

Kährs

QUALITY IN WOOD SINCE 1857

WOOD & WOOD SPECIES

Kährs UK Ltd
Unit A4 Cairo Place | Endeavour Business Park
7 Penner Road, Havant | Hampshire | PO9 1QN
Phone: +44 2392 453 045 | Fax: +44 2392 453 050
E-mail: sales@kahrs.co.uk

What is wood?

Trees have been very important to humans for centuries, and there would probably be no functioning life on earth without them. Trees have given us shade and food. They provide oxygen and absorb carbon dioxide. Trees also offer shelter in windy and exposed locations, whilst forests have provided protection and a habitat for game, which was once hunted for food by humans. Tools have been made of wood since time immemorial, and wood is unsurpassed as a raw material. Wood is the most commonly-used material all over the world, particularly as a fuel. In addition, the medical benefits of substances in trees and other plants cannot be exaggerated, yet the field is only in its infancy.

A tree is a ligneous plant at least 5 m high. A tree consists of three parts: roots, trunk and crown.

Trees are divided into two types: coniferous and deciduous. Conifers are most common in colder latitudes, and their waste makes the soil more acidic and poorer in nutrients than deciduous soil. The biggest difference between the two types of trees is that deciduous trees in colder climates shed their leaves in winter to save energy, while conifers (except for the larch) retain their needle-like foliage throughout the year. The conifers are an old plant group that was already present during the Carboniferous period.

The role of the roots is to provide the tree with water and minerals, store nutrients and stabilise the tree in the ground. Tree roots usually co-operate with fungi in mycorrhizae. Both the tree and the fungus benefit from this co-operation. The fungus releases certain minerals from the ground into the tree, which the tree itself cannot accomplish.

The crown consists of branches and twigs with leaves or needles. The role of the crown is to photosynthesise/metabolise in the leaves or needles.

The role of the trunk is to support the crown and connect the crown and the roots. On a warm summer's day, as much as 1 m³ of water can be transported up to the crown. The trunk is also a storehouse for nutrients.

The tree's strength, relative to its weight, and ease of working make it an extremely useful material, particularly in the construction industry. The trunk consists of a great deal of cellulose and lignin, which makes it hard.

Wood as a material has many properties resulting from the tree's internal structure.

Wood is:

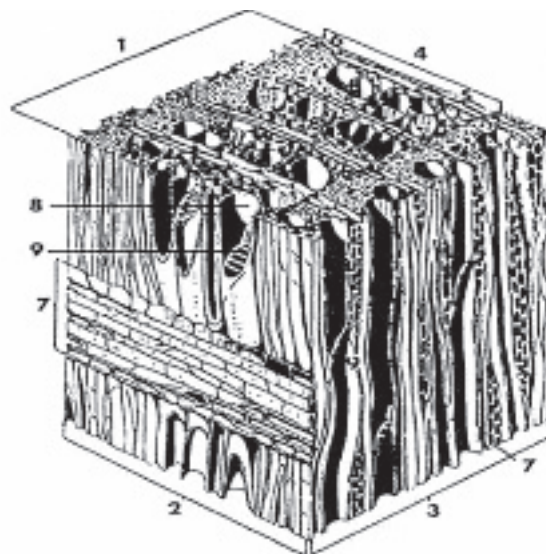
Anisotropic: i.e. it has different properties in different directions, e.g. when it absorbs or loses moisture.

Heterogeneous: which means that different parts have different properties, e.g. spring wood and summer wood, trunk and branches.

Hygroscopic: it adjusts its moisture content to the RH of the ambient air.

Rheological: i.e. wood deforms permanently under a sustained load.

The anisotropic and hygroscopic properties have the greatest significance for floor manufacturing. This is why the multi-layer construction is so successful. The anisotropic properties are exploited to curb the hygroscopic properties.



Important terms in wood technology

The fibres run in the wood's longitudinal direction. The radial direction is horizontally outwards from the heartwood towards the bark. The tangential direction is considered to be along the annual rings. The pith is the small central part of the trunk. It can contain stored nutrients. Nutrients are transported to and from the pith through the trunk via radially oriented cells, the medullary rays. All tree species have medullary rays, which are clearly visible in some species. The most pronounced medullary rays are in surface layers with vertical annual rings (sawn radially). The medullary rays are clearly visible in oak and ash. Birch is an example of a species where they cannot be seen.

Annual rings

In the spring, when the tree begins to grow, spring wood is formed. Its large, thin-walled cells give the tree the best possible conditions for growth. The tree grows more slowly during the summer, when the smaller, thick-walled cells that form the load-bearing part of the trunk are formed. The bond between the annual rings is strong. This process takes place in each growing season, making the tree thicker and producing new annual rings. The width of these annual rings varies between different species and growing conditions. Deciduous trees have more summer wood than conifers, which means deciduous trees are usually denser.

Sapwood and heartwood

The outer part of the trunk is called the sapwood. It is usually lighter in colour than the heartwood. The sapwood part of the trunk contains a lot of liquid. The heartwood is the inner part of the trunk. It is normally darker than sapwood because the cells contain resins, fats, etc. The heartwood consists of dead cells. Its moisture content is significantly lower than sapwood's. The heartwood confers strength and stature on older trees. The heartwood is not darker in certain species, e.g. spruce. Species such as birch and beech do not have pronounced heartwood. These are therefore called sapwood trees.

Resin ducts

Resin-secreting cells fill certain intercellular spaces with what are called resin ducts. If the tree is injured, the resin leaks out, hardens and covers the injury. These are visible as black cavities in certain species, e.g. in cherry, hard maple and European maple.



Odour

Trees that contain oils, aromatic substances, resins, etc., have an odour. This is most noticeable in newly sawn wood. Some species have characteristic scents, such as oak, which smells of tannin, and pine, which smells of resin. Other trees have more agreeable odours. Juniper is an example of a wood that has a smell even when dry. Beech is an essentially odourless and tasteless species, and therefore has domestic applications, e.g. lollipop sticks and chopping boards. Synthetic vanilla for baking is produced from the spruce's lignin.

The energy content of wood

Heavier species contain more material than lighter species, and therefore have a higher energy content. Calculating by weight, on the other hand, the differences between the energy contents (kW/kg) of different species are smaller. However, the energy content is highly dependent on the wood's moisture content.

Thermal properties

Wood has very good thermal properties. In older buildings, solid wood is used for thermal insulation. Thermal conductivity is highest in the direction of the fibres, and increases with moisture content and density. The thermal capacity of wood is relatively high – approx 1300 J/kg °C for absolutely dry wood.

Fire properties

Wood can be ignited by a naked flame or glowing objects as well as by overheating. Given sufficient time and air supply, ignition can occur at temperatures below 200°C. For wood to be ignited by a naked flame, a higher temperature (300–400° C) is required. Igniting wood by overheating, i.e. by radiation, requires an even higher temperature (500–600°C). When wood burns, it happens controllably without sudden collapses. Wood burns slowly at an almost constant rate (approx. 0.6–1.0 mm/min) because of the insulating surface layer of charcoal that is formed. Smoke production in fire is moderate, and the fumes are not normally aggressive. Load-bearing wood burning on its surface retains a load-bearing capacity proportional

to the unburnt cross-sectional area. Wood's load-bearing capacity in fire can therefore be determined by calculating the progression of the fire.

As a fire progresses, wood forms a layer of charcoal that protects the underlying wood due to its low thermal conductivity. Heavy timber constructions can therefore be superior, in fire protection terms, to unprotected steel. Inadequately ventilated piles of sawdust can generate so much heat that they can self-ignite. The oxidation of resins in the sawdust can also cause fire. The service lives of poles and fence posts can be extended by allowing their surface layers to char.

Grading

The Swedish publication "Gröna boken" (the green book) only gives instructions for grading spruce and pine. The wood is graded with regard to faults in the timber and also to its overall impression. For wood that is to be used to manufacture parquet floors, usually hardwood, all manufacturers decide for themselves what rules will apply to each grade of floor. Different gradings are used to create different looks. In this case it is only a matter of the appearance desired in the room: lively or tranquil.

In accordance with the EN standard, the appearance of wood falls into three different classes. O refers to grades with minor variations, o refers to grades with moderate variations and Δ larger variations (in the absence of specific standards).

Stating that a grade may have certain knot sizes or other visual criteria does not mean that all boards in that grade actually do. The overall appearance of different floor grades must be different, with a natural distribution of the parameters within each grade.

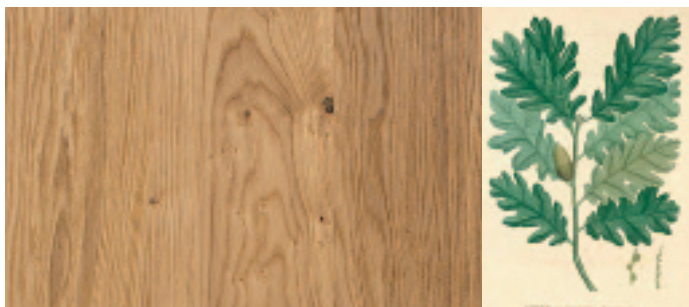
However, the design and construction of floors with different appearances are of the same high quality. The terms appearance and quality, which are actually two different things, are commonly confused.



Our species

Our range includes many of the world's most beautiful species from the most exciting parts of the globe. Kährs is determined to promote environmental awareness even in global terms. Tropical species in our range come from countries who are members of the International Tropical Timber Organization (ITTO). All members of the organization have pledged to work towards ecological forestry. When purchasing tropical timber we source raw materials from responsibly managed forests. Suppliers are chosen principally from those who hold an FSC (Forest Stewardship Council) or PEFC (Program for the Endorsement of Forest Certification) certificate or equivalent, or from those who can in some other way document that they operate environmentally-aware timber procurement.

OAK (*Quercus robur*, *Quercus petraea*, *Quercus rubra*)



The tree

There are more than 300 different species of oak in the temperate region. Furthermore, there are a number of hybrids between different species. Sweden has mainly common oak (summer oak, forest oak) and sessile oak (winter oak, mountain oak). In North America, red oak is the most common, and in southern Europe a specific cork oak. The sessile oak retains its wilted leaves in winter. Oak generally grows to a height of 20–40 m, and can live to be 1000 years old. The strong taproot and thick lateral roots make the tree very resistant to storms. At least 500 insects live on the oak. Some 40 of these are threatened species, the majority of them living in old trees with decayed wood. The acorn is a much sought-after food for roe deer, wild boar and jays. Acorn production varies greatly from year to year, but in an acorn year many oaks in the same region produce large quantities of acorns. This happens approximately every seventh year. Abundant acorn years cannot occur consecutively.

The wood

The timber is relatively hard and heavy, with excellent physical properties. Oak is easy to split and work, but difficult to dry. The heartwood is the most durable among the Swedish tree species. It is hard and rot-proof, but the sapwood can be attacked by insects. The timber is highly resistant to abrasion. Oak is ring-porous, and has marked medullary rays. The wider the medullary rays, the higher the density of the wood.

Uses

Nowadays, oak is used for parquet floors, panels, furniture veneers, fuel, thresholds, stairs, fence posts, etc. Previously it was used for shipbuilding, foundations, bridge and hydraulic construction, wheel spokes, fencing, sleepers, coffins, agricultural implements, tanning, etc. Oak bark contains approx. 10% tanning agents.

BEECH (*Fagus sylvatica*)



The tree

Grows in Europe between latitudes 40° N (Madrid) and 60° N (Stockholm). Beech grows to a height of approx. 30 m and generally lives approx. 300 years. It has a strong, rather shallow root system, and can withstand cold but is sensitive to spring frosts. Beech forms continuous forests, and is a beautiful and valuable landscape feature. Beech nuts are a sought-after food for mammals and birds. Beech nut production varies greatly from year to year, but in a beech nut year, many beeches in the same region produce large quantities of nuts. This happens approximately every seventh year. Abundant beech nut years cannot occur consecutively.

The wood

The timber is easy to process and work, and has a high bending strength. The beech is not resistant to rot and insect attack, but easy to impregnate. The wood swells and shrinks considerably with changes in moisture, which means it warps a lot.

Uses

Nowadays, beech is used for chopping boards and lollipop sticks because of its lack of taste, and for furniture because it does not have marked graining. Beech is a common species for toys, parquet and panels. It has been used in the past for railway sleepers, the manufacture of potash, charcoal, churns and other wooden barrels. Many different products used to be extracted by dry distillation, including acetic acid and Bakelite. During the world wars the beech nut was used for coffee substitute, and cooking oil was also extracted.

ASH (*Fraxinus excelsior*)



The tree

Grows in the northern hemisphere. Ash generally grows to a height of approx. 30 m and can live to be 300 years old. It is resistant to cold but sensitive to spring frosts. Ash has an extensive and, in damp soil, shallow root system, and tends to send out suckers. Elk, roe deer, hares and rabbits eat ash saplings with enthusiasm. Ash is often called the “King of Trees”, because its leaf canopy “arrives last and departs first”. The nutritious leaves form an excellent humus soil where many of our small molluscs thrive.

The wood

Ash is a relatively hard, heavy and tough species. It is difficult to split and has good strength properties, but is flexible. The wood has yellowish sapwood and light-brown heartwood, and visible medullary rays.

Uses

Nowadays, ash is used for tool handles, sports equipment, billiard cues, boat interiors, furniture, handrails for stairs, parquet, sulky shafts, dogsleds, etc. It has been used in the past for aircraft construction, tool handles, weapons (in Icelandic, “askr” (ash) = spear), spokes and casings.

BIRCH (*Betula alba*)



The tree

Grows in the northern hemisphere. There are many different species of birch, including downy birch (white birch bark; the mountain birch is a variant), silver birch (also known as weeping birch), Swedish birch and dwarf birch. Birch readily develops suckers. Birch grows to a height of 20–30 m.

The wood

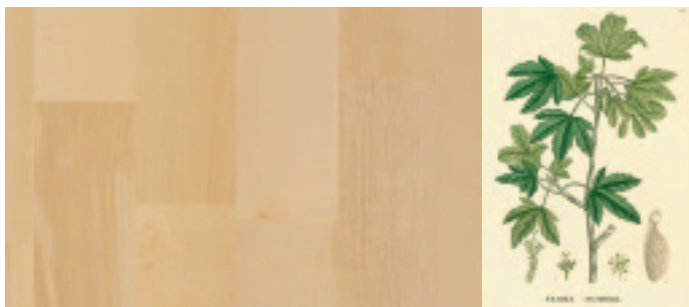
Birch is relatively soft and resilient. It is easy to work and bend, and easy to impregnate. On the other hand, birch is not resistant to rot and insects. Birch is considered a sapwood tree.

Uses

Birch is used for furniture, tool handles, brush handles, interior joinery, toothpicks, parquet, plywood, rulers, etc. Both birch bark and the sap were used previously. Birch bark was used as a seal under turf roofs, for canoes by Native Americans in North America, for birch bark baskets, etc. The sap was used as a nutritious drink. The bark contains the antiseptic substance betulin.



EUROPEAN MAPLE (*Acer pseudoplatanus*)



The tree

Grows throughout Europe, as far as the Urals, but not normally in the Netherlands and the UK. The tree normally grows to a height of 20–30 m and lives for up to 500 years.

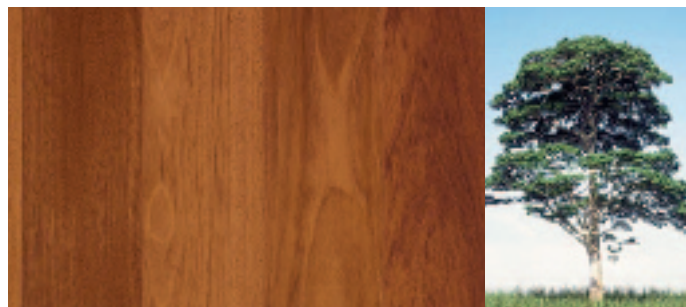
The wood

European maple is a light and resilient wood that is easy to work.

Uses

Nowadays, European maple is used mainly for cabinet making, parquet flooring, handicrafts, tool handles and violin backs.

JATOBA (*Hymenaea cuorbaril*)



The tree

Grows in Central and South America, and is sometimes known as the Brazilian cherry.

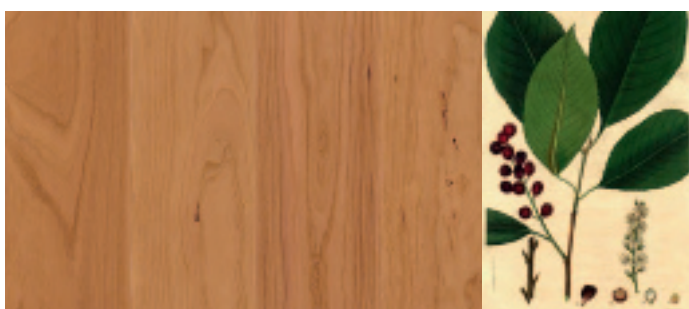
The wood

Jatoba is a very heavy and strong species. The heartwood is resistant to mould.

Uses

Jatoba is used for construction, railway sleepers, furniture, tools, musical instruments and veneers. The tincture is used medically to counter inflammation, bacteria, fungi and slugs and snails.

CHERRY (*Prunus serotina*)



The tree

The cherry tree grows rapidly. It normally reaches a height of 15–20 m and lives for up to 80–90 years. The edible berries are particularly attractive to birds. The leaves are poisonous to cattle.

The wood

American cherry is darker than the European variety. Cherry darkens quickly on exposure to light.

Uses

Cherry is used for exclusive interior fittings, floors, furniture, veneers and musical instruments.

WALNUT (*Juglans nigra*)



The tree

Found in various parts of the world including eastern North America, Europe and Asia Minor. Walnut normally grows to a height of 40 m, with a trunk circumference of 2.5 m. The nuts are poorer quality than those of the common walnut.

The wood

Walnut is resilient and easy to work and treat, and is very suitable for bending. The wood is dimensionally stable.

Uses

Walnut is used for furniture and interior fittings, rifle butts (because of its ability to withstand impacts) and inlaid work.

HARD MAPLE (*Acer saccharum*)



The tree

Hard maple grows in eastern North America, and normally reaches a height of 30 m. This species is also called the sugar maple, and in its autumn colours it is the national symbol of Canada.

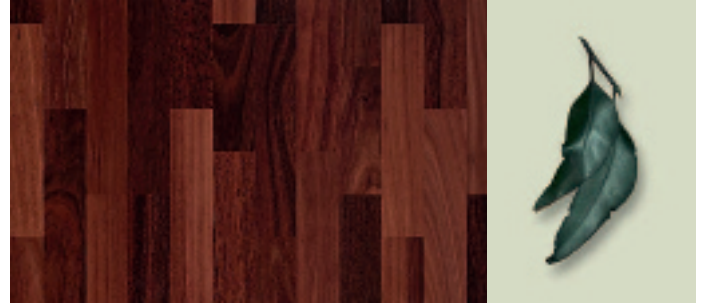
The wood

Maple is a heavy and hard species, but still resilient, and it withstands wear well. It is one of the most moisture-sensitive species. It dries slowly with extensive deformation. The wood is easy to turn.

Uses

Hard maple is used for inlaid work, parquet flooring and other sports floors (e.g. bowling alleys), bowling pins, musical instruments and kitchen equipment (it leaves no taste). Sugar is extracted to make maple syrup. It takes 30 litres of maple sap to produce one litre of maple syrup.

JARRAH (*Eucalyptus marginata*)



The tree

Jarrah grows in south-western Australia, reaching a height of up to 40 m with a trunk diameter up to 3 m. The Jarrah tree is unusual in that it has long underground nodules for storing carbohydrates that enable the tree to regrow after a forest fire. The roots go very deep, and therefore cope with long dry periods.

The wood

The species is very hard. When green, Jarrah is quite easy to work, but when dry it causes severe wear to tools.

Uses

Jarrah is very weather-resistant and is therefore used for bridges, railway sleepers, shipbuilding and telephone poles, and for panels, floors and garden furniture. Jarrah flowers are used by beekeepers for the production of honey. In the UK, tar-covered Jarrah blocks were once used for surfacing roads.

RED OAK (*Quercus rubra*)



The Tree

Also known as Champion Oak. The tree grows in the northeast United States and southeast Canada – in areas with good soil that is slightly acidic.

The wood

It is heavy, hard, strong, coarse-grained.

Uses

The northern red oak is one of the most important oaks for timber production in North America. The wood is of high value. When carefully treated it can be used for furniture. Also used in construction and for interior finish of houses.

MERBAU (*Intsia bijuga*)



The tree

Merbau grows to a height of approx. 20 m, with a trunk diameter of 1.5 m. It grows in locations such as Indonesia, Malaysia and the Philippines.

The wood

Merbau is a heavy and very hard species and has very little movement in response to moisture.

Uses

Merbau is used for construction, interior fittings, furniture, windows, doors and floors.



The forest

Forests in temperate regions have more species than the coniferous forests in the more northerly regions. Tropical forests offer the greatest diversity of species.

Forests in Sweden

Sweden's forest land corresponds to barely 1% of all the world's forest land. More than half of Sweden is covered by forest. Of this, approx. 85% is coniferous, 10% mixed and 5% deciduous. Deciduous forests dominate only in southern Sweden. Mittlanskogen forest on Öland is northern Europe's largest continuous deciduous forest.

Sweden's forest resources have doubled in less than a century. Forests are still expanding in Sweden because felling is outweighed by new planting.

Barely half the timber felled goes to the sawmill. All forests in Sweden can be defined as plantations. Only forests in the most northern mountain regions are not used for cultivation and silvicultural activities.

Certification of forestry means that an independent certifying body confirms that the forestry complies with a standard verifying that economic, social and environmental requirements are being met. With a certificate, the wood products can then be marked, which can increase the market share of wood products in environmentally aware markets. See the section on Environment at www.kahrs.com.

Solitary trees (usually oak) and pollarded trees have high natural value, above all because they can reach a great age. Solitary trees, which avoid competition for sunlight and nutrients with other trees, can be up to 1000 years old. The reduced crowns of pollarded trees reduce the risk of the tree being damaged by snow and wind, and these trees can also, therefore, live for countless years.

Cultural history

Birch leaves or birch twigs are used as a tribute to the Indogermanic god Donar, the Thunderer (predecessor of the Norse god Thor). The custom of adornment with birch or birch twigs for the spring and midsummer festivals lives on in the Nordic countries.

Because trees live to a great age, they span people's fates over many generations and connect us with our forefathers. Trees are cult objects in most cultures. The mythical world-tree Yggdrasil is famed in Nordic mythology. The first humans, Ask and Embla, were created from it. Other cultures also have trees to which certain beings are linked, in Greek mythology as well as in Buddhism. In ancient Rome, the oak was the tree of Jupiter, the god of war, and wreaths of oak leaves were handed out to honour specially chosen heroes. At Dodona, a temple dedicated to Zeus, an oak grew whose whisperings were considered oracular.

In the old Swedish provincial laws, fines were imposed on those who unlawfully felled nut-bearing trees (e.g. hazel, oak and beech). The oak was the king's tree, because oak was used in the manufacture of warships. This came to an end after 1842, when the first iron ship was built.

It is not unusual to plant a so-called tree of life when a child is born. This was very common among the ancient Romans, but the Assyrians, Egyptians, Indians and Sami have also made use of respected and highly venerated trees. The tree of life was considered to be strongly interconnected with the property's residents, and as long as the tree lived, the property was inherited down the generations.

The tree of life was also used in genealogy as a symbol of the family's branches.

Planting a guardian tree as a symbol of the property's prosperity is an old tradition with pagan roots. In later times it has acquired a more symbolic character associated with the property, but it is mainly ornamental.

In older times, leaf-bearing branches and twigs were commonly polarded for winter fodder for animals. Ash and willow particularly were used as feed for goats and sheep. For cattle and horses, leaf fodder was used mainly when there was a shortage of feedstuffs.

Few trees have been used for predictions about years to come as much as the rowan. In Sweden, it was said that an autumn with plenty of berries would give way to a severe and snowy winter.

Elder was a veritable medicine cabinet for all sorts of ailments, and was therefore commonly planted close to the house. Furthermore, an elder close to the house was considered to keep goblins away. The elder's excellent qualities have been known in most cultures, from antiquity to the Middle Ages.

From wood floor to parquet floor

The first "floors" were just trampled down earth or clay, and they were not uncommon in Sweden and the Nordic countries right up to the end of the 19th century. Flat stones were sometimes used, perhaps to keep out the damp. A later development was to lay wood instead of stones directly onto the ground. The floor joist system was developed to escape the damp ground and the worst of the cold. A number of widely spaced logs, often split, were laid directly on the ground, and rough planks of spruce were laid on these logs. Spruce was used for the floor because it was light in colour. This construction was not connected to the walls, to make it easy to replace

planks attacked by rot. The floor planks were usually naturally narrow, and laid alternately root end to top end. The floor planks could also be laid directly on sand. In buildings constructed in this way, the cornerstones supported the building.

In the brick or stone buildings constructed in later times, the foundations had to carry the entire load, which made raising the floor joists off the ground obvious, and the foundations were used to accommodate the floor joists. The crawl space foundation had become reality. This construction also became common for simpler buildings, and is called a suspended timber floor. The floor boards were still mainly spruce, but they were more slender.

Floors were more prominent in old buildings than they are today, partly because at that time nearly all furniture was positioned along the walls, and partly because carpets and rugs did not begin to be used in Sweden until the middle of the 19th century. Spruce floors are not particularly durable, and they warp considerably. Oak was therefore used in houses owned by the gentry. It was harder, and also conferred a certain status on the owner.

The first "proper" parquet floors were manufactured in France as early as the Middle Ages. The oldest known patterned wood floors in Sweden date from the 16th century. In the middle of the 18th century, parquet floors came in chequer patterns, presumably an influence from French carpenters working on the Royal Palace in Stockholm. Parquet floors became increasingly common in Swedish homes from the early 20th century. In 1941, Kährs was granted the first patent for multi-layer parquet. This was based on its patent for laminated doors, which was developed to achieve a flat, rigid product.

The cores of Kährs floors are made from coniferous wood. We currently use only hardwood for manufacturing the surface material.





Did you know...

- The world's tallest trees are the North American conifers – the giant sequoia, the Douglas fir, the giant silver fir – and an Australian eucalyptus.
- The world's tallest tree in 2006 was said to be a *Sequoia sempervirens* (Hyperion) at 115 m, growing in Redwood National Park, California.
- The world's tallest broadleaf tree is *Eucalyptus regnans* at 110 m, which grows in Styx Valley, Tasmania.
- The world's largest tree is the Californian giant sequoia General Sherman. It is 84 m tall, with a circumference of 31.3 m and a diameter of 11.1 m.
- Trees in Europe can reach heights of about 100 m, and many are more than 1000 years old.
- The most famous tree in Sweden is the Rumsquilla Oak, near Norra Kivill in Småland. It is Sweden's thickest and oldest tree. It measures 14 m in circumference at its foot, and is about 1000 years old.
- The Ginkgo Biloba tree is considered to be the missing link between conifers and deciduous trees.
- Pine groves offer ideal conditions for finding fungi such as slippery jack, russula and fly agaric.
- Ash grows generally in Europe apart from Finland, Portugal and Ireland.
- The buildings in Venice were built on alder or Siberian larch piles.
- Granhult church in Småland is one of Sweden's oldest surviving wood buildings. It dates from the 1220s.
- On some ash trees, all the flowers are male, on others all are female. Some trees have both male and female flowers.
- Thin slices of spruce, known as shingles, were used to cover roofs before tiling became common.
- Scrubbing brushes can be made from thin spruce roots.
- Each rubber tree can yield up to 4 kg of latex each season.
- In the past, hides were prepared with tanning agents from the oak and the spruce.
- The world's first underfloor heating system for wood floors was invented in Korea. The system was based on smoke (and hence the heat) being led in under the wood floor, before leaving via the chimney on the opposite side of the building.
- The oldest tree ever known was a pine (*Pinus longaeva*) 5100 years old. It grew in Nevada, USA, but has now been cut down.
- The oldest living tree is a pine in California that is thought to be 4700 years old.
- Beech originally meant simply wood. Runic characters were cut into thin beech strips (bokstav in Swedish), and the Swedish word for letter is still bokstav.
- Johan Gutenberg discovered that pieces of beech made marks on white paper and invented the art of printing.
- In England, ash wood and bacon were thought to be able to remove warts.
- The ancient Romans took wreaths of lime bast to feasts, convinced that they would be able to prevent food poisoning.
- It was thought that children with rickets or other serious diseases could be cured by being pulled through holes in a tree, often a maple.
- Robin Hood used yew for making bows. The wood for the bow should be cut so that it includes both heartwood and sapwood. This produced a bow that was both strong and flexible.
- Originally, alder was used for making clogs, but today mainly birch is used.
- Hard maple was once also used for the heels of high-heeled shoes.
- The ancient Roman Pliny the Elder used ash leaves to drive away snakes.
- The oak grows for 200 years, lives for 200 years and dies for 200 years.