



Figure 1: Bark from protected cork trees is periodically harvested.

### Raw Materials

Cork is found in naturally separated **bark** from oak trees (*Quercus suber*) that grow primarily in a Mediterranean climate. These trees are indigenous to the southern Iberian Peninsula and the Mediterranean basin including Portugal, Spain, and North Africa.

### Manufacturing Process

The process begins as bark is harvested from trees in oak groves. “Most of the producing nations regulate how frequently cork can be harvested to minimize damage to the trees” (EBN 1996). It takes at least 25 years for a planted sapling to reach maturation, at which point the bark will naturally separate from the trunk and the bark can be harvested. This natural separation, and the harvesting of the bark, occurs every 9-14 years thereafter (EDC 1998). Each oak tree can produce bark for 100 to 150 years, with each year yielding hundreds of pounds of cork per tree. “The largest cork oak in Portugal, estimated to be 200 years old, produced 1,200 kilos (2,600 lbs) of cork in 1992” (EBN 1996). The harvesting of cork is a renewable process. Once harvested, the bark regenerates and is not harvested again until the bark has regenerated. The denuded trees are susceptible to injury until the new protective outer bark is generated.

Once the slabs of bark are harvested, the slabs are cured, cleaned and boiled. The rough outer surface is removed and the slabs are cut into strips. These strips are punched for wine corks. Scrap left after punching is ground into granulated cork, “mixed with a binder, molded into large blocks, then baked in specialized ovens.” (EBN 1996)

Cork flooring is a byproduct of bottle cork production. Virtually no waste results from this process as much of the waste or byproduct is used for other purposes. For example, cork dust generated from the scrap grinding is burned to create more energy (Chmielecki 2003).

### Manufacturing Locations

Portugal, Algeria, Spain, Morocco, France, Italy, and Tunisia

Open, savannah-like cork forests cover approximately 5.4 million acres in the seven listed countries, with 50% of production coming from Portugal (EBN 1996).

### Benefits

Because the bark of the cork oak tree naturally replenishes itself, cork, like bamboo, is a rapidly renewable resource. Oak groves are typically regulated to maintain a long-term

presence, thereby maintaining both forested land and an economically productive natural resource.

Cork used in building products is sought after because of its many beneficial qualities. Cork is warm, durable and cushioning. The cell structure, incorporating 200 million air cells per cubic inch, provides good shock absorption as well as thermal and acoustical insulation properties (Chmielecki 2003). “Cork derives its remarkable properties from a cellular structure of hollow polyhedral (14-sided) cells with extremely strong, flexible cell walls that are waterproof and airtight. The cells are joined together in a honeycomb fashion producing a very low-density, compressible, yet strong, insulating material.” (EBN 1996). The cellular structure also lends to cork’s resistance capabilities. The density of cork means it is inherently fire resistant as well as resistant to moisture damage or decay. To combat the impression that cork falls apart easily, it has been termed the ‘workhorse floor’ as some floors dating from 1890 are still in use in commercial installations today (EDC 1998).

## Use and Installation

Given its durability and versatility, cork has been used in Egyptian tombs, bridge expansion joints, bulletin boards, and wine corks (Chmielecki 2003). It is as usable, durable, and long-term as wood flooring. It is available in pre- or unfinished tiles usable for application on vertical or horizontal surfaces. Care should be taken when selecting cork products. Some cork tiles employ layers of vinyl or composite in their makeup whereas others are all natural.

Cork is available in rolls, tiles, or planks. Rolls can be used as a sound control underlayment, tiles are the most common finished floor product, and planks are manufactured as a composite product. Thickness is established when the cork blocks are sliced, usually at 3/16” or 5/16”. Tiles typically come in two sizes: 12x12 inches or 24x24 inches. Planks are generally 36” long by 12” wide; some manufacturers make narrower planks. Many colors and textures are available, including unfinished or pre-finished.

Cork plank flooring is a laminated product containing a top layer of cork, a middle layer of fiberboard and a cork underlayment layer. There is also a cork-vinyl product on the market that has a vinyl backing and surface layer with a middle layer of cork. While it does contain cork, it is primarily a vinyl product engendering the same strong environmental concerns as other PVC products.

## Indoor Air Quality

Cork is itself benign and hypoallergenic, reportedly even in the processing. According to Philippe Erramuzpe, president of Natural Cork, cork manufacturing is “a pretty clean process.” He reports “the only chemicals really used would be for the finishing process.” (Chmielecki 2003). However, a binder is required to bond the cork granules together. The binder used could be urea-melamine, phenol-formaldehyde, or polyurethane. Urea-

formaldehyde is less prevalent as a binder than it was in the past. Some products do use all-natural protein products.

Indoor air quality problems can also exist with the adhesives, finishes, or sealers used. Adhesives generally involve polyurethane; water-based latex adhesives are also available. Cork is finished similarly to wood, using polyurethane or wax. Off-gassing potential will be a characteristic of the individual product used. Pre-finished cork tiles can be used thereby eliminating the need for finishing on site, however, there is then no seal provided at the tile joints.

The natural properties of cork resist mold, mildew, rot and many insects. They do not off-gas or shed microfibers.

## Cost

The Environmental Home Center (EHC) is used here as a reference for pricing cork tiles and planking. The pricing of tiles and planks described below is based on their product information (May 2003).

EHC has two suppliers listed: OS and Expanko. OS planks are sold 6 planks or 18 square feet per box. Plank pricing ranges from roughly \$115-\$140 depending on the style chosen. Per square foot the range is from \$6.42-\$7.78. Expanko planks are sold 10 planks per box or 30 square feet per box. Square footage pricing is either \$7.79 or \$9.19 for unfinished planks or \$8.49 or \$9.99 for planks with a wax or polyurethane finish.

Tile pricing for 12x12 inch parquet tiles is based on the square foot and ranges depending on the finish. Matte polyurethane finished tiles start at \$7.29 per square foot. Tiles finished with carnauba wax start at \$6.29 per square foot. Unfinished tiles begin at \$5.79 per square foot.

## Local Suppliers

Cork Insulation Sales Company Inc. (CISCO)

7831 South 198<sup>th</sup> Street, Kent, WA, 98032

Phone: (253) 239-2675

[www.corkinsulation.com](http://www.corkinsulation.com)

Supplier of floor and wall tiles, underlayment from Natural Cork located in Augusta, Georgia.

For details on quality, location, source, and more go to [www.naturalcork.com](http://www.naturalcork.com)

Environmental Home Center

1724 4<sup>th</sup> Avenue South, Seattle, WA, 98134

Phone: (800) 281-9785 or (206) 682-7332, Fax: (206) 682-8275

[www.EnvironmentalHomeCenter.com](http://www.EnvironmentalHomeCenter.com)

Supplier of cork flooring, underlayment, wall paper from OS and Expanko. Their supply comes from Portugal, Spain, and Germany by ship and truck, sometimes by rail. EHC cork products have no PVC; tiles and plank floor systems are solid cork with European grade mdf (formaldehyde free) while their wall paper is cork and nylon, and underlayment is solid cork sheeting. EHC cork products are prefinished with polyurethane or Hardwax Oil; they offer these and other finishes in the store.

## References / Resources

“2003 Product+Resource Guide: Products,” *Environmental Design + Construction*. November/December 2002; pp. 71-72.

(Full list of products and resources related to building industry – including cork and flooring)

Bihun, Yirij. “Letters: Cork Trees in Jeopardy,” *Environmental Building News*, Vol. 5: No. 4 (1996); p. 3.

“Cork Flooring,” *Environmental Building News (EBN)*, Vol.5: No.1 (1996); pp. 10-12.

Chmielecki, Michael. “From Trees and Grasses: Environmental Sustainability in Wood Flooring,” *Environmental Design & Construction (EDC)*. March/April 2003; pp. 14-18.

“Cork: Environmental for 2,500 years,” *Environmental Design & Construction (EDC)*. March/April 1998; pp. 38.

Environmental Home Center. *Fact Sheet: Cork for floors? and Fact Sheet: OS Cork plank flooring*. Product literature, 2002.

“Section 09640: Cork Flooring,” BuildingGreen. <http://www.buildinggreen.com/>.

(List of current cork flooring products and manufacturers)

## Image Credits

1. IpoCork, Inc. in *Environmental Building New*, Vol.5: No.1 (1996), p. 11.

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