Research hits new heights

Swedish wood technology research has never been as strong as it is now, writes Jöran Jermer of SP Trätek, the timber-focused arm of the SP Technical Research Institute.

A new national building code in 1994 opened the door to multi-storey timber building in Sweden. Since then, the country has seen rapid developments in the technology and systems for this type of structure.

In combination with its low weight, high load-bearing capacity and environmental benefits, these advances have made wood one of the most important materials in the recent 'industrialisation' of Swedish construction. The industry is seeing more prefabrication of apartments and other volume building units, reducing build times dramatically and giving rapid weather protection. Wood has been at the forefront in these developments and SP Trätek has helped evolve associated new construction techniques and provided analysis of their performance.

Fire safety is critical in timber construction and still restricts the use of multi-storey timber buildings in many countries. As a result, SP Trätek is also coordinating a research project, Fire in Timber, involving experts from nine European countries. Together they have developed the first technical guide on fire safety in timber building at the European level. This focuses on structural fire protection and gives detailed advice on load-bearing and fire block functions of timber structures under standard fire exposure. It also includes information on fire performance of wood products required by latest European standards. The critical nature of detailing in building design for fire performance is stressed through practical solutions and the guide also advises on active fire protection.

The publication targets architects, engineers, educators, regulators and the wider building industry and addresses fire-safe use of wood products in buildings as well as performance of whole timber structures.

"We hope it will help speed up the harmonisation of national fire safety regulations, said SP Trätek fire expert and Fire in Timber's co-ordinator Birgitt Östman, who is also leading new research in timber building sound-proofing, involving collaboration with Swedish universities and other European researchers.

EcoBuild pushes technical boundaries

SP Trätek is also developing EcoBuild, a "competence centre" to facilitate co-operation between universities, other research institutes and industry. Under the direction of centre manager Dr Magnus Wällinder, the aim is to create an internationally competitive wood science and technology research operation focused on the development of innovative, durable wood and bio-based material systems for building and interior and exterior-use furniture. It currently brings together the expertise of 11 research institutes and universities and around 30 companies. Within six years it expects to achieve a turnover of €14m from research operations.

The centre undertakes both fundamental and applied research and direct product development. Its focus areas include bio-based binders, bio-based coatings, biocomposites, and modified wood and fibres. The latter includes CelluNova, a project aimed at developing better wood-based fibres for textile manufacture than those derived by the viscose process.

The fifth focus area is durability and eco-efficiency, which also seeps into the activities of the other four.

WoodBuild focuses on durability

Another major initiative in Swedish timber construction is WoodBuild, a five-year programme of research into the complex interrelation of exposure conditions and timber's resistance to biological attack. This forms part of the 2006-12 sectoral R&D programme for the Swedish forest-based industry, which is funded by government, industry and other stakeholders.

The main partners in the project are SP Trätek and the University of Lund. Its key goals are to identify sustainable design solutions and protective measures for boosting durability of wood and wood-based material in a range of building envelope and exterior above-ground applications.

WoodBuild is also looking into new, accelerated methods for testing timber's resistance to decay and microbial growth and the development of practical engineering tools for assessing the durability of wood and wood-based building components and structures and estimating their service life.

Developing these tools for exterior timber applications is also the subject of another research initiative, WoodEster, a WoodWisdom-Net project involving partners in eight other European countries.

In addition, SP Trätek is working with Luleå Technical University to develop methods and equipment to increase sawn timber yields. This focuses on the use of thinner saw blades and development of more exact shrinkage allowances and reduced sawcut allowances. A key feature of the project is to be able to adapt production processes at the sawmill to the unique characteristics of each log and piece of wood, a task made easier by latest technology for real-time assessment of raw materials, according to Dr Johan Oja who heads the research at SP Trätek.