Ricycled Asia Pacific Sdn. Bhd.

August 2019

- Together with our partners in Sabah, Malaysia, Ricycled present a range of process modified, certified sustainable, structural wood products

- We use plantation species such as Rubber wood, Laran (similar to Poplar) and Acacia. These are sustainably grown and certified by PEFC (https://www.pefc.org)

- The characteristics of the raw wood are modified using process technology into the product range of Tuff Timber.

Rubber wood

Acacia

The **Tuff Timber** range comprises of:

1. **Temperature Modified Tuff Timber**

2. **Polymer Impregnated Tuff Timber**

3. **Cross Laminated Tuff timber**

4. **Glue Laminated Tuff Timber**

- By changing the strength & durability parameters, these products perform as good or better than increasingly scarce and expensive tropical hardwoods

- These materials saw, nail, join, glue, stain, flex and of course look like wood … as it is wood !

Temperature Modified Tuff Timber

- This process heats the wood in a controlled environment for appx. 4 days @ 90 degrees centigrade

- Renders mechanical and strength properties similar or better than comparable hardwoods

- The durability of the base material increases significantly from Class 3 (Malaysian Timber Board) to Class 1 / 2.

- Importantly this product (wood) is low maintenance.

Mechanical Properties	Normal Rubber wood	Temp Mod. Rubber wood	Normal Acacia	Temp Mod. Acacia	Dark Red Meranti	Merbau	Red Balau
Modulus of Rupture, MOR (N/mm²)	72	121	110	159	88	116	121
Modulus of Elasticity, MOE (N/mm²)	9,900	11,806	10,500	13,842	12,020	15,400	15,900
Shear Stress (N/mm²)	11.08	16.8	15.9	17.12	8.3	12.5	12.5
Compressive Stress (N/mm²)	42	55.7	58	89	48.8	58.2	60

- Please note test data can vary with age of trees and age is standardised when product is produced

- Data as an example only

Temperature Modified Tuff Timber

- The process seals and confers enhanced water resistance although the material can still be stained, varnished or at the extreme end acrylic coated for heavy duty UV resistance.

- This process was originally developed along with FRIM. (Forestry Research Institute Malaysia).

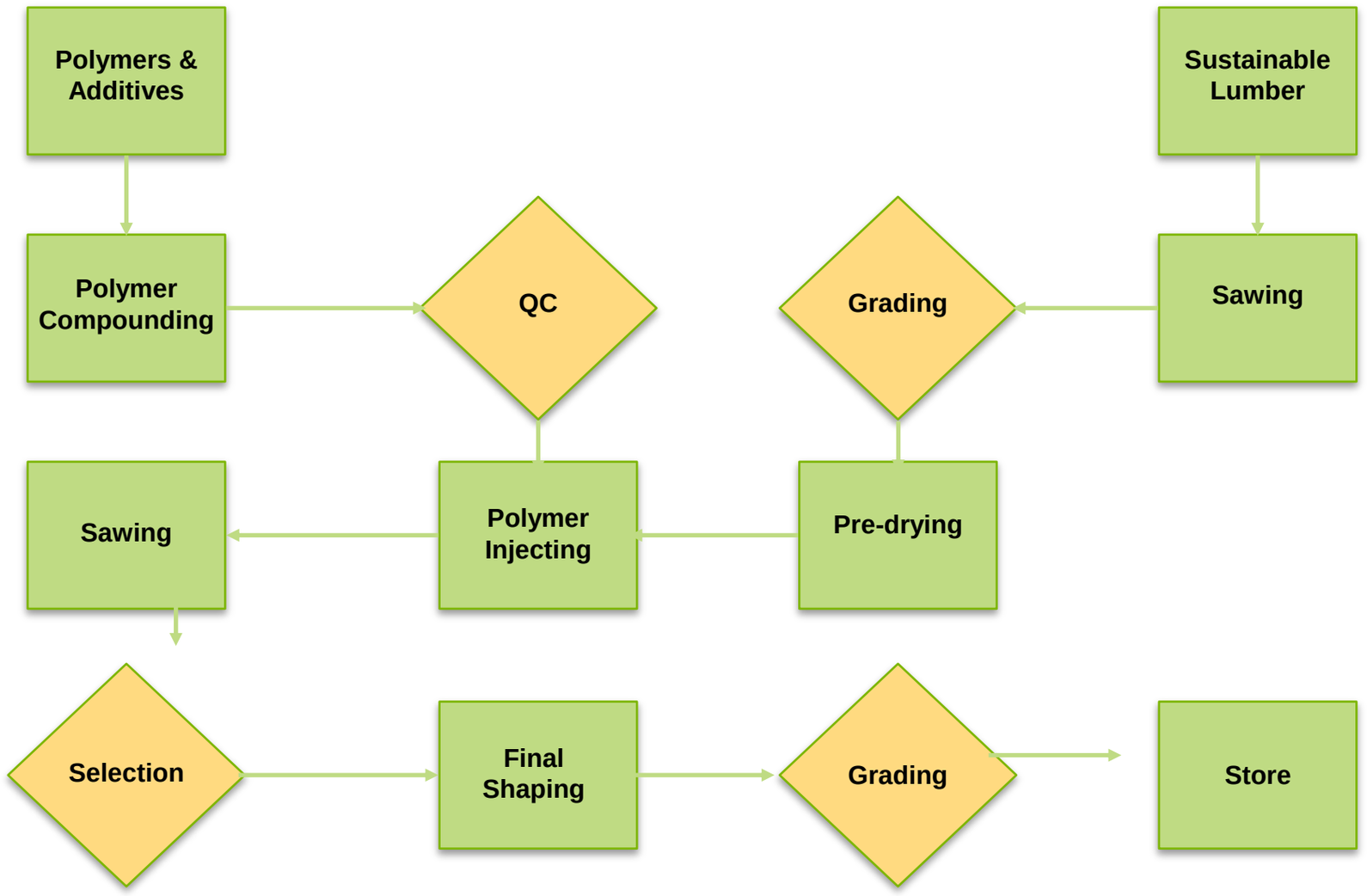
- Appearance is enhanced with a more pronounced grain feature and slightly darker. There are no emissions and workability is the same

Temperature Modified Rubber wood

Water pools and runs off

Polymer Impregnated Tuff Timber

- This process uses the impregnation of silicones to take the performance characteristics beyond most wood species and way beyond wood plastic composite



Polymer Impregnated Tuff Timber

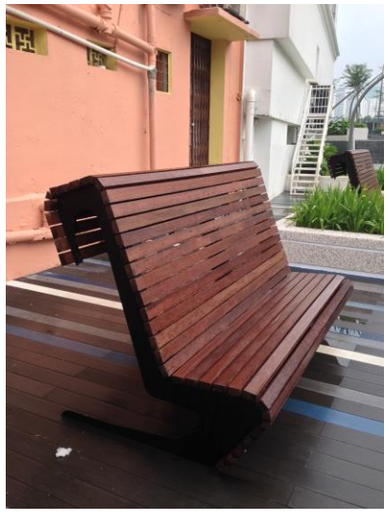
Mechanical Properties	Rubber wood	Temp. Mod. Rubber wood	Polymer Impregnated	Dark Red Meranti	Merbau	Keruing	Red Balau
Modulus of Rupture, MOR (N/mm^2)	72	121	168	88	116	115	121
Modulus of Elasticity, MOE (N/mm^2)	9,900	11,806	15,278	12,020	15,400	15,810	15,900
Shear Stress (N/mm^2)	11	17	19	8	13	12	13
Compressive Stress (N/mm^2)	42	56	80	49	58	61	60

- Please note test data can vary with age of trees and age is standardised when product is produced
- Data as an example only

Polymer Impregnated Tuff Timber

- Superior & cheaper than wood plastic composite (WPC)

Key Parameters	Polymer Impregnated Rubber wood	Wood Plastic Composite
Polymer Content	< 10 %	> 30 %
Dimensional Stability	Enhanced	Normal
Structural Strength	High	Low
Fibre Strength	Natural Long Fibre	Pulverized Short Fibre
Nail Holding Properties	Superior	Avoid



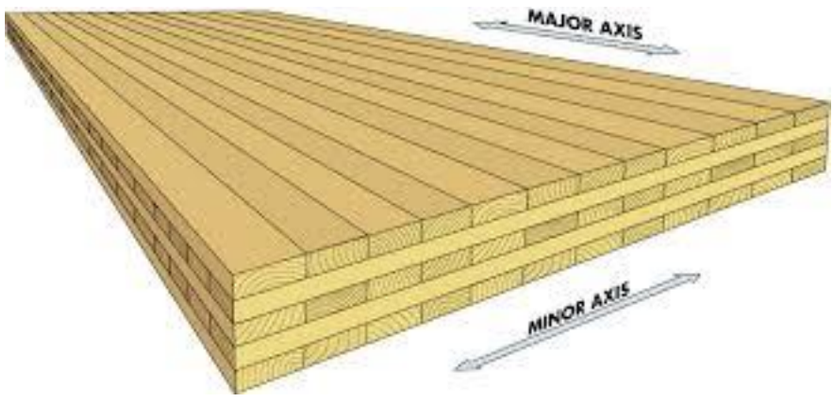
Machined to order & use

Cross Laminated Tuff Timber

- It is a timber panel product that has similar characteristics to that of a pre-cast, rebar concrete panel.

- Perpendicular layers of sustainable plantation species timber are glued together using a speciality structural glue.

- This forms a structural material that is lightweight and very strong, with excellent acoustic, fire, seismic, and thermal performance.



Cross Laminated Tuff Timber

- CLT's are also fast and easy to install, generating almost no waste onsite. CLT offers design flexibility and much lower environmental impacts compared to rebar concrete.

- Sustainable Rubber wood or Laran would be used to make up sheets with 3, 5 or 7 laminations, and with dimensions up to 2.4m by 12m and thicknesses for 50mm to 200mm.

- Specification and other information can be easily accessed from the CLT Handbook - USA edition that is available on the internet.

Glue Laminated Tuff Timber “Glulams”

- High performance structural products constituted by sustainable plantation Rubber wood layers bonded together in the same direction with specialist structural adhesives

- Glulams have the strength and significant environmental benefits when compared to steel beams.

- Increased design possibilities with improved product performance, and cost competitiveness make the Glulam the superior choice for beams, posts and headers / lintels etc. in residential and other construction projects.

Tuff Timber offers;

- **100% certified, sustainable plantation wood**
- Process modified to become a **design flexible, structural material**
- Offers **significant environmental benefits** when compared to;
    - Using unsustainable hardwoods
    - Steel
    - Rebar concrete
    - WPC (Wood plastic composite material)

Please contact:

Simon
Whatsapp: +6012 9048629
By email: simon@ricycled.com
Or visit our website @ www.tufftimber.com