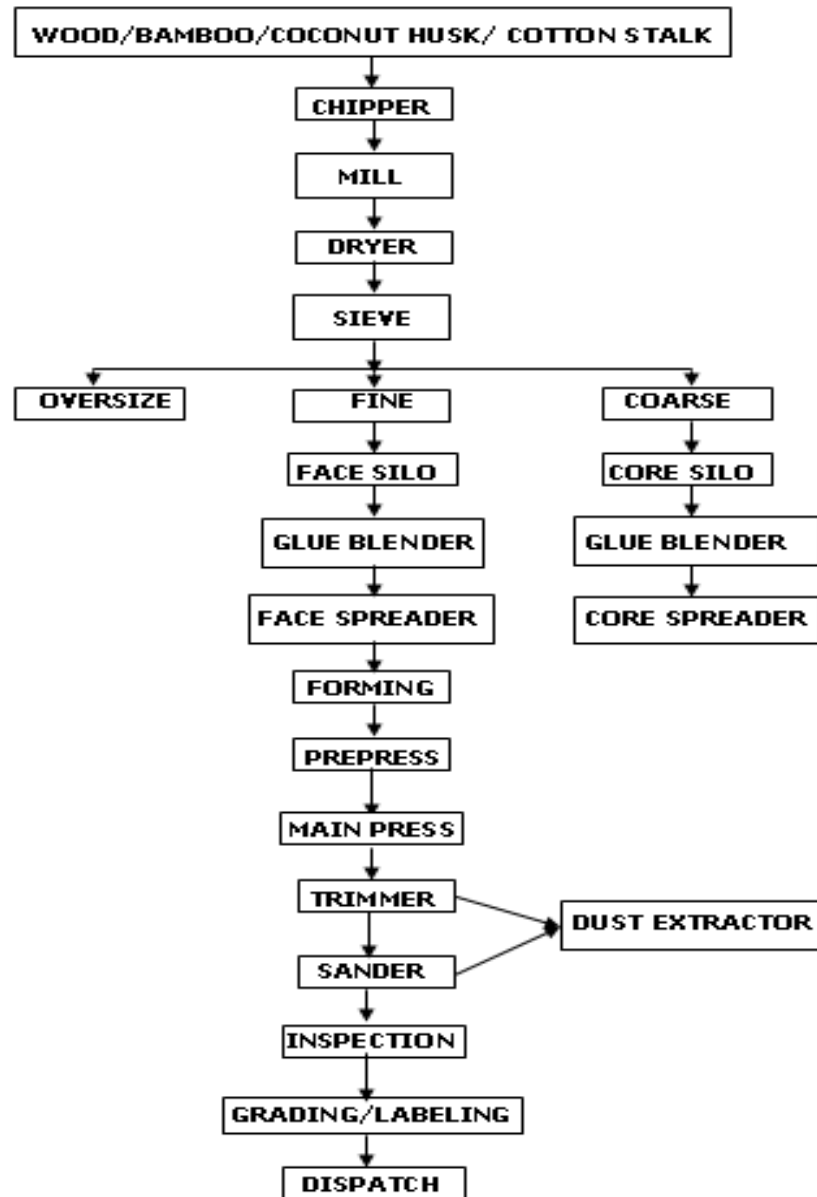
- **TO ASSESS THE POTENTIAL APPLICATIONS**

A decorative graphic on the left side of the slide features three balloons in light green, light blue, and light purple. Each balloon has a yellow string and several yellow triangular shapes radiating from it, resembling sunbeams or confetti. The balloons are arranged vertically, with the green one at the top, the blue one in the middle, and the purple one at the bottom.

# Tender Coconut Fibers

- Abundantly available fibre from Metro
- Neglected Source in coconut group
- Difficulty in extraction

# BOARD PREPARATION



# UNIQUE FEATURES OF THE MACHINE

- CHIPPER

- § Designed with 2 Fly Knives and 1 Dead Knife

- § Uniquely developed for this application



**PROCESS**

**IN**

**DETAIL**

# CONVEYING THE RAW MATERIAL FOR CHIPPING

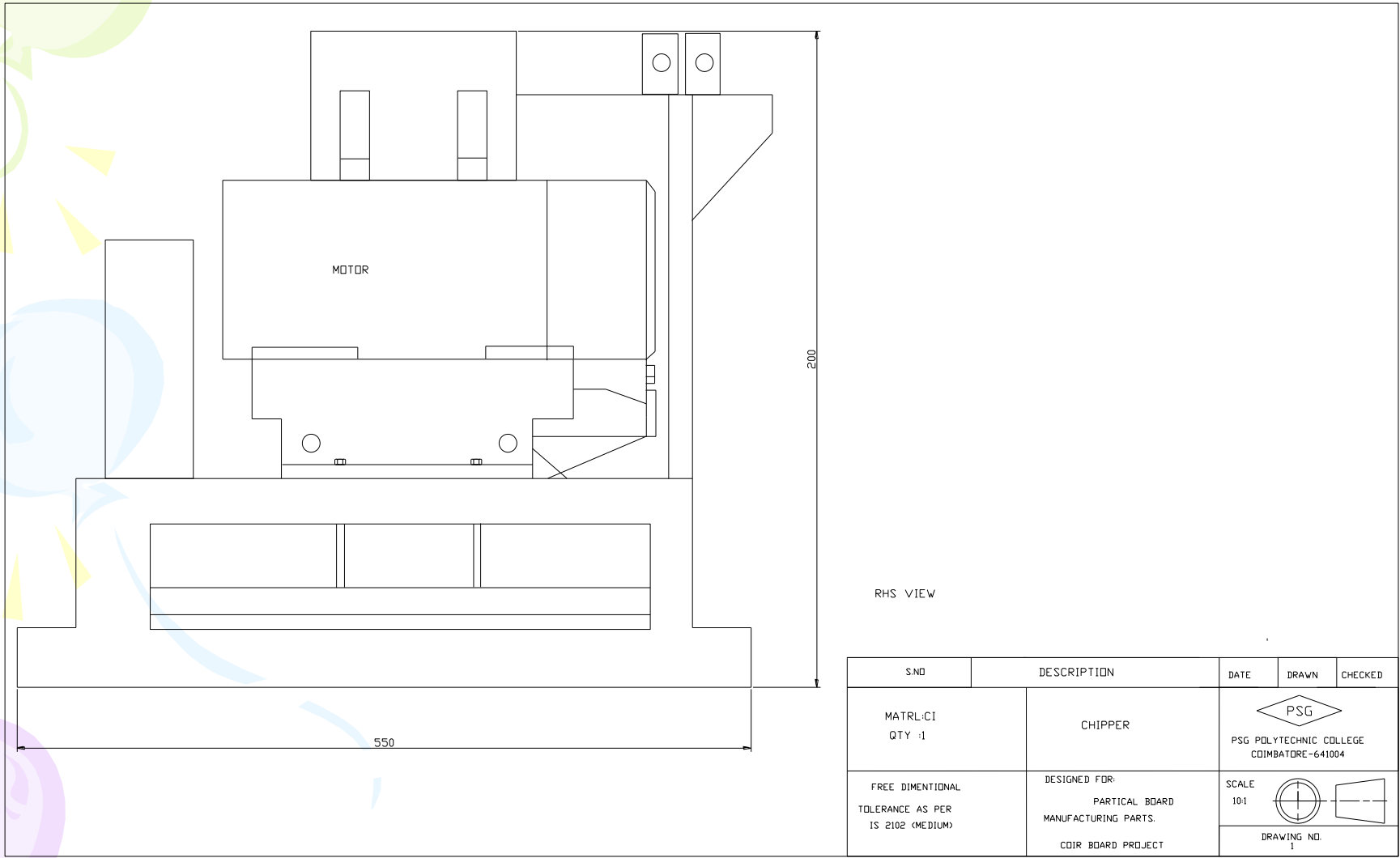



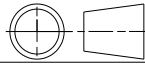


# CHIPPER

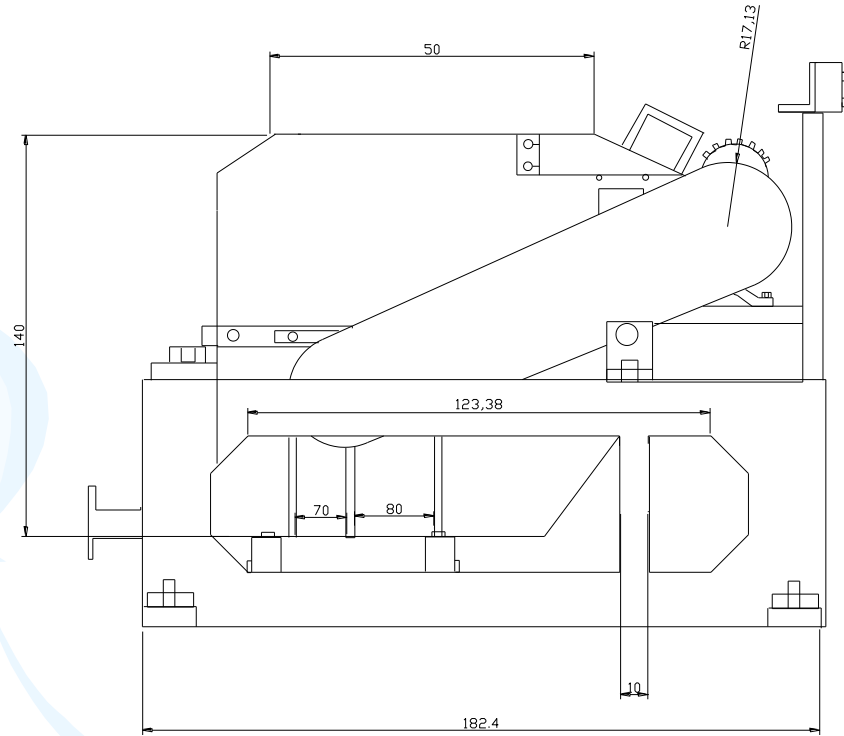



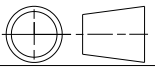
# CHIPPER



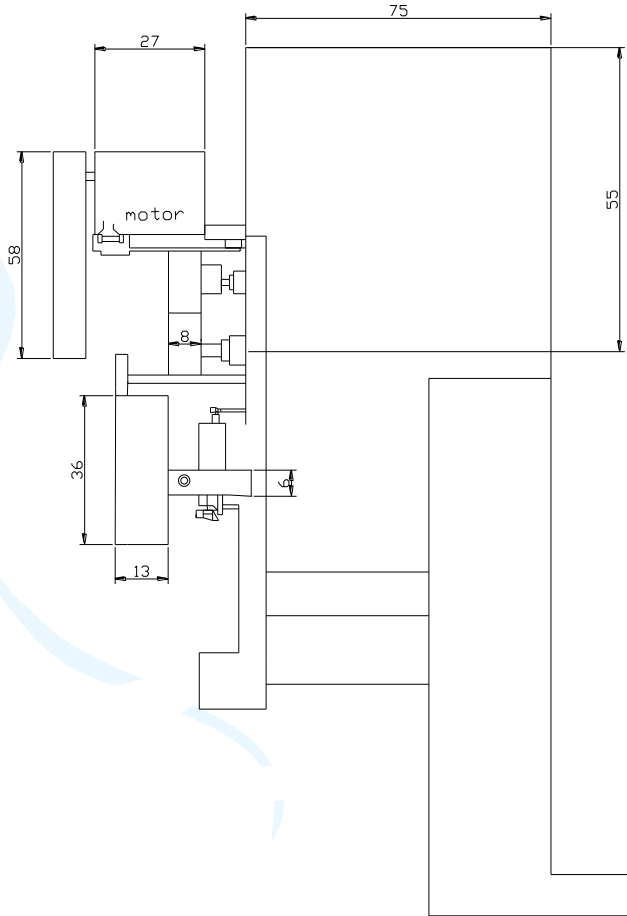
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MATRL:CI QTY :1	CHIPPER	 PSG POLYTECHNIC COLLEGE COIMBATORE-641004		
FREE DIMENSIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR:	SCALE		
	PARTICAL BOARD MANUFACTURING PARTS.  COIR BOARD PROJECT	10:1		
		DRAWING NO. 1		

# CHIPPER


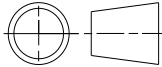


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FREE DIMENSIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTIAL BOARD MANUFACTURING PARTS.	SCALE 10:1		
	CDIR BOARD PROJECT	DRAWING NO. 1		

# CHIPPER



LHS VIEW

S.NO	DESCRIPTION	DATE	DRAWN	CHECKED
MATL:CI QTY : 1	CHIPPER	 PSG POLYTECHNIC COLLEGE COIMBATORE -641004		
FREE DIMENSIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTIAL BOARD MANUFACTURING PARTS.	SCALE 10:1		
	COIR BOARD PROJECT	DRAWING NO. 1		

# CONVEYING TO MILLER





# MILLER

- ▶ Knife ring flakers

- ▶ An outer ring with 26 knives rotate in clockwise direction

- ▶ Inner impeller with 8 beaters rotate in anticlockwise direction.

# MILLER

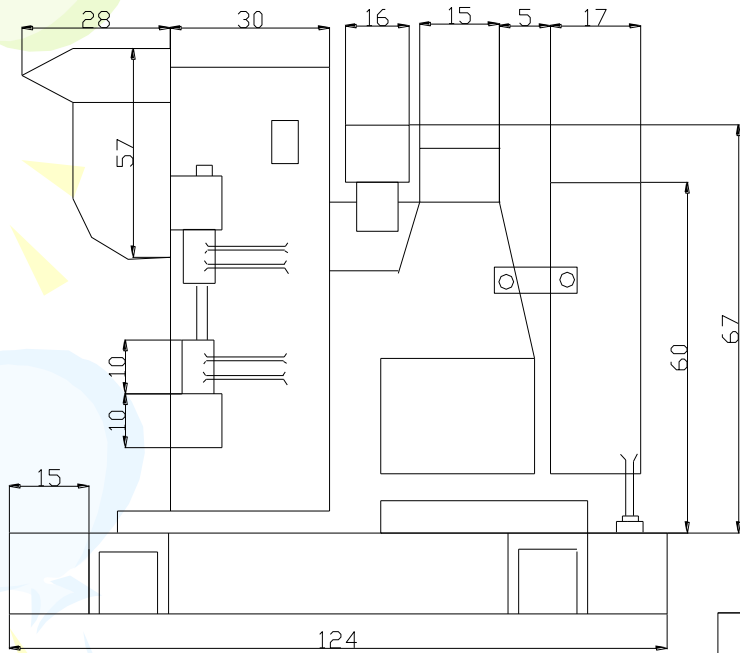



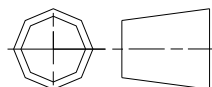
# MILLER



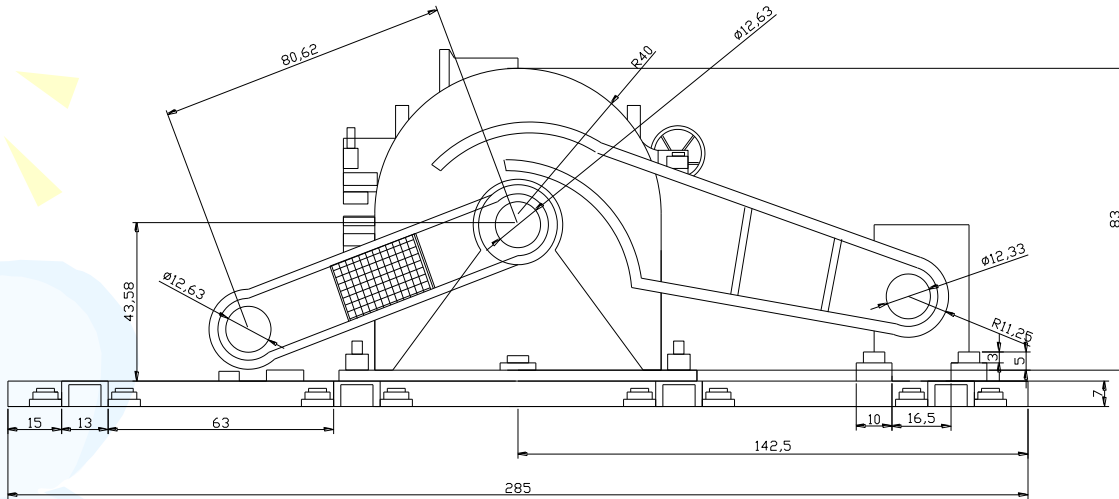



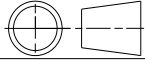
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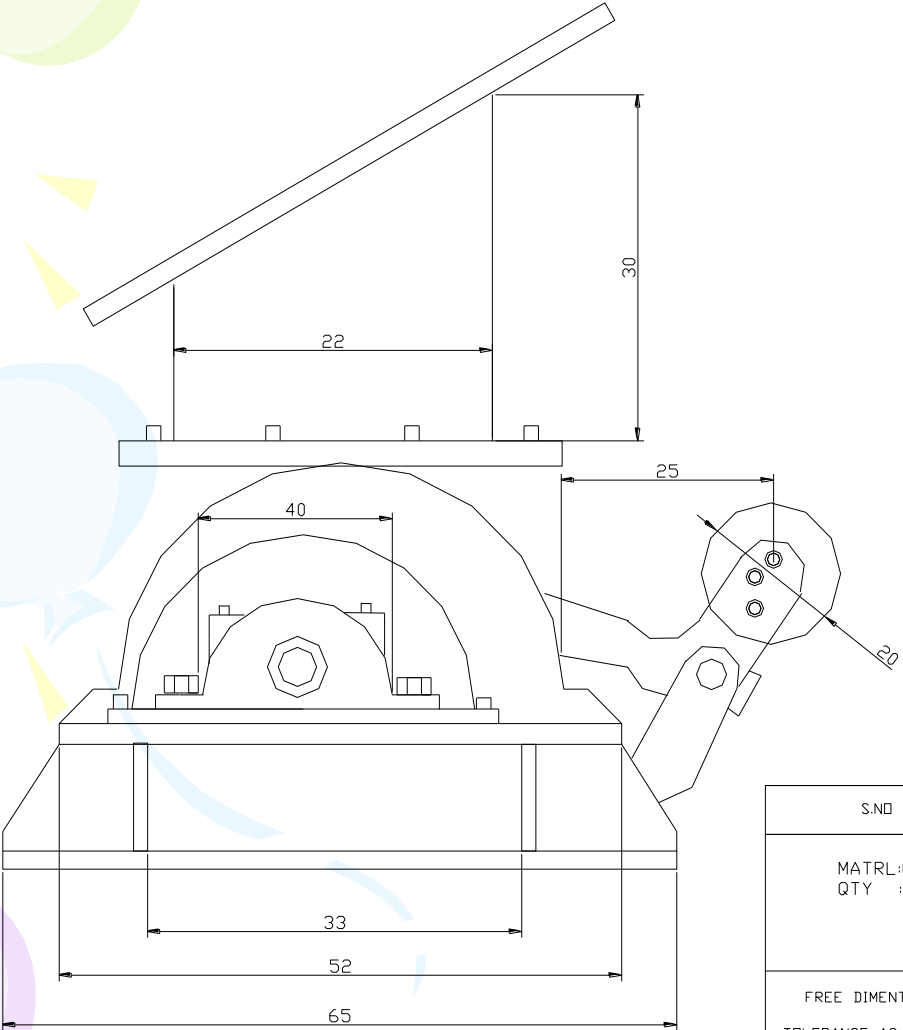
S.NO	DESCRIPTION	DATE	DRAWN	CHECKED
MATRL:CI QTY:1	MILLER		 PSG POLYTECHNIC COLLEGE COIMBATORE-641004	
FREE DIMENTIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR:  PARTICAL BOARD MANUFACTURING PARTS.  COIR BOARD PROJECT	SCALE 10:1		
		DRAWING NO. 1		

# MILLER


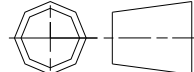


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FREE DIMENTIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTICAL BOARD MANUFACTURING PARTS. COIR BOARD PROJECT	SCALE 10:1	 DRAWING NO. 1	

# MILLER



RHS VIEW

S.NO	DESCRIPTION	DATE	DRAWN	CHECKED
MATL:CI QTY :1	MILLER	 PSG POLYTECHNIC COLLEGE COIMBATORE-641004		
FREE DIMENTIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR:  PARTICAL BOARD MANUFACTURING PARTS.  COIR BOARD PROJECT	SCALE 10:1		
		DRAWING NO. 1		

# CONVEYOR TO DRIER





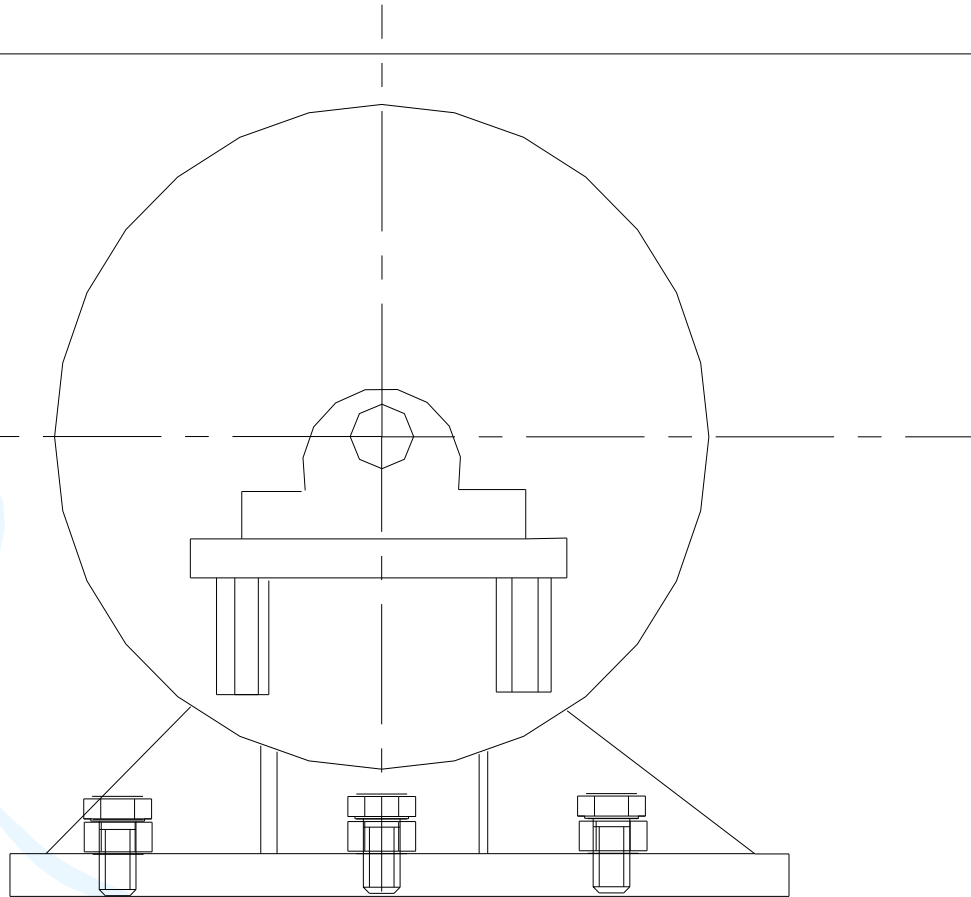
# DRYER


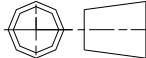
- Thermic fluid based working
- Working temperature (110°C–150°C)
- Feeding from top & discharge from bottom side

# DRIER



# DRYER



SNO	DESCRIPTION	DATE	DRAWN	CHECKED
MATL:CI QTY :1	DRYER			
FREE DIMENTIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTICAL BOARD MANUFACTURING PARTS. COIR BOARD PROJECT	SCALE 10:1		DRAWING NO. 1

# CONVEYOR TO SIEVE







# SIEVE

- 3 stage separator
- Fine, coarse oversize
- Built in conveyor available for feeding

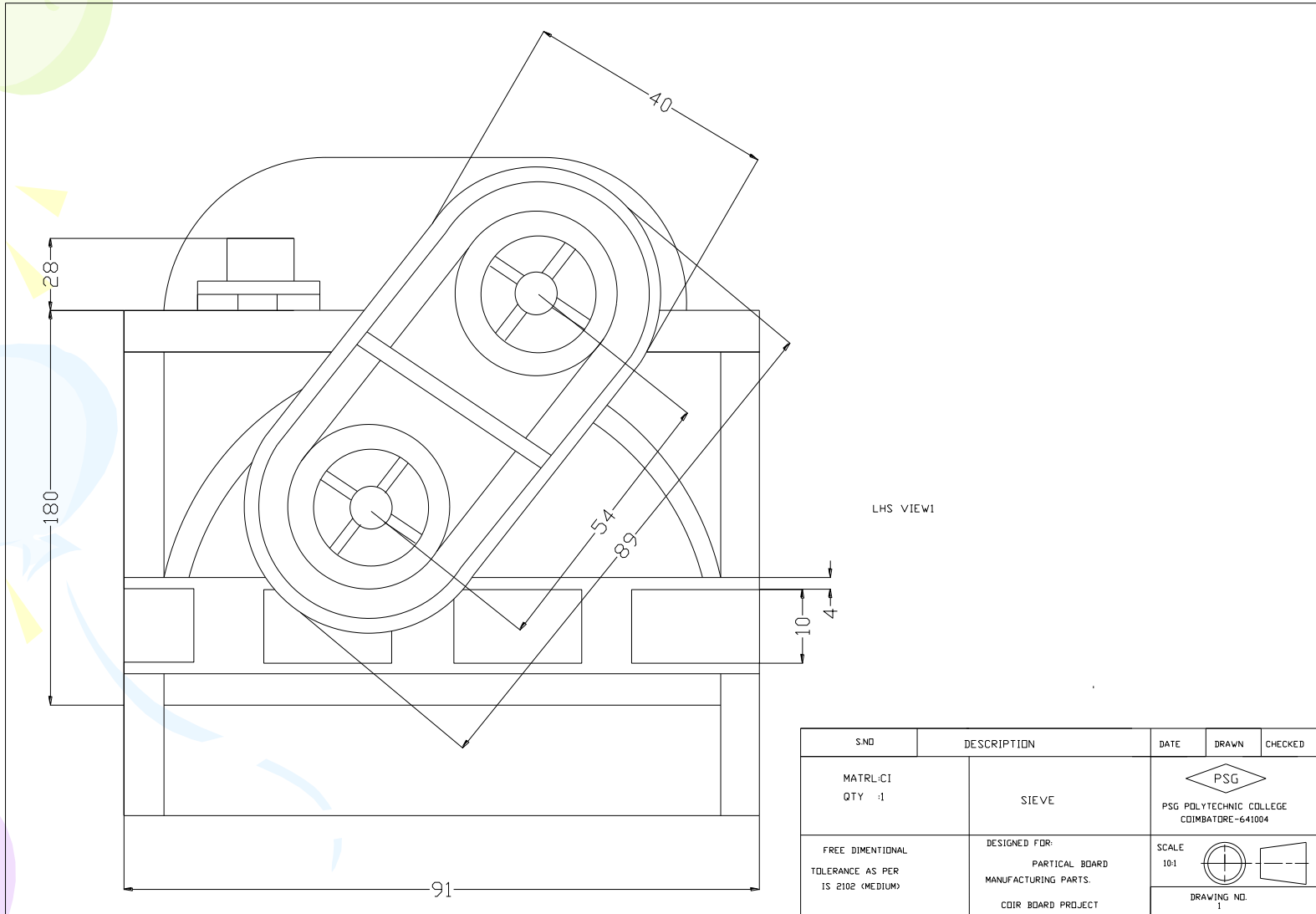
# SIEVE


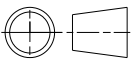


# SIEVE



# SIEVE



SNO	DESCRIPTION	DATE	DRAWN	CHECKED
MATL:CI QTY :1	SIEVE	 PSG POLYTECHNIC COLLEGE COIMBATORE-641004		
FREE DIMENSIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTIAL BOARD MANUFACTURING PARTS. CDIR BOARD PROJECT	SCALE 10:1	 DRAWING NO. 1	

# FROM SIEVE TO SILO





# BLENDING PROCESS

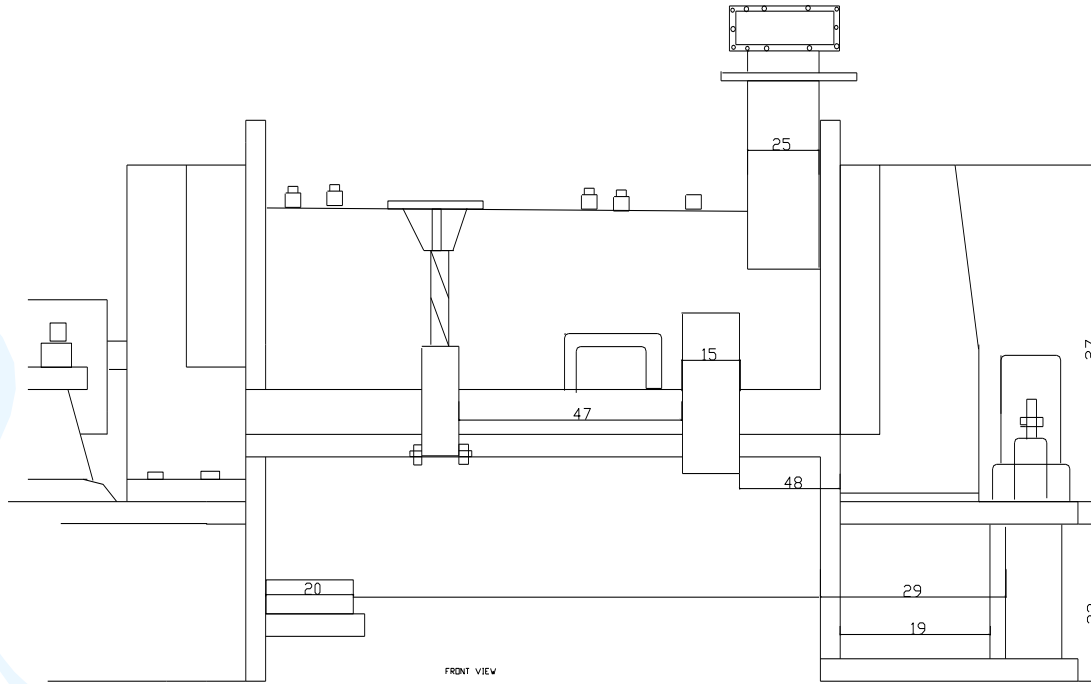
- **A Special glue has been developed exclusively for this project keeping in view the properties of the raw material**

Materials:

1. Urea Formaldehyde
2. Wax Emulsion
3. Synthetic Resin
4. Ammonium Chloride

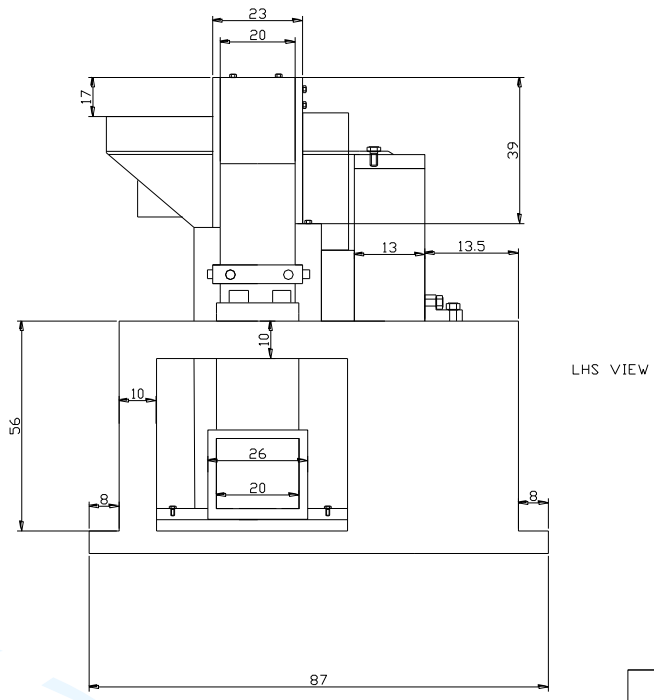
In a unique combination


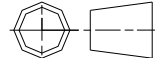
# GLUE GENDER



SNO	DESCRIPTION	DATE	DRAWN	CHECKED
MATELICI QTY: 1	GLUE GENDER		PSG	
FREE DIMENSIONAL TOLERANCE AS PER IS 2192 (MEDIMUM)	DESIGNED FOR: PARTICAL BOARD MANUFACTURING PARTS COIR BOARD PROJECT		101	
			SCALE	DRAWING NO.
			1:1	1

# GLUE BLENDER



S.NO	DESCRIPTION	DATE	DRAWN	CHECKED
MATERIAL:CI QTY :1	GLUE BLENDER	 PSG POLYTECHNIC COLLEGE COIMBATORE-641004		
FREE DIMENTIONAL TOLERANCE AS PER IS 2102 (MEDIUM)	DESIGNED FOR: PARTICAL BOARD MANUFACTURING PARTS.	SCALE 10:1		
	COIR BOARD PROJECT	DRAWING NO. 1		



# GLUE BLENDER





# SPREADING MACHINES

- Mechanical spreaders
- Storage cum discharge banker fitted with equalizing & spreader rollers

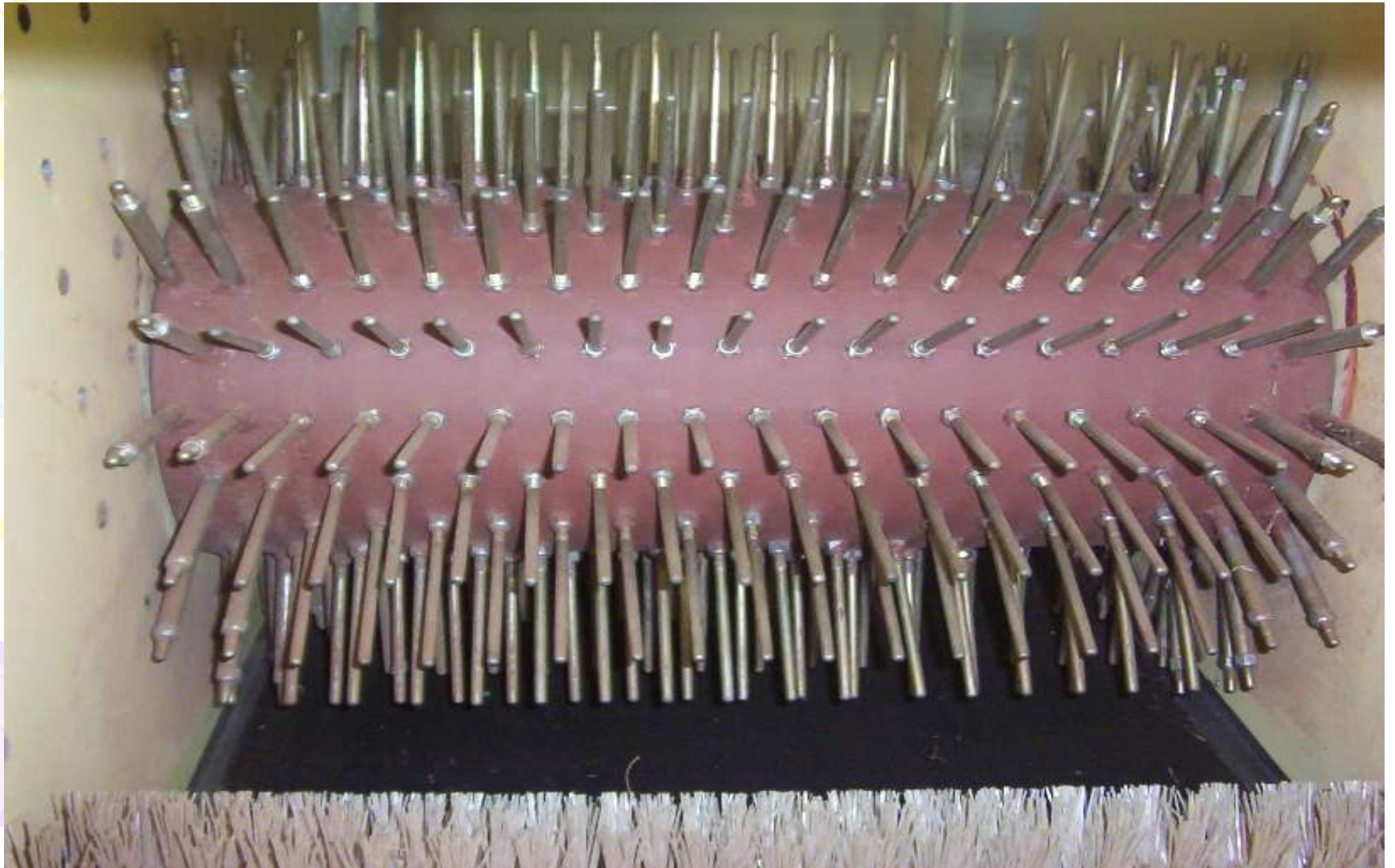
# EQUALISING AND SPREADING UNITS



# EQUALISING AND SPREADING UNIT(FINE)



# EQUALIZER



# TROLLEY FOR COLLECTING THE BLENDED HUSK



# TROLLEY AND DAY LIGHT PRESS



# DAY LIGHT PRESS





# PRESS' HOSES FOR HEATED OIL CIRCULATION



# SOURCE OF HEATED OIL CIRCULATION



# THERMOPAC



# PRODUCT



# RAW MATERIAL

Type : Tender Coconut fibre

Required Qty : 300 Kgs / hour

# USAGE OF HUSK BY THE RETAILERS

CITY	AS FUEL	PAY TO GET IT CLEARED	GIVES IT AWAY	DUMPS (OR) GARBAGES BINS
Bangalore	13.5%	2.2%	53%	29.7%
Chennai	18.7%	—	15.9%	64%
Kolkata	—	7%	9%	84%
Mumbai	—	—	—	100% By paying municipal sweepers

In Chennai & Kolkata - willing to make arrangements to collect the husk at a single point

Chennai : 18.2% - 25 Paisa, 81.8% - 50 Paisa

Kolkata ; from 25 paisa – 1.50/unit

# Details of Sales for Tender coconut

<b>CITY</b>	<b>NO. OF TC SOLD BY A SINGLE RETAILER IN A DAY</b>	
	<b>SUMMER</b>	<b>OTHER SEASON</b>
<b>Bangalore</b>	<b>88</b>	<b>57</b>
<b>Chennai</b>	<b>110</b>	<b>64</b>
<b>Kolkata</b>	<b>119</b>	<b>73</b>
<b>Mumbai</b>	<b>153</b>	<b>87</b>

# POTENTIAL TENDER COCONUT FIBRE AVAILABILITY

<b>City</b>	<b>Bangalore</b>	<b>Chennai</b>	<b>Kolkata</b>	<b>Mumbai</b>
<b>Kgs</b>	<b>1,61,205</b>	<b>1,35,870</b>	<b>4,76,388</b>	<b>39,83,850</b>





# Production Details

Raw Material : Tender Coconut  
Fiber

Req. quantity : 300 kgs/hour

# PRODUCTION DETAILS

No. of boards per hour : 16

No. of boards per shift : 64  
at 50% efficiency

No. of boards per month  
@ 50% : 4800

# PRODUCTION DETAILS

Size of the manufactured Board " 2' x 2'

Total No. of boards manufactured  
/ shift : 64

Total area of board manufactured: 256Sq. ft  
/ shift

# PRODUCTION DETAILS

Conveying Time : 03 min

Time required for pressing : 12 min

# LABOUR CHARGES

Man power Reqd/shift : 5

Man hour / shift : 40

Wages @80per person : Rs. 400

Cost of labour / Sq.ft : Rs. 1.56

# COST ANALYSIS

Cost of power in Sq.ft	: Rs. 4.68/Sq.ft
Cost of fuel required / Sq.ft	: Rs. 3.00/Sq.ft
	: Rs. 7.68/Sq.ft
Cost bonding/Sq.ft chemicals	: Rs. 3.46/Sq.ft
Cost of consumables/Sq.ft	: Rs. 0.50/Sq.ft
Manufacturing cost/Sq.ft	: Rs.12.70
Over head charges	: Rs. 3.90
Total charges	: Rs.16.60
Rounding off	: <u>Rs. 17.00/Sq.ft</u>

*Market rate of Particle board manufactured : **Rs.30-35/sq.ft**  
Through other materials*



# PRODUCT QUALITY

- WARPAGE OF THE BOARD NEGLIGIBLE
- TESTED FOR
  - Tensile Strength
  - Density
  - Water absorption
  - Swelling

And found to satisfy the various requirements

# Potential Applications

- As acoustic ceiling for echo reduction in auditoriums
- As a replacement for asbestos roofing in false ceiling applications
- As different types of furniture
- For floor covering in cold atmospheres
- Bathroom doors
- As decorative boards for heavy vehicles





# CONCLUSION

- A unique machine has been designed for converting the waste product from tender coconut into a multipurpose particle board.
- A unique glue blending process has been developed for making the tender coconut fibres suitable for being converted to particle board
- The machine successfully installed and trial runs made.
- The particle board developed meets the requirement for many commercial applications