

BRIDGES STREAM

DAVIES CREEK AND CHESHIRE CREEK BRIDGE

David Swan, Director of Engineering, Evans Shire Council

What does a small Council do when two or even one timber bridge within their Shire requires replacement within a short period. Not only is the impact of the quantum of the expenditure of concern to Council's budget, but also with activity based budgeting, the use of contractors are employed must lead to fancy financial arrangements or shedding of staff.

Evans Shire were faced with this dilemma and were looking at an expenditure of up to \$1,050,000 for the replacement of two bridges, one 24m span and the other 36m span. Both bridges were on local roads and notwithstanding a history of pleading for State and Federal funding, no special funding was forthcoming. Restrictive weight limits were imposed on both structures plus a bypass in an attempt to delay the permanent demise of the structures.

Council looked at all alternatives with the aim of getting these structures replaced with the following conditions:

1. A cost effective solution with real long term solutions.
2. A solution that could use Council's resources, reducing the impact on Council's long term staff requirements.

Council made use of M-Lock precast bridge system by Rocla to construct these bridges which met these requirements. This paper will look at this method of construction and the satisfactory outcomes that resulted.

THE STRUCTURAL APPRAISAL OF TWO TIMBER TRESTLE BRIDGES – A CASE HISTORY

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There are approximately 700 timber bridges remaining in NSW. Many were built in the 1920's, when prevailing loads were a four tonne traction engine at most. Expected life was about 30 years.

Still in service, but suffering from obvious deterioration, these bridges are long overdue for replacement.

But with the prevailing sentiment on the part of the Federal Government, the return of fuel taxes sufficient for replacement does not appear to be forthcoming.

The two bridges covered by this paper had been load limited to 15 tonnes. Further analysis, load testing and strain gauge work, and consideration of typical semi-trailer geometry enabled relaxation of the limits. The bridges have been re-rated to a 38 tonne limit.

APPLICATION OF FIBRE REINFORCED POLYMER COMPOSITES IN BRIDGE CONSTRUCTION

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Fibre reinforced polymer (FRP) composites have found increasingly wide applications in the civil engineering infrastructure area in recent years throughout Europe, Asia and in the USA. Some of the applications of FRP composites in the bridge construction industry include:

- Strengthening of existing bridges with external FRP composite reinforcement;
- Deck replacement of existing bridges with FRP composite decks;
- Construction of new FRP composite bridge superstructures.

The strengthening applications include external bonding of FRP composite plates to beams and slabs and external confinement of columns by wrapping FRP composites. This application has been used in Australia for several years, although the use of FRP composites for deck replacements or the construction of new bridge superstructures, have only recently emerged as potential applications.

The potential use of FRP composites for new bridge decks and superstructures in Australia includes the following areas:

- Deck replacements for deteriorated timber, concrete or steel bridges;
- Deck replacements for heritage bridges that are to be retained;
- Construction of bridges in isolated, unpopulated areas;
- Construction of bridge decks used in lift bridges, or swing bridges;
- Construction of bridges in aggressive environments.

FRP composites are recognised as a viable material source for bridge deck replacements and the construction of new superstructures, in Australia, with several FRP composite bridge projects currently being investigated and developed. This material is being used for pultruded structural sections, pultruded bridge deck beams, wet lay-up girders, vacuum assisted resin transfer moulded (VARTM) decks and particulate filled polymer beams.

This paper will review the applications of FRP composites in bridge decks and superstructures that are suitable in Australia, and will examine current examples.

STRESS-LAMINATED BRIDGES USING GREEN (UNSEASONED) AUSTRALIAN HARDWOOD

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The stress-laminated timber (SLT) bridge system is well recognised and has been proven throughout North America, Europe and Australia. The system has been applied in five Australian at over 30 different sites. While these applications have utilised a number of wood products, Australian hardwoods have been predominantly used.

NSW has the greatest number of road bridges that have utilised timber in their construction, with some existing bridges dating back to the late 1800's. Most of those bridges have survived with minimal attention, only because they were built with highly durable hardwood species. Today, by combining the natural durability of the Australian hardwoods with the new SLT concept we have a strong and durable timber bridge alternative.

Until recently, only kiln-dried timbers were considered suitable for SLT bridges because of concerns regarding the potentially large creep characteristics of unseasoned timbers as they dry. However, several years ago Australia's first green hardwood SLT deck was completed and has been monitored consistently since that time. The excessive creep that had been predicted has not occurred. In fact the early indications are that it may perform better than kiln dried material for some applications.