

THE ADVANTAGES OF TIMBER

Timber is worth more than you pay

Whether an article is cheap or expensive depends on what one can achieve with it and the cost of the alternatives. Considering its usefulness timber is cheap. In fact timber often gives the means of arriving at the cheapest solution. The many virtues of timber lead to practical economy for users.

Equipment and labour are significant cost items in the manufacture of components in any material. With timber, one has the choice to operate with simple hand tools or fully industrialized processes, and therefore the manufacturer can either invest in equipment or labour, and can adapt over a period. The choice is his.

Timber costs little to freight and handle. Maintenance costs are low if timber is used correctly.

By building with timber the various functions of individual components can be considered in isolation and the best and cheapest material can be utilized with the timber. For example an external wall must give protection, support and insulation. The timber provides some of these properties and other specialist materials (eg mineral wool) can be added easily and economically.

Timber is strong

By comparison to its weight, timber is stronger than any other building material. Laminated timber (for example Scandinavian Grade L40) has a greater strength/weight ratio than either aluminium or steel. Stress graded timber is available with a greater strength/weight ratio than mild steel.

Relative strength capacities of certain material

Material	Ultimate strength (minimum) N/ sq mm	Density kg / cub m	Strength / weight ratio
Laminated timber (L40)	39	470	0.0830
Aluminium (SIS 42-12-0.4)	190	2700	0.0704
Structural timber (T30)	30	500	0.0600
Steel (1411)	440	7800	0.0564
Structural timber (T20)	20	500	0.0400
Prestressed concrete (K600)	67	2400	0.0279
Reinforced concrete (K300)	37	2400	0.0154

At present timber strength is assessed mainly by appearance criteria. In the future however it is likely to be stress graded by other methods which will permit a more exact determination of strength and lead to more economy in use.

Timber is light

The density of softwood is approximately 500 kg / cub m. This compares with 7800 kg/cub m for steel (about 16 times greater than timber) and 2400 kg/cub m for concrete (about 5 times greater than timber).

Due to the low density in relation to high strength, buildings of timber can be as little as one eighth of the weight of similar buildings of brick or concrete.

Timber buildings do not require such solid foundations as buildings of heavier materials. This is a particular advantage where sub-soil conditions are poor. The lightness of timber and timber components can reduce or even eliminate the need for handling equipment. Transport costs are minimised.

Timber components withstand movement

Uneven settlement may easily cause serious cracking in buildings of concrete, lightweight concrete or brick. On the other hand a timber house can accept differential settlement of several centimeters without visible results and without damage. Therefore foundations of timber buildings can be of a light design not only because the timber is light, but because of its ability to accommodate movement.

Timber withstands impact

Timber is excellent at absorbing impact and usually only suffers local indentation itself. The object causing the impact also receives minimal damage.

Timber therefore is often used for its impact properties and is particularly suitable for uses such as external boarding, flooring, packing, buffer pads and rubbing strips.

Timber is easily worked

The amount of power required to work timber is small. Timber can be worked with simple tools by both professionals and laymen alike, or it can be worked easily by highly industrialised methods.

The increase in leisure time may be expected to expand the 'do-it-yourself' market. For the more ambitious, components, extensions and even whole houses of timber are the most suitable kinds for 'build-it-yourself'. Such components and houses are also easier to modify and extend by professionals or laymen.

For site assembly, formwork and temporary work the ease of working timber is particularly important and the same material can be used many times. Alterations and additions are simple.

Timber can be assembled easily

There are many simple ways of assembling timber parts and of joining timber to other materials. Nails, screws, bolts, glue, etc. can be used.

Nailing is fast and can be carried out with simple tools or can be mechanised easily. Nailed gussets make it possible to butt-joint pieces with little increase in thickness.

Modern glues give strong joints. They are used in the manufacture of finger-jointed timber, laminated timber, plywood, laminated boards, certain joinery and structural components, etc.

Timber has high thermal properties

In the past timber on its own (eg as a solid wall) was considered to provide sufficient thermal insulation.

Today there are several other specialist materials for this purpose, especially mineral wool which has extremely low thermal conductivity. However, timber remains easily the best natural material to be used in conjunction with the excellent thermal insulation of these man-made materials. Compared to steel, aluminium and concrete, the thermal conductivity of timber is very low and hence does not act as a 'cold bridge'.

Material	Thermal conductivity W/m degree celcius λ	$\frac{\lambda}{\lambda \text{ Timber}}$
Timber	0.14	1.0
Lightweight concrete, brickwork & blockwork	0.18	1.3
Concrete	1.74	12
Steel	58	417
Mineral wool Class A	0.041	0.3
Aluminium	210	1500

The table shows that the thermal insulation property of timber is 400 times better than that of steel and somewhat better than lightweight concrete.

Because of the good thermal insulation properties, structures of timber do not cause 'cold bridging' problems which can lead to condensation and draught sensations. Thus design can be simplified and costs reduced.

Timber is pleasant in hot and cold weather

Timber does not become brittle at low temperatures, retains its strength well at high temperatures, suffers only small movements due to temperature changes and has relatively high specific heat and low thermal conductivity.

For these reasons timber feels neither excessively hot nor cold at extremes of temperature. Combined with small thermal movements this makes timber suitable for use in cold or hot environments (eg refrigeration stores, sauna baths).

Timber is not a fire hazard

Most building and fire experts are quite satisfied that low rise buildings in timber-framed construction do not represent any increase in fire risk.

Building regulations in Scandinavia and north America pay more attention to the functional performance during a fire than to the actual combustibility.

In many countries, including the UK, fire insurance for timber-framed houses is based on rates comparable to those for more traditional forms of construction.

Timber buildings present no special problems to fire defence. Timber, if ignited, burns in a controlled manner without any sudden unexpected collapse thus minimizing the danger to firemen. The smoke generated is moderate and not particularly toxic.

If ignited, timber burns at a constant rate independent of the ambient temperature. Charring forms an insulating layer of carbon which steadies fire attack on the residual section. Therefore, the strength of timber members is reduced gradually and the structure is not prone to the type of sudden collapse associated with, for example, an unprotected steel structure subjected to fire. With a timber structure, firemen can break through to vent smoke or save life. This can be vital.

Timber is durable

A correctly designed and detailed timber structure is extremely durable. There are timber buildings in existence today which are over 1000 years old.

In a well designed timber structure there is little risk of excessive moisture movements or decay. In exposed situations the service life of timber can be increased by special treatments. Timber can be combined with other materials without the risk of electrolytic interaction. Maintenance costs for timber suitably treated and/or finished are low.

Timber is attractive

Timber can look extremely attractive and interesting. It has a natural association with life and warmth and has appeal.

The texture and characteristics are highly expressive. The attraction is enhanced with age.

The many ways in which timber surfaces can be treated – sawn, planed, stained, impregnated, painted etc. offer wide opportunities for individual expression. Timber used for shuttering can even be used to impart life to the surface of concrete.

Timber does not pollute the environment

Sawmills satisfy the requirements of environmental conservation to a higher degree than any other industry. The raw material is a natural product which is being constantly renewed by natural methods every 60 – 120 years. Felling takes place without scarring or destroying the locality for years. Manufacturing processes require little power and are non-toxic. Timber can be recycled without causing pollution. Timber is a natural building material which does not make irreplaceable inroads into the earth's resources.