

# Encouraging innovation in the use of timber and glulam

Dr Vahik Enjily of the Building Research Establishment, and a member of the IStructE's Research Panel, outlines three areas of current research at The Centre of Timber Technology and Construction (CTTC) at BRE

## Innovative timber engineering for the countryside (InTeC) project

Bridges are one of the highest forms of engineered structures – while they must be functional they also act as a public sculpture making a visual impact on the environment and its inhabitants.

In most industrialised countries the use of timber for vehicular and pedestrian bridges is experiencing a major revival. The strength, lightness in weight and environmental features of timber make it highly desirable for bridge construction.

Major initiatives have taken place in Australia, New Zealand, North America (USDA Forest Service Timber Bridge Initiative), Canada and Northern Europe (Nordic Timber Bridge Programme). This is in marked contrast to the UK where design and construction of timber bridges has been very limited.

- The US Department of Agriculture reports that approximately 41 700 road bridges of over 6m span are made of timber, and improvements are continually being introduced, through the Federal Highway Administration Timber Bridge Programme.
- In Finland, about 700 timber bridges are owned by the Finnish Road

Administration, and along with other Nordic countries, (Denmark, Finland, Norway and Sweden), a development programme has been in progress since 1994

- Australia and New Zealand have also been using thousands of timber bridges for decades. Although, there is an established history of timber bridges in the UK, current bridge producers are a small, niche sector of the UK timber industry, and some firms are really only representatives of producers that are adding the main value elsewhere in Europe.

Against this background, Forestry Commission, Forestry Civil Engineering (FCE) of Forest Enterprise (FE) and the two major players in timber research namely the Centre for Timber Technology and Construction (CTTC) of the Building Research Establishment (BRE) and TRADA in collaboration with Sydney University of Technology (Australia), have come together with a mutual aim of increasing the use of timber for bridges in the UK countryside.

The project has been entitled 'Innovative Timber Engineering in the Countryside' (InTeC) whose objectives are to:

- stimulate the use of timber for vehic-

ular and pedestrian bridges (see Fig 1)

- encourage the use of timber for other related countryside structures such as abutments, retaining walls, foundations, signs, barriers, fencing, walkways, log cabins and other environmentally friendly structures.

InTeC will run for 5 years and will involve research and demonstration projects. It involves a consortium of the major timber designers, suppliers and users such as certain local authorities in the UK.

The project so far has produced:

- A report for the Forestry Commission regarding timber bridges
- A symposium, held at BRE in April 2001 for timber bridges
- Three different bridge designs in timber (Howe girder in green glued UK oak, stress laminated timber arch and flitch beam type) for a 12m span pedestrian/bridle bridge at Thames Chase (to be constructed soon)
- In addition, at least three different local authorities have approved and used timber footbridges in their counties since April 2001.

Work is underway on a BRE Information Paper regarding timber bridges and a BRE Digest giving guidance on the design of stress laminated timber bridges.

## Glued laminated products made from UK grown timbers project

The Centre for Timber Technology and Construction (CTTC) of BRE is currently leading a Partners in Innovation (PiI) project under the Department of Trade and Industry to investigate the potential use of home-grown timbers in the manufacture of glued laminated structural products. The aims of the project are:

- to demonstrate that UK grown timbers can successfully be used to manufacture glulam and associated products
- to show that the current resistance to the use of home grown species is unfounded

The aims are not only to demonstrate that conventional glulam can be produced, but also to go further and show that re-engineered timber products for structural use can also be successfully produced.

The re-engineered products can be

Fig 1. A glulam traffic bridge in Finland



manufactured both within and outside of the constraints of the current codes and standards framework depending on the products, and they make best use of UK timber reserves. They are innovatively engineered and add value to non-structural timbers.

For example, recent advances in adhesive technology have made it possible to glue wet timbers (green timber) successfully, which can make a significant difference in benefits for the production process and waste elimination. This, combined with defect cutting of knots and associated finger jointing, can substantially improve overall stability of the products and significantly reduce distortion. They do however need to be researched prop-



Fig 2. (above)  
A gazebo in Whistler, Canada

erly in order to demonstrate their potential use.

As part of the project a range of glue laminated products will be designed, manufactured and subjected to full-scale structural testing to demonstrate that they comply with the scope of the design specification, thereby generating confidence in the design process.

In addition, the project will investigate the physical and structural properties for the target products as well as the economics of the whole process, which will need careful scrutiny.

**Structural insulated panel (SIP) research projects:**

With the recent changes to Building Regulations and initiatives by Government to adopt 'Egan compliant' construction practices that are more

sustainable, new products have emerged for buildings. These products are generically termed Structural Insulated Panels, SIPs for short, and are similar in nature to sandwich panels commonly used for industrial cladding.

Research into the performance of SIPs is being carried out on a variety of products currently being used in housing. Typical product tests have included racking, vertical loading, thermal and acoustic performance. So far tests have produced promising results but have been conducted without the supporting framework of British and European Standards to demonstrate product conformity.

To help ratify testing and performance standards for SIPs, The Centre for Timber Technology and Construction (CTTC) of BRE has provided technical input to the drafting of a new European Technical Approval Guidance (ETAG) through its membership on the committee.

This will provide a framework for the approval and certification of SIPs and speed their market penetration in Europe until such time that our codes and standards will include such systems comprehensively.

It must be noted that currently Technical Approval is necessary for these products for compliance with UK Building Regulations. se



Fig 3.  
A glulam building in Switzerland

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September/October should see the publication of the IStructE *Sessional yearbook 2002-03 and directory of members*.

In A4 or CD format and corrected to 1 July 2002, it will list alphabetically the names and addresses of Fellows, Members, Associates, and Associate-Members in all parts of the world, with the names only of Graduate and Student members. It will also include topographical lists of members in the 105 countries of the world where they reside and work.

The Yearbook also contains the constitution of Council, Committees and Panels, as well as other information about the Institution.

ONE copy of the new Yearbook will be sent, free-of-charge, to any Chartered or Incorporated Member from whom the order form is received before Friday 6 September 2002. Subsequently, the price for the printed format copy will be £20 per copy to members; the non-members' price, pre- and post-publication, will be £100 per copy. The electronic version on CD will attract VAT @17.5% and so will cost £23.40 to members and £117.50 to non-members. Please note the normal postage & packing charges will also apply for orders to be dispatched by mail. Cheques should be made payable to the Institution of Structural Engineers.

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