# Fibre Reinforced Plastic Component for Interior Automotive Component

Global development of Fibre Reinforced Plastic Composites (FRPC) as new hybrid composite material had been intensified in recent years. Wood fibre was initially utilized for FRPC in thermoplastic matrix such as polypropylene (PP), polyethylene (PE) and polystyrene (PS). However, recent development in FRPC suggests that the use of non-conventional wood fibre such as annual crops in Kenaf, Hemp, Flax and Sisal and perennial crops such as Oil Palm and Coconut Palm are gaining momentum and prominence. In the past six (6) years, the Universiti Putra Malaysia with close collaboration from research institution such as Malaysian Institute for Nuclear Technology Research (MINT), Sabutek Sdn. Bhd. has developed extensive study on FRPC material and products development using non-conventional fibre in Oil Palm and Kenaf fibres as base lignocellulosic materials blended in thermoplastic matrix.

*Palm Oil tree*

*Bunch of Palm Oil*

Laboratory scale development of FRPC conducted involved the use of Oil Palm and Kenaf fibres in PP matrix. Various parameters viz., Fibre: PP loadings, particle geometry and size, moisture content of fibre, types of fibre/particle preparations, and blending processes were identified and formulated to achieve optimum treatment conditions. Among the major difficulties encountered include blending of two contrasting hydrophyllic (Oil Palm and Kenaf fibres) with hydrophobic (PP, PE) materials. Optimisation of FRPC was achieved with using laboratory scale mixer and extruder with the FRPC being hot-pressed into flat sheet for materials properties evaluations. Results obtained from various FRPC sheets were evaluated viz., tensile, flexural, Rockwell Hardness, heat deflection, melt flow index, dimensional stability and other physical properties using international established standards such as the ASTM. To further strengthen the FRPC through effective cross-linking between the fibre and the matrix, various approaches were used such as using chemical additives, electron beam irradiation and combination of both. The most challenging process in the blending of thermoplastic and agro-based fibre is to achieve high fibre loadings of 50-60 % without compromising the properties of thermoplastic. Instead, some properties of the hybrid composite are enhanced compared to conventional materials such as pure thermoplastic.


*Fibre reinforced plastic automotive components*

Preliminary Pilot Scale Trials were conducted using Oil Palm Fibre and PP matrix at optimum fibre loading of 50:50. FRPC sheets produced were then thermoformed into interior automotive components such as rear parcel shelves and door trims. In addition, current efforts are being focused in utilising FRPC material for other uses such as building components.

FRPC materials have huge advantage to conventional wood composites in terms of enhanced dimensional stability, improved bio-resistance, easy to mould into various shapes, high flexibility in forms, recyclable, and longer service life. Hence, FRPC can be effective alternative to conventional wood-based materials such as sawn timber, plywood, particleboard, medium density fibreboard (MDF) etc.

**For further information, kindly contact:**

Dr. Jalaluddin Harun
Bio-Engineering Laboratory
Institute of Advanced Technology (ITMA)
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia
Tel: +603 8946 7538, 019 320 3494
Fax: +603-8656 6061
E-mail: jalal@itmail.upm.edu.my