TALKING TIMBER

WOOD, SCIENCE AND STRENGTH

EN 844 defines the features in both round and sawn timber and, depending on the effect each has on the parent material, these might be classified as character or defect, says ***John Park***

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"**Lignocellulosic substance between the pith** and bark of a tree or shrub" is the European Standards (EN 844:2019 *Round and sawn timber - Terminology*) definition of wood. With the revision of EN 844 (previously in 12 parts but now combined into a single compendium edition in the three main languages of European Standardisation, namely English, French and German, and running to a mere 100 pages) it is a whole lot more descriptive with the introduction of a couple of notes as a number of countries represented on the committee (CEN/TC175/WG1) responsible for it wanted to make it absolutely clear what wood is and that other lignified materials such as bamboo, cork, rattan and palm tree are not wood.

And I had the devil's own job of getting them to accept the correct definition of 'solid wood' (answers on a post card please, to ... do all you readers out there know?); and 'timber' caused all sorts of agonising as the French and German terms are also used with other meanings.

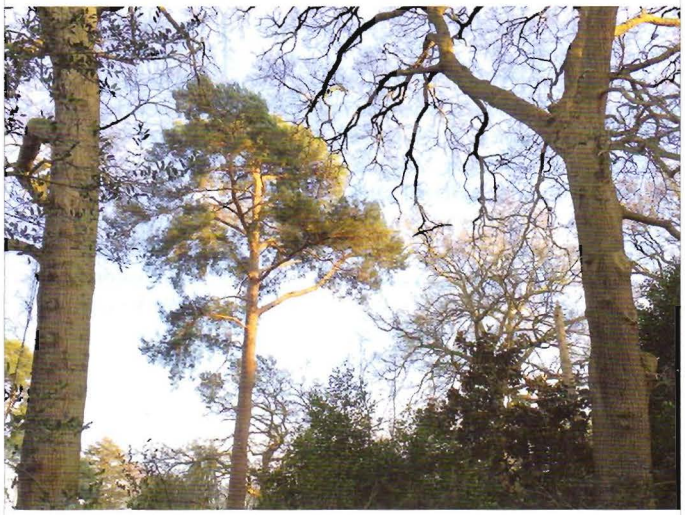
Last time, I talked about the primary function of trees being to produce that lignocellulosic substance, which they do with great efficiency and wood left in its natural state – ie standing tree – is phenomenally strong; just spend a moment marvelling at immense cantilevering branches or the modest diameter of some species which soar to impressive heights. In its native habitat Sitka spruce does just that and with particularly long wood fibres making it a good species for paper production it also results in a timber, when knot free, with one of the highest strength-to-weight ratios of all wood species. It is also prized as a sound-wood in musical instruments for its acoustic properties.

It is the continuity of individual wood fibres, microscopically small things that they are, which imbues wood with such prodigious strength. Unfortunately, the strength at the branch root in the standing tree becomes a weakness in the converted timber – knots. And being fibrous, wood is orthotropic and thus anisotropic, which doesn't trouble the tree but which has a fundamental influence on its performance as a material, having significantly different strength properties in different directions and, with the nature of the cell structure, different rates of shrinkage in different directions, which has an influence on drying, distortion, weathering, stability and paint adherence.

EN 844 defines, as the name implies, the panoply (that's not a wood-based panel!) of features in both round and sawn timber and depending on the effect each has on the parent material might be classified as characteristics or defects, which all depends, of course, on whether you are selling it or buying it; add 'character', call it 'rustic' and you can almost double the price.

That is, of course, primarily in relation to knots, the feature of wood that is both an appearance characteristic and a strength-reducing characteristic, aka defect, and which figure large (pun unavoidable) in both cases. And being the material that it is, one other significant factor in both cases is variability, which when considering strength and structural performance must also be considered together with reliability.

For that purpose, grading is the function with which the timber trade is most familiar. Strength grading is the outcome of a considerable amount of physical testing combined with statistics and the inherent nature and variability of wood. The eventual strength properties with which structural engineers have to work, based on the lower fifth percentile (95% of pieces will exceed that value) together with a factor of safety, are but a fraction of the true capability of the remarkable material we know simply generically as wood. ■



Below: A standing tree is phenomenally strong