

MASS COLOURED MEDIUM DENSITY FIBREBOARD FROM ADMIXTURE OF EMPTY FRUIT BUNCHES AND RUBBERWOOD FIBRES: ENHANCED THE BOARD APPEARANCE

by: ROPANDI MAMAT; ASTIMAR ABDUL AZIZ; ANIS MOKHTAR; KAMARUDIN HASSAN and CHOO YUEN MAY

285

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2005

MPOB TT No. 288

Medium density fibreboard (MDF) is a non-structural wood-based panel that is composed of wood fibres bonded together with resin under heat and pressure. The board density ranges from 400 kg m⁻³ to 900 kg m⁻³. At present, Malaysia has 10 MDF plants producing more than one million cubic metre of MDF in 2004.

Most of the MDF plants depend on the supply of rubber wood (RW) as their feedstock. With the declining supply of RW, the Malaysian MDF industry has to search for a new fibre sources in order to sustain their operations in future.

Studies have shown that empty fruit bunches, which are readily available through routine mill operations could be used together with RW as fibre sources for the manufacture of MDF. In line with this, MPOB and BASF (M) Sdn Bhd initiated a collaborative research project on the use of fibres from empty fruit bunches and RW for coloured MDF using the pilot plant facilities at MPOB.

MANUFACTURING PROCESS

A coloured MDF is manufactured using the same processing steps as those of conventional MDF, starting from chipping, refining, glue dosing, drying, mat forming to hot pressing. For coloured MDF, the pigment (of a specified colour code) is homogeneously mixed into the resin prior to spraying the fibres in the blowline of refiner. Figure 1 illustrates the process flow on the manufacture of coloured MDF.

COLOURANT

The colour pigment, which is supplied by BASF (M) Sdn Bhd has an excellent surface activity with the fibres. It creates a colour brilliancy, intensity, smoothness and resistant to ultraviolet rays.

PROPERTIES OF COLOURED MDF

The physical and mechanical properties of coloured MDF and those of the same product devoid of colour pigment (Table 1).

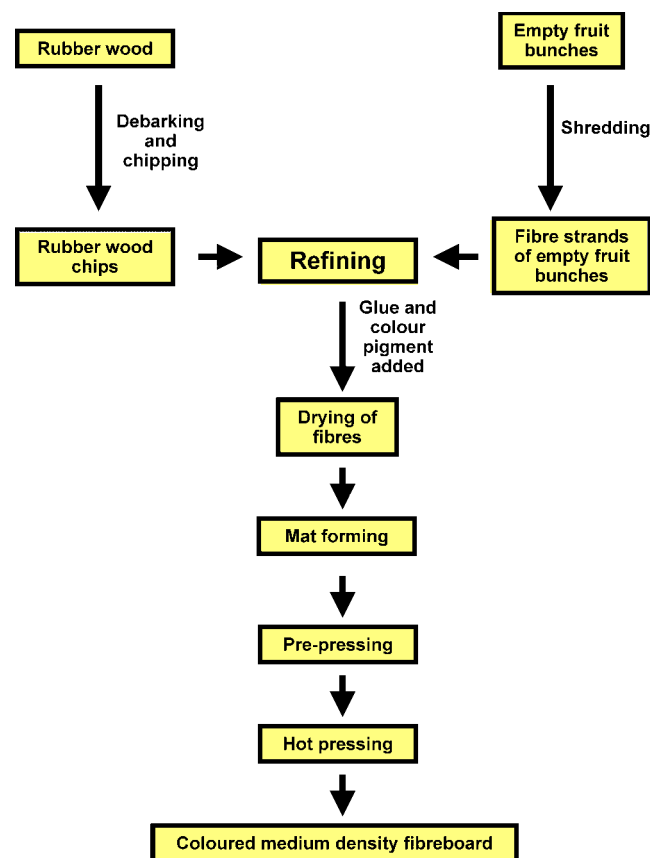


Figure 1. Process flow on the manufacture of coloured medium density fibreboard (MDF) from fibres of empty fruit bunches and rubberwood (RW).

APPLICATIONS

The introduction of coloured MDF will help to create a new niche market, which commands a premium. The resulting board could be cut with different cutting profiles for various applications such as furniture and decorative items. In addition, the cut section possesses the same colour as those of the board, and therefore, it requires minimum surface finishes.

ECONOMIC FEASIBILITY

An estimated cost saving on the use of RW mixed with 30% of empty fruit bunches for the MDF productions (Table 2) and the production costs of coloured MDF (Table 3).

TABLE 1. PROPERTIES OF COLOURED MEDIUM DENSITY FIBREBOARD (MDF) AND MDF DEVOID OF COLOUR PIGMENT

| Amount of empty fruit bunches added to RW (% _w) | Density (kg m ⁻³) | Internal bond (MPa) | Bending strength (MPa) | Thickness swelling (%) |
|---|-------------------------------|---------------------|------------------------|------------------------|
| European Standard: BS-EN (1993) | 400-800 | 0.75 | 24.00 | 8.00 |
| A. MDF devoid of colour pigment | | | | |
| 100:0 | 672.36 | 0.75 | 23.14 | 17.05 |
| 10:90 | 660.51 | 1.26 | 30.12 | 13.77 |
| 20:80 | 679.46 | 1.75 | 29.85 | 13.84 |
| 0:100 | 711.92 | 1.71 | 31.58 | 13.70 |
| B. Coloured MDF | | | | |
| 100:0 | 659.43 | 0.62 | 19.39 | 15.43 |
| 10:90 | 658.52 | 1.31 | 26.79 | 14.32 |
| 20:80 | 699.73 | 1.02 | 28.97 | 15.62 |
| 0:100 | 713.08 | 1.58 | 24.40 | 13.70 |

TABLE 2. A COST SAVING ON THE USE OF RUBBERWOOD (RW) MIXED WITH 30% EMPTY FRUIT BUNCHES (based on the production capacity of 60 000 m³ yr⁻¹)

| | RW (100%) | RW (70%) and empty fruit bunches (30%) |
|--|--------------|--|
| 1 Amount of raw materials consumed (yr ⁻¹) | 96 000 t | RW: 67 200 t Empty fruit bunches: 115 200 t |
| 2 Price of raw materials (t ⁻¹) | RM 85 | RW: RM 85 Empty fruit bunches: RM 15 |
| 3 Total costs of raw material | RM 8 160 000 | RM 7 440 000 |
| 4 Costs saving (yr ⁻¹) | - | RM 720 000 |

Note: Approximately 1.6 t of RW and 4.0 t of empty fruit bunches is required to produce 1 m³ of MDF, respectively.

TABLE 3. VALUE ADDITION OF COLOURED MEDIUM DENSITY FIBREBOARD (MDF)

| | Coloured MDF | MDF devoid of colour pigment |
|--------------------------------------|------------------|------------------------------|
| 1 Production costs (m ³) | RM 560 to RM 590 | RM 550 to RM 570 |
| 2 Market price | RM 874 to RM 988 | RM 722 to RM 798 |
| 3 Profit | RM 314 to RM 398 | RM 172 to RM 228 |

For more information kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-89259155, 89259775
Website: <http://mpob.gov.my>
Telefax: 03-89259446