

# MDF FROM OIL PALM BIOMASS

by: **MOHAMAD HUSIN; ANIS MOKTHAR; RIDZUAN RAMLI;  
ROPANDI MAMAT; KAMARUDDIN HASSAN; ASTIMAR AZIZ;  
WAN HASAMUDDIN HASSAN and YUSOF BASIRON**

MAY 2002

180

MPOB TT No. 168

MPOB INFORMATION SERIES

ISSN 1511-7871

**M**alaysia is one of the top five exporters of MDF in the world. Our total production capacity exceeds one million cubic metres per year. Presently, most of the major producers use rubberwood as the raw material. With the decline in the price of latex, interest in rubber plantation also decline. At present, the area under rubber is only about 1.2 to 1.4 million hectares, which is approximately half of its original size slightly over a decade ago. As such, it is envisaged that the supply of rubberwood for MDF production would not be sufficient to cater for the huge demand.

The annual value of MDF industry in Malaysia is RM 5 000 000 and provides employment to a large number of people directly or indirectly. With the decline of raw material supply, it is feared that the MDF industry would decline or be relocated to other countries where raw material is plentiful. The well-being of the people involved in the country will then be affected.

Meanwhile, oil palm plantations, encouraged by oil price, grew in leaps and bounds and presently stands at 3.6 million hectares. Ninety percent of the total biomass produced by the oil palm plantation is non-oil, which comprises of over 22 million tonnes of fronds (OPF), 8 million tonnes of trunks (OPT), 5 million tonnes of empty fruit bunches (EFB) and others. These materials have been tested in the laboratory at MPOB and elsewhere to be suitable for the production of MDF. It is felt that it is suitable as substitute for rubberwood as raw materials for MDF production.

## MANUFACTURING PROCESS

Manufacturing of MDF from oil palm biomass necessitates appropriate chipping process, refining and gluing, forming, prepress and hot pressing of the oil palm biomass as shown in *Figure 1*.

## PROPERTIES OF MDF FROM OIL PALM BIOMASS

Oil palm MDF can be manufactured to pass any standard including the Malaysian Standard, JIS or ASTM, as shown in *Table 1*. In most cases, the dimensional stability is poor

RAW MATERIAL



CHIPPING



REFINING



BLENDING



DRYING



FORMING



PRESSING

*Figure 1. Process flow of MDF manufacturing from oil palm biomass.*

due to high absorption of moisture. As such, a special glue formulation may deem necessary to overcome the problem. Inclusion of hydrophilic substance may also decrease water absorption to a certain extent.

## COMPATIBILITY WITH RUBBERWOOD

Oil palm biomass has been proven at laboratory scale to be compatible with rubberwood. Addition of rubberwood



**TABLE 1. PROPERTIES OF MDF FROM OIL PALM BIOMASS**

Properties	
Density (kg m <sup>-3</sup> )	717 - 772
MOR (Mpa)	33 - 42
MOE (Mpa)	3 135 - 1 671
Internal Bond (Mpa)	0.9 - 1.58

increases the strength properties of the MDF. These important characteristics enable the incorporation of oil palm biomass in the existing industrial plant for actual production purposes. In anticipation of the fact that supply of rubberwood will be significantly reduced with the decreasing hectare under rubber plantation, existing MDF manufacturers should consider using at least a portion of their material from oil palm biomass.

### ECONOMIC ANALYSIS

The cost of transportation of oil palm biomass appear unacceptable in the past. Recent review indicated that the cost of transporting oil palm biomass as shown in *Table 2*, appears reasonable.

Facilities to scale up production of MDF and also production of samples for marketing purposes can be done using the MDF Pilot Plant at MPOB (*Figure 2*). The pilot plant which is highly versatile is capable of simulating industrial plants to imitate their processing behavior. Therefore, facilities are available at MPOB for industrialization of MDF from oil palm biomass.

**TABLE 2. AVERAGE ESTIMATED TRANSPORTATION COST OF OIL PALM BIOMASS**

Biomass	Cost (RM)*
Trunk (within 100 km)	13.00 - 15.00
Trunk (100 km to 200 km)	20.00 - 30.00
FronD	70.00 - 100.00
Empty fruit bunches	5.00

Notes: Trunk = piece.  
 Fronds = 1 t lorry load of petiole.  
 Empty fruit bunches = 1 t wet weight.



*Figure 2. MDF Pilot Plant at MPOB.*

For more information kindly contact:

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