

TECHNICAL REPORT: MTC TECHNOLOGY ACQUISITION MISSION ON PLYWOOD

26-30 JULY 2015

NANNING, CHINA



JOINTLY PREPARED BY:

- TIMBER INDUSTRY DEVELOPMENT
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**MTC TECHNOLOGY ACQUISITION MISSION ON PLYWOOD
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1.0 INTRODUCTION

MTC has successfully organised a Technology Acquisition Mission focusing on plywood to Nanning, China on 26-30 July 2015. The mission was organised at the request of MPMA and was carried out with the assistance of MTC Guangzhou. The objectives of this mission are:

- To gather information on Eucalyptus plantations development programme;
- To gather information on the latest technology in peeling small diameter logs; and
- To assist in the acquisition of machines for such processing.

The mission was participated by 16 industry members from 11 companies and the Malaysian Panel-Products Manufacturers' Association (MPMA).

No.	Name	Designation	Company
1.	Dato' Sheikh Othman Rahman	Chairman	MPMA
2.	Datuk Chua Hock Gee	Deputy Chairman	MPMA
3.	Mr. Tan Chong Yin	Executive Secretary	MPMA
4.	Mr. Cheong Hok An	Director	Forest Heights Industries Sdn Bhd*
5.	Mr. Tan Kha Luong	Business Development Manager	Gimzan Plywood Sdn Bhd
6.	Mr. Chieng Pong Sing	Senior Production Manager	GT Plywood Industries Sdn Bhd*
7.	Mr. Eric Yeoh Hong Jun	Assistant Head of Operation	Hwa Sen Veneer and Plywood Industries Sdn Bhd*
8.	Mr. Ling Chii Huo	General Operation Manager	KTS Timber Industries Bhd*
9.	Mr. Lai Yin Tjun	Director	LKM Plywood & Timber Sdn Bhd*
10.	Datuk Wira Tan Chang Yong	Director	Plus Interinvest Sdn Bhd
11.	Datuk Siaw Teck Swee	Director	Plus Interinvest Sdn Bhd
12.	Mr. Yap Kin Chong	Director	Plus Interinvest Sdn Bhd
13.	Ms. Nancy Chia Tou Kin	Senior Manager	Sabah Forest Industries Sdn Bhd
14.	Mr. Wu Chun Hsin	Factory Manager	Samawang Sawmill Sdn Bhd*
15.	Mr. Thong Chee Hong	Managing Director	T-Forest Products Holdings Sdn Bhd
16.	Mr. Ngang Tuong Thai	PA to CEO	Ta Ann Plywood Sdn Bhd*

* *New participant of MTC Technology Acquisition Mission*

2.0 THE MISSION

To achieve the objectives of this mission, visits were carried out to plywood factories and forest plantation in Nanning, Guangxi because the region has a successful plywood industry and Eucalyptus forest plantation. More than half of the plywood produced in China came from this region. The companies visited are as follows:

- Nanning Diwangcun Wood Co., Ltd.
- Nanning Jin Lun Wood Co., Ltd.
- Guangxi State-owned Dongmen Forest Farm
- Nanning Dongsheng Wood
- Guangxi Fenglin Wood Industry Group Co., Ltd
- Nanning Xu Ting Wood Co., Ltd.

Meetings with local manufacturers of machineries and the Guangxi Forestry Industry Trade Association (GFITA) were also arranged to help Malaysian manufacturers to get more information on plywood machines (**Figure 1**). Participants exchanged information and had discussions among themselves on possible future collaborations. Details of companies that participated in the meeting are given **Annex I**.



Figure 1. Delegates from Malaysia and China at the meeting

2.1 Nanning Diwangcun Wood Co., Ltd.

Company background

- The company was founded in 2009 with a RMB 50 million investment, a total production area of around 86,000 s.q.m, and 600 workers.
- Products include container flooring, veneers, decorative plywood with and plywood for floor substrate.
- It has 8 production lines for veneers, 4 for drying and 7 for plywood.
- Annual output capacity is 100,000m³ of veneers and 100,000m³ of plywood.

Products

- The company produces container flooring (**Figure 2**) and the product is sold under their own brand name.
- Species used for face veneer is Keruing from Myanmar, which is bought from traders in the Yunnan Province (**Figure 3**).
- The company is not capable to peel hardwood species and they are familiar with Keruing veneers. They said it is difficult for the production to adjust to new species.
- The factory purchase sets of veneers (face and bottom) from a local trader at RMB 40/set. The veneers dimensions are 1.2 x 1220 x2440mm with a moisture content of below 8%.
- The price of the core plywood with the thickness of 1.7 – 2.0 mm is RMB 10 per piece. These consist of 30% good quality panels (which do not need repair), 30% splice slab (maximum 4 slabs) and another 40% of the panels that need repair.
- The company produces core plywood using different grades of veneers (**Figure 4**). Two layers of the same grade will be laid perpendicular to the other grade.
- The thickness of the core is around 28mm and around 21-23 layers of veneers are used, depending on the buyers' requirements.



Figure 2. Container flooring produced by Nanning Diwangcun Wood Co., Ltd.



Figure 3. Face veneers imported from local traders

- Glue used is phenolic-based with preservatives added into it.
- Their annual production capacity is about 50,000-60,000 m³, or an average of 4,500 – 4,800 m³ per month.
- The company sells the container flooring in the domestic market only and the selling price is about RMB 5,000/m³.
- They are now beginning to produce plywood for furniture.
- However, there is insufficient raw material, in particular hardwood to support their production because of the unstable situation in Myanmar.
- They are looking for alternate species with the density of 0.55 kg/m³ and above for face veneer. Eucalyptus is used for the core.



Figure 4. Different grades of core veneers

- The factory is equipped with proper machineries, however the production is rather slow as the machines are under utilised and the process flow is not smooth. For example, after the panels are being discharged from the hot press, they are sent by

conveyor belts to the end of the press line. The workers will have to flip the panels before stacking them up manually (**Figure 5**). After stacking is completed, the panels will be sent to another process.



Figure 5. After being discharged from the hot press, panels were sent by conveyor belt but stacking were done manually

2.2 Nanning Jinlun Wood Co., Ltd.

- The company was founded in 1998 and is an export oriented plywood manufacturer with a sales of RMB 100 million annually.
- South Korea used to be their main market. Due to fierce competition, the company now focuses on the Middle East and Europe only.
- The dimensions of their plywood are 5-28 x 1220 x 2440 mm.
- Eucalyptus veneers (0.6 mm) are used for the core and mix hardwood veneers (0.2-0.6 mm) which are bought from the Linyi City are used as face (**Figure 6**).
- Some face veneers used are as thin as 0.2mm (**Figure 7**) and these veneers were produced in Shandong.
- The quality of core veneers used by this company is lower than the ones used by Nanning Diwangcun Wood Co., Ltd. (**Figure 8**)
- Their plywood are mainly used for furniture and are certified by FSC, PEFC, CARB and CE.
- According to the company, hardwood veneers are not produced in Guangxi and all the producers have to buy these veneers from other provinces in China.
- The company proposes to cooperate with Malaysian plywood manufacturers, in which they will produce the core plywood (Eucalyptus) and export the panels to Malaysia for lamination with hardwood veneers. The finished products can be exported from Malaysia.
- They think that the price of “Made in Malaysia” products will be better than the ones “Made in Guangxi”.



Figure 6. Finished plywood with 0.2mm thick face veneer



Figure 7. 0.2mm thick face veneers



Figure 8. Workers patching the core veneers with offcuts

2.3 Guangxi State-owned Dongmen Forest Farm

- Guangxi State-owned Dongmen Forest Farm was founded in 1965.
- It is the biggest Eucalyptus gene bank in Asia and the biggest Eucalyptus nursery in Guangxi.
- The Eucalyptus plantation inside the forest farm covers an area of 300,000 mu or 48,000 acres (1 mu \approx 0.16 acre).
- Other than the farm, there are more than 350,000 mu or 56,000 acres of Eucalyptus plantation in all over Guangxi.
- The forest farm cooperated with Australia at the very beginning. In 1982, Australia invested AUD 6 million in Eucalyptus nurseries, in which 174 Eucalyptus species were tested and 19 Eucalyptus clones were eventually selected by the state government.
- Previously, 100% of the plantation in the forest farm were Eucalyptus.
- In the recent two years, they began to develop other species such as pine and fir, in line with the national policy.
- The government suggested a harvesting cycle of 12 years instead of 5-6 years, in order to reduce the water losses and soil erosion.
- For the small diameter logs (diameter at breast height = 16 cm), harvesting can be done in 5 years, in which each acre can produce about 31-37 m³ of timber.
- The market price is about RMB 700/m³ and the cost per acre is about RMB 9,400. Therefore, the profit is about RMB 12,300-16,500 per acre.
- For the second rotation, the diameter increases by 12 cm per year, and it can be harvested in 3 years.
- China state government did not impose any limit on the harvest cycle on commercial use Eucalyptus plantation.



Figure 9. Briefing by Mr. Chen De Wen, Deputy Vice Director of the Guangxi State-owned Dongmen Forest Farm



Figure 10. Preparation of seedlings in a controlled environment



Figure 11. Nursery with seedlings at various growth stages

2.4 Nanning Dongsheng Wood

- Nanning Dongsheng Wood is a small factory which produces Eucalyptus veneers using locally fabricated machines produced by Hebei Dahuayu Machinery Manufacturing Co., Ltd. which carry the brand name Sanle (**Figure 12**).
- The Eucalyptus logs used have diameters of about 4-5 inches (**Figure 13**).
- The company produces only veneers, which will be air-dried for about 1-2 days (**Figure 14**).
- Moisture content of the veneers is not controlled.
- The factory layout is very simple with 4 workers and 1 peeler to take care of the production, *i.e.*, log yard, peeling, stacking, drying and storage (**Figure 15 & 16**).
- Although small, the factory runs efficiently with very small overhead costs.
- The thickness of the veneers produced are quite consistent.



Figure 12. Sanle spindleless lathe



Figure 13. Eucalyptus logs before peeling



Figure 14. Veneers wheeled to the open yard for air drying



Figure 15. Simple factory layout from log yard, peeling to stacking.



Figure 16. Air-dried veneers ready for delivery

2.5 Guangxi Fenglin Wood Industry Group Co., Ltd

- The company is founded in 2000 and is one of China's largest panel-products companies.
- The main products are MDF, HDF, plywood and particleboard.
- These products are used as base materials for flooring, doors, furniture in the domestic market.
- The company has its own laboratory doing research and developing new products such as low formaldehyde glue and flame-retardant panels.
- The group has other businesses in afforestation and forest management, which provide some of the raw materials required for the board production (**Figure 17**).
- Other raw materials used for particleboard and fibreboard are mainly Eucalyptus offcuts and bark, which are bought at the price of RMB100/ton.
- The delegates visited the production line of the fibreboard. It is highly automated, in which all processes are monitored by a few workers in the control room (**Figure 18-20**).
- They are capable of producing E0 and E1 boards (**Figure 21**).



Figure 17. Raw materials



Figure 18. Control room of the production line for fibreboard



Figure 19. Production line for fibreboard



Figure 20. Finished board at the warehouse, which can be accessed and transported by automated forklift



Figure 21. Packed E0 boards in the warehouse

2.6 Nanning Xu Ting Wood Co., Ltd.

- The company produces veneers from Eucalyptus logs, which are planted around the factory compound.
- The logs will only be harvested when there are orders from the buyers.
- There are 8 production lines in the factory using the Sanle brand spindleless lathe produced by Hebei Dahuyay Machinery Manufacturing Co., Ltd. **(Figure 22)**
- The factory is equipped with a log feeder that sends logs to 4 peelers **(Figure 23)**.
- The factory peels veneers of different thicknesses, depending on buyers requirements.
- Similar to Nanning Dongsheng Wood (Item 2.4), the production runs efficiently with around 3 workers for each line.
- One worker will load the logs onto the peeler, another worker will sort and stack the veneers accordingly **(Figure 24)** and one worker will collect all the offcuts and barks.
- All peeled veneers will be sent for air-drying immediately at the back of the factory **(Figure 25)**.
- All the logs will be peeled down to a diameter of around one inch and all these cores will be collected for sale, normally to be used as broomsticks.
- Apart from the offcuts, barks and cores, sawdust is also collected for sale **(Figure 26)**.
- After drying, the veneers will be sorted according to thickness before being sent for storage at the warehouse **(Figure 27)**.



Figure 22. Part of the 8 production lines at Nanning Xu Ting Wood Co., Ltd.



Figure 23. Log feeder sending logs to the peelers



Figure 24. Veneers sorted according to grades



Figure 25. Veneers sent for air-drying immediately after peeling



Figure 26. Different types of by-products collected for sale



Figure 27. Veneers sorted according to thickness in the warehouse

3.0 OBSERVATIONS

Eucalyptus is the main species used for veneers and plywood production in Guangxi. The species is used only for the core plywood, also known as the platform. The logs are peeled using locally fabricated spindleless lathes down to a core with a diameter of about 1 inch. By-products such as bark, off-cuts, cores and sawdust are collected for sale to increase recovery rate.

The Eucalyptus logs are harvested at about 4 years and have an average diameter of 4-5 inches. The peeling operation is simple and efficient with only 3-4 workers at a line. The bigger veneer mills are equipped with log feeders to increase production efficiency. The machines run efficiently and the raw materials are easy to get as some of the sources are located just around the factory.

The successful forest plantation development programme is made possible by R&D efforts on tree breeding, which was started by the Guangxi State-owned Dongmen Forest Farm in the 1980s. In 2013, Eucalyptus plantation in Guangxi covers about 2 million hectares, which accounts for 60% of the total Eucalyptus plantation in China.

The availability of raw materials and technology are the two main keys to the fast development of the plywood industry in the Guangxi region. These observations are similar to the ones made in 2014.

4.0 CONCLUSION AND RECOMMENDATIONS

MTC has organised a successful mission which enabled the participants to gather information on the Eucalyptus plantation development programme in Guangxi and the know-how of peeling small diameter logs. The mission has also aided in the sourcing of this technology. Some participants are in negotiation with suppliers to purchase a few machines. It is recommended that similar focussed missions be organised in the future as these activities are in line with MTC's effort in facilitating technology transfer and encouraging product diversification.

5.0 ACKNOWLEDGEMENT

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