TALKING TIMBER

MODIFYING WOOD

*Bangor University's **Graham Ormondroyd** brings the spotlight onto wood modification in the first of a series of looks at the subject*

The use of timber in many areas of life has had somewhat of a renaissance in recent years, mainly driven by requirement to reduce CO_2 emissions and produce products in a more environmentally friendly manner.

Consequently this has led to an increased need for high quality timber and in turn to an increase in plantation forestry and the use of fast-grown species. Whilst fast grown species are useful for certain applications, for example short life span applications or applications for which the timber is broken down from its bulk (i.e. panel and paper manufacture), some of the intrinsic properties are less desirable.

Not surprisingly, changes in dimensions when exposed to atmospheric moisture, susceptibility to biological attack and the change in appearance when exposed to weathering are all reasons cited for not using timber.

Whilst timber preservation has been the mainstay of the timber industry since the 1830's, in recent years the broad spectrum toxic chemicals (namely creosote and CCA) have been regulated against and very few broad spectrum wood preservatives are available.

Timber modification provides a means to overcome one or more of the perceived disadvantages of using timber, without using a toxic substance. The modification can be to change either the chemical or physical make up of the timber.

Timber modification naturally falls into two categories, the first being active modifications that react with or chemically change the timber (e.g. chemical modification, thermal treatments), the second being passive modifications, which change the physical properties of the timber as a whole but do not change the chemical structure (e.g. impregnation treatments).

A wide range of wood modification technologies exist, some of which act to fill the cell lumena and others which fill the cell wall.

Among these, some form chemical networks within the wood cell and react with the cell wall bonding to the chemical groups associated with decay and water uptake whilst others degrade the wood cell wall material either by heat or chemical action.

The majority of timber modifications are still in the development stages and have yet to produce significant amounts of commercially available modified timber.

However, three processes have been successfully commercialised in the past two decades: acetylation (Accoya and Tricoya), thermal modification (including Thermowood, Platowood, Le Bois Perdure and Retiwood) and impregnation (Kebony).

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Each of these modifications alters the timber in a characteristic and unique way.

Commercially available modified woods each have a variety of improved properties, ranging from colour change to increased durability and dimensional stability. Often, with modified timber, the improvements in some properties are coupled with a decrease in other properties; for example, decay resistance may be improved with a thermally modified wood product, but the impact toughness may be reduced.

But no matter how wood is modified it is still wood and its successful use is reliant on a sound understanding of the resulting material properties.

It is that understanding of those properties and the relationships between them that will lead to an increased market and increased use for these products in civil engineering and architecture.

Good communication of the different attributes of modified wood products and the differences between grades available from the same manufacturer are required and must be recognised by the designer or engineer, to ensure the appropriate product is chosen for the situation.

Over the next few months we will delve deeper into each of the three commercially available modification techniques and discuss the merits and limitations of each type of modified timber available on the market. ■

Below: Kebony modified wood