CHAPTER V

CONCLUSION

The manufacture of particleboard from rubber wood with pMDI binder appears to be technically feasible. The properties meet the industry-level requirements for the commercial particleboard. The optimum conditions for the particleboard preparation are as follows:

pMDI content in surface/core layers (%)	7/5
cure temperature (^{0}C)	160
cure time (min.)	5
moisture content of the flake (%)	12-17.

Under this condition, the high performance particleboard was achieved with the lowest water absorption, low thickness swelling, the highest modulus of rupture and modulus of elasticity, and the highest internal bonding strength both at dry and wet conditions.

The properties of particleboard prepared with pMDI and PF resin were significantly different. At the same binder content, pMDI binder had higher performance than PF resin, especially with the high moisture content. In the case of using pMDI in the core layer and PF resin in the surface layers, it indicated that the good properties of rubber wooden particleboard could be achieved and the conventional releasing agents could be used.

The interfacial adhesion could be confirmed via the observation of fracture surface by SEM study. The scanning electron micrographs of the rubber wooden particleboard prepared from high moisture content flakes showed the better packing characteristic than the flakes at low moisture content. This was also supported by the results of the effect of moisture content on the internal bonding strength of particleboards.

The staining method (using Lofton-Merritt as staining agent) was used to confirm the performance of pMDI binder. The pMDI could penetrate into the wood matrix and diffuse to the uncoated area, while PF resin could not. This could confirm the good performance of pMDI binder. Although the liquid pMDI resin has a dark color, the cured one is colorless; while PF resin before and after curing has the same color.

It could be concluded that the pMDI binder can be used very well with rubber wood flakes and gave the particleboards having better properties than the one using the conventional binder. This particleboard (rubber wooden particleboard) could be used for interior and exterior applications, which have a vast potential for the supply of wood. For the rubber growing countries like Thailand, the wood based industries could be developed and used to meet her own requirements and to trade to her neighbouring countries. Moreover, the formaldehyde emission of pMDI binder is zero, therefore, it would not cause indoor air pollution and health risk for workers. The cost of pMDI binder is unfortunately higher than phenol-formaldehyde binder but many advantages could compensate the higher costs of pMDI binder. The present investigation demonstrates that the rubber wooden particleboards with pMDI binder might be used for structural applications.

SUGGESTIONS FOR FURTHER WORK

The use of rubber wood flakes for particleboard production using pMDI as binder should be further studied in the aspects of:

1. Particle/flake design, the rubber wood particleboard may be used as the structural particleboard. The particle/flake design must include to achieve the highest performance particleboard suitable for the following end use applications, furniture productions and structural applications.

2. The pMDI emulsion having lower viscosity than the pure pMDI is easier for spraying more than the neat pMDI. The emulsion binder can be therefore evenly distributed onto the flakes. Better mechanical properties of the finished particleboard may be achieved.

3. The new type of releasing agent should be investigated. For the industrial production, the high performance of releasing agent should be used.