

# Construction of the new exhibition centre of the Malaysian Timber Industry Board in Johor Bahru

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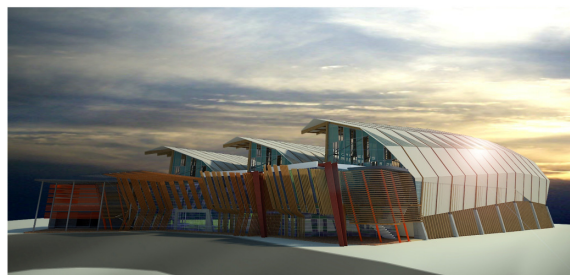
**Abstract** To improve the perception in Malaysia regarding use of indigenous Malaysian timber and its use in construction, the Malaysian Timber Industry Board decided to build a new exhibition center that could show the potential of timber as a structural material. The three exhibition halls are formed by parallel portal frames, built using a combination of Resak and Keruing hardwood glued laminated members. The structural elements are connected by glue-in steel rods, bolted and welded to steel brackets and steel plates, applied both at the factory and on-site. This paper covers the basic design of the exhibition hall, focusing in particular on measures taken to improve the biological durability, the temperature measurements at various bonded joint locations, and the application of a novel end grain sealer. This paper also includes a preliminary investigation on the strengths of glued-in joints using Malaysian high-density timber.

**Keywords** hardwood, glulam, glued-in rods, monitoring

## INTRODUCTION

Similar to some European thinking and philosophy, the general believe in Malaysia is that timber is not a durable or worthy structural material, suffering, particularly in a tropical climate, from both insect and weathering damage. In addition, there is the ongoing perception that a timber structure presents a higher fire hazard when compared to stone, bricks or concrete.

To overcome this erroneous perception, the Malaysian Timber Industry Board (MTIB) commissioned in the end of July 2009 to a Malaysian Architect the design of a new exhibition centre, at Johor (Malaysia), that could show the potentialities of timber structures, Fig. 1.



**Figure 1** – Proposed conceptual development.

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Simultaneously, MTIB wanted to demonstrate the potentialities of indigenous south East Asia hardwood as raw material for glued laminated timber.

During the construction, some repairs to the hardwood glulam members were carried out and a monitoring plan was set up to account for the possible impact of the temperatures on the performance of the connections with glued-in rods.

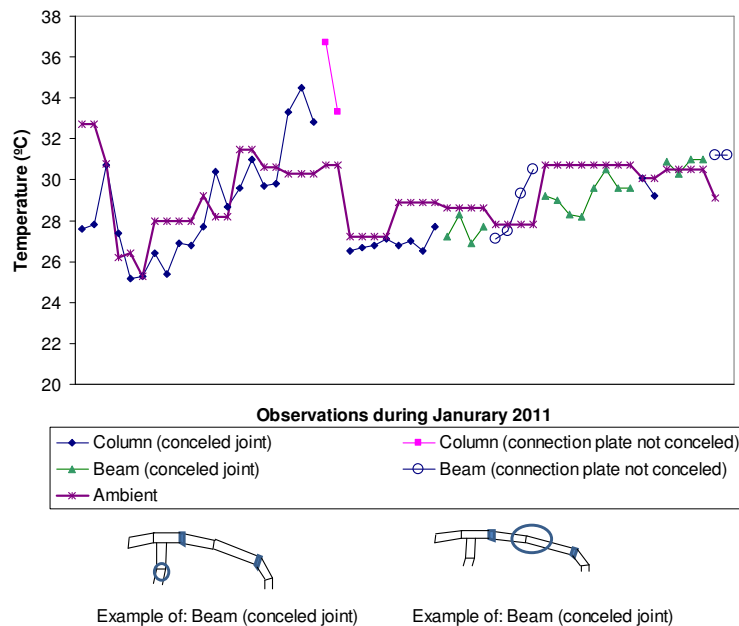
## MONITORING

A monitoring plan was established having in mind assuring the durability and expected service life of the construction. The plan was set up with the goal of detecting in due time any manufacturing problems and also problems in glued in rods due to exposure ambient conditions (air temperature and relative humidity).

The problem of elevated temperatures in glued-in rod connections with epoxy compounds led to the implementation of a temperature monitoring system at some critical spots.

The objective is to measure the surface temperature of timber, cured adhesive, at the surface of the internal 32 mm diameter steel shear bars and at the surface of the shear bar integral connection plate. This last plate has a greater heat sink than the bars and also its exterior surface is closer to the outer surface of the timber.

A close match was observed between ambient temperature and temperature inside the glulam members (Fig. 2). The monitoring plan will continue in the next years in order to evaluate possible risks to the resistance of the glued joints.



**Figure 2** – Temperature monitoring records of January 2011.