



Stripped cork oaks. CREDIT: ALAN SMILLIE / SHUTTERSTOCK

A remarkable material

Most of us enjoy a glass of wine from time to time and the odds are that we will have to withdraw a cork from the bottle before we can pour it and consume it. Less well known are the remarkable qualities of cork as a material and the breadth of applications and products it can be used for. We all know it is extremely light and buoyant but, beyond that, probably very little. So, what exactly is it and what gives it its extraordinary physical properties?

Cork is actually the outer bark of the cork oak tree *Quercus suber* and is unique in that it can be 'stripped' off to be replaced by new bark without causing any damage to the tree itself. It is therefore an entirely renewable source of raw material throughout the natural life of the tree. It grows principally in southern Europe and North Africa as a result of a micro climate and type of soil found there. Portugal is by far the largest producer and accounts for over 50% of output.

Cork oaks are also unusual in that

they are self-preserving. Forest fires are common in Mediterranean regions whereby pine trees, olive groves, eucalyptus trees and even vineyards are destroyed and then take years to recover. Cork oaks, on the other hand, are able to survive relatively unharmed as the bark acts as a natural protective shield and, although scorched, generally survive and return to full growth within a short time. Nothing could better demonstrate the durability of cork and its insulating qualities.

STRIPPING CORK

Stripping is the process of removing bark from the tree. The first stripping takes place approximately 20 years after planting and is repeated every nine to 10 years until the tree is approximately 200 years old when it is replaced. A machete is used to slice the bark into as large sections as possible, followed by a metal wedge to peel them from the tree. Although this might appear simple, great care has to be taken so as not to damage the thin

membrane found between the bark and the inner trunk, as this carries nourishment to the upper branches.

To register the harvest date and ensure trees are not stripped again before the requisite period has passed since the previous stripping, the last number of the year in which this occurred is painted onto each tree. For example, if a tree was harvested in 2006, then the numeral '6' would be painted on the tree as shown in the title image. This assures both forest owners and environmental authorities that trees are only stripped at the correct interval, thus keeping trees in good health and producing good quality cork.

UNIQUE PROPERTIES

No other natural or man-made material possesses the unique properties of cork. It is resistant to rot, compressible and recoverable, expandable, fire resistant in its natural state, impermeable, and soft and buoyant. With its light weight honeycomb structure, it has been found



Typical thermo moulded heel insert. CREDIT: CORTICEIRA AMORIM

suitable for a wide variety of applications ranging from wine bottle stoppers to fishing floats, floor and wall coverings to gaskets and from clothing to drink mats. Its light weight and elasticity also makes cork an excellent material for use in footwear.

Some 2½ times our body weight is transmitted through our feet anything up to 9,500 times a day. We also walk on hard flat surfaces for which our feet are not designed, so it is little wonder we increasingly need remedial foot support and pain relief. As it is 50% air, cork is not only extremely light but, at the same time, an excellent insulator and shock absorber. The fact that it also has high moisture absorption, coupled to rapid release and anti-bacterial properties, was recognised by the Romans who regularly used it as a soling material.

FOOTBEDS AND INSERTS

One of the main footwear applications today is in footbeds and shoe inserts. They can be a removable, moulded inner sock designed to support the foot and in this form are widely used by comfort or outdoor footwear brands. As a permanent moulded insole, they have long been used in health promoting nature form sandals. Alternatively, they can be individually tailored to a wearer's foot and inserted into an oversize shoe for many of the more common orthopaedic complaints.

In some applications, they actually replace the traditional insole in the search to provide greater comfort. The interface between the foot and the inner surface of a shoe is important and cork offers a smooth yet tactile surface which feels supremely comfortable under the sole of the foot. This can have a major

influence at point of sale as an immediate feeling of comfort is likely to appeal strongly to a purchaser and several factors play a part in achieving this.

Cossetting – tactile impression of the foot when trying on a shoe. Key elements include compressibility under low forces, softness, friction (slipperiness or grip), thermal insulation (warm or cold feel) and abrasiveness (roughness). Cork performs well in every respect.

Cushioning – ability of the shoe bottom to conform elastically to the shape of the foot and distribute pressure while walking or standing. Cork helps to eliminate the high pressure points associated with discomfort and accommodate changes in foot shape during weight transfer.

Shock absorption – ability of the shoe to absorb the dynamic forces which repeatedly jar the body when a foot strikes the ground. Cork performs extremely well here and may even add additional bounce to the wearer's step.

Ground insulation – this property can be of considerable importance in regard to comfort in all types of footwear by minimising the 'feels rough' effect between uneven surfaces and the foot. Cork once again performs admirably.

Surface friction – low insock friction can detract from both comfort and a sense of security when walking. Cork tends to grip the sole of the foot and so holds it in place within the shoe to enhance overall comfort.

Moisture dispersal – materials that absorb moisture and then quickly release it are ideally suited to footwear. While conventional insole materials may perform adequately in this respect, cork is often considered to be superior.

BOTTOM FILLER

Cork is also well suited for use as a bottom filler for the gap between the sole and insole where it again offers a degree of shock absorption and insulation from the ground. Where it really scores in this regard is with Goodyear welted shoes. A feature of many welted lasts is a quite pronounced curvature or 'swell' across the bottom of the last which enables good fitting properties and toe depth to be built into a shoe which, when finished, nevertheless displays a smart shallow toe. This swell is effectively 'lost' in the bottom cavity because filler compensates for the varying depth of cavity throughout the forepart of the shoe.

A mixture of granulated cork and acetone-based binder is applied using a special machine that extrudes it into the forepart cavity. The solvent binder causes it to adhere to the insole, filling the forepart cavity back to the waist and at the same time helping to strengthen the shoe. It dries sufficiently for the sole to be attached within minutes and dries out fully by the time the shoe leaves the factory. Not only does the compound completely fill the cavity, it also adapts itself after a short while to the sole profile of the wearer's foot to provide a high degree of individual wearer comfort. 🌀



Welted shoe bottom after filling.

CREDIT: LIVINGSTON & DOUGHTY