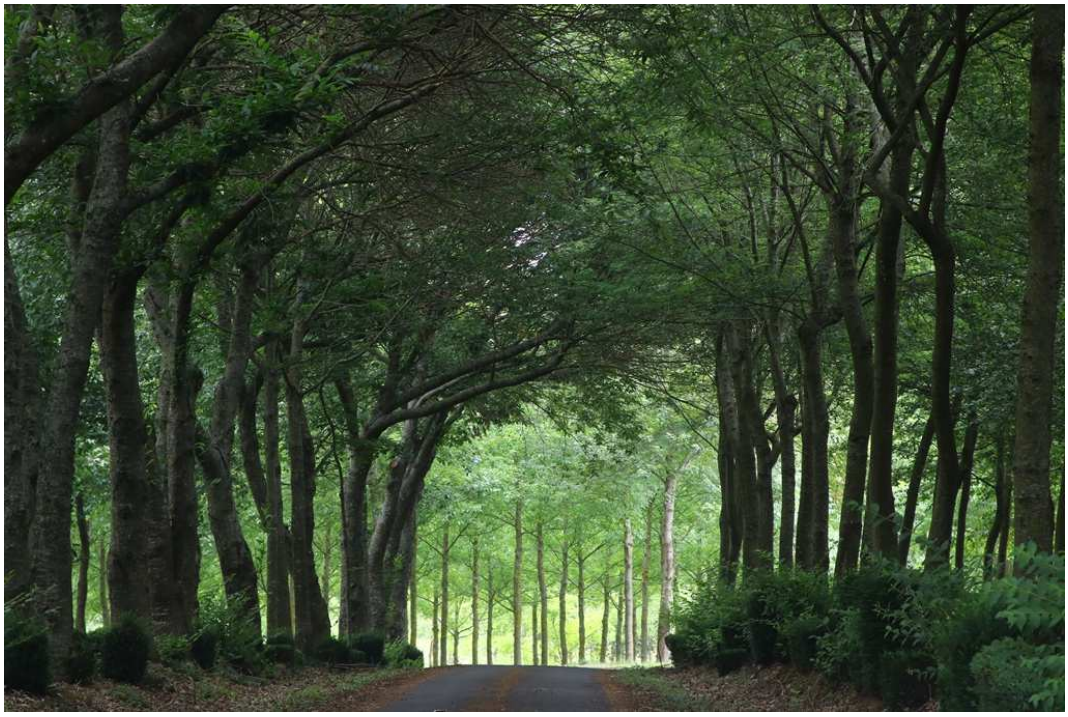
Woodna Oblicua Geométrica



Woodna, within its walnut surfaces workline (www.woodna.es), launches Woodna Oblicua Geométrica, an innovative, high-performance, versatile product with many possibilities for designers. Woodna owns 1300 ha and more than 300,000 trees planted throughout the Iberian Peninsula from A Coruña to Girona passing throught Cáceres, Toledo y Cuenca. From these plantations we obtain an UNIQUE (Improved trees), SUSTAINABLE (from plantation) and ECOLOGICAL (capture and store CO^2) raw material Also, it promotes RURAL DEVELOPMENT in these areas. A series of innovations have been made to create a unique and high design product from this raw material.

Picture 1 and 2 Walnut trees in the Arzua plantation, A Coruña, July 2017

The Innovation of Oblique Cross Sawing

The first innovation is the way to cut the tree through an oblique cross section, registered as Intellectual Property M-006756/20.

This sawing scheme allows to take advantage of the properties of wood in its cross section. The wood, both microscopically and macroscopically, does not stop being a series of longitudinal tubes that confer very different characteristics if one takes a tangential plane or a longitudinal plane. It is what is called anisotropy of the material.

For walnut wood the following values are obtained:

	Contraction %	Monnin Hardness	Compression N/mm2	Thermal conductivity kcal/mhºC
Longitudinal	2 a 4	4	16	0,126
Cross	0,1/0,2	10/15	50/70	0,284

Kollmann F. “Tecnología de la madera y sus aplicaciones” INFIE Madrid 1959

Picture 3 Oblique cross section of walnut trunks

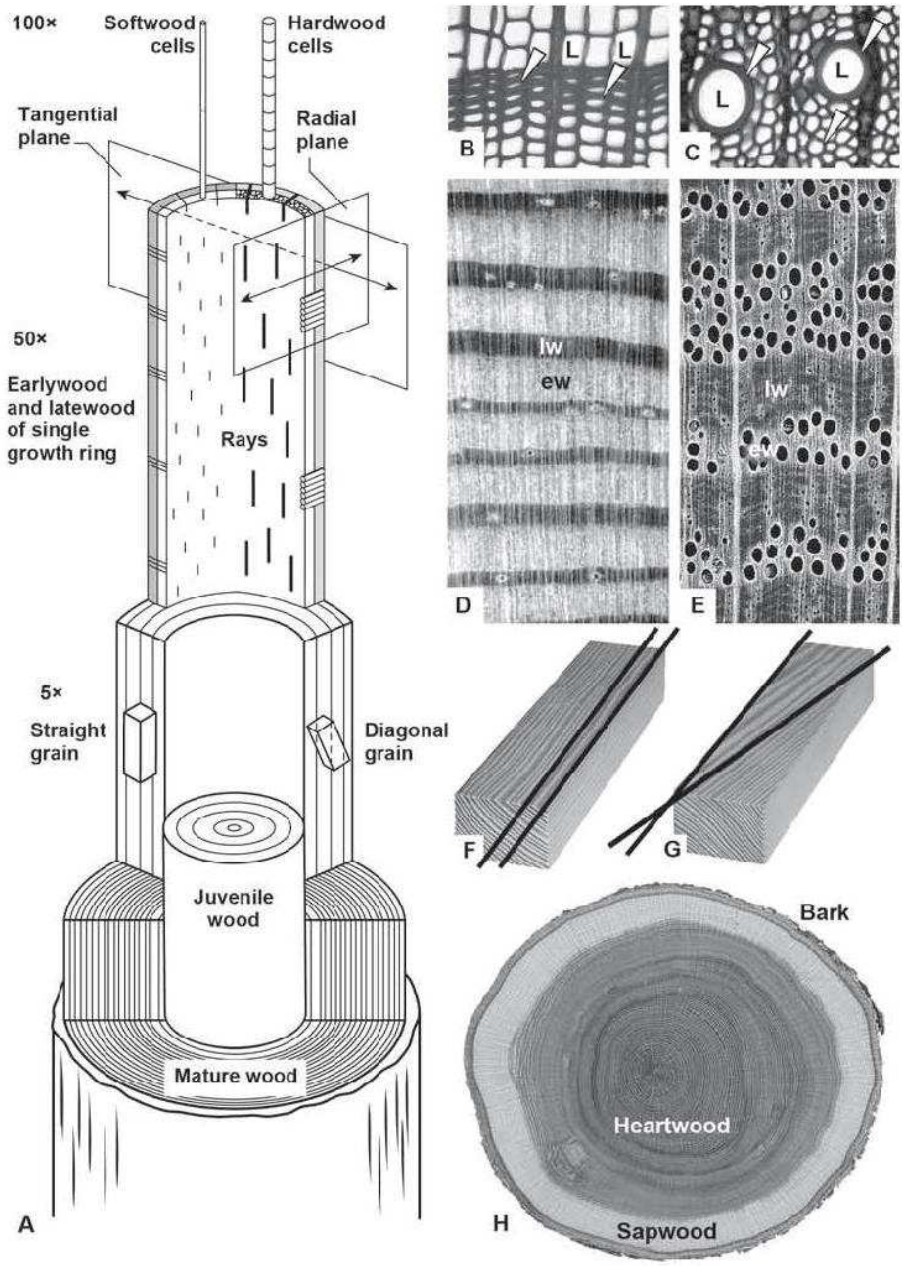


Illustration of a cut-away tree at various magnifications, corresponding roughly with the images to its right; at the top, at an approximate magnification of 100×, a softwood cell and several hardwood cells are illustrated, to give a sense of scale between the two; one tier lower, at an approximate magnification of 50×, is a single growth ring of a softwood (left) and a hardwood (right), and an indication of the radial and tangential planes; the next tier, at approximately 5× magnification, illustrates many growth rings together and how one might produce a straight-grained rather than a diagonal-grained board; the lowest tier includes an illustration of the relative position of juvenile and mature wood in the tree, at 1× magnification. B,C, light microscopic views of the lumina (L) and cell walls (arrowheads) of a softwood (B) and a hardwood (C). D,E, hand-lens views of growth rings, each composed of earlywood (ew) and latewood (lw), in a softwood (D) and a hardwood (E). F, a straight-grained board; note that the line along the edge of the board is parallel to the line along the grain of the board. G, a diagonal-grained board; note that the two lines are markedly not parallel; this board has a slope of grain of about 1 in 7. H, the gross anatomy of a tree trunk, showing bark, sapwood, and heartwood.

Forest Products Laboratory. 2010. Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory.508 p.

The oblique cross section of Woodna Oblicua Geométrica has two characteristics, very useful for floors:

- High hardness
- High thermal conductivity

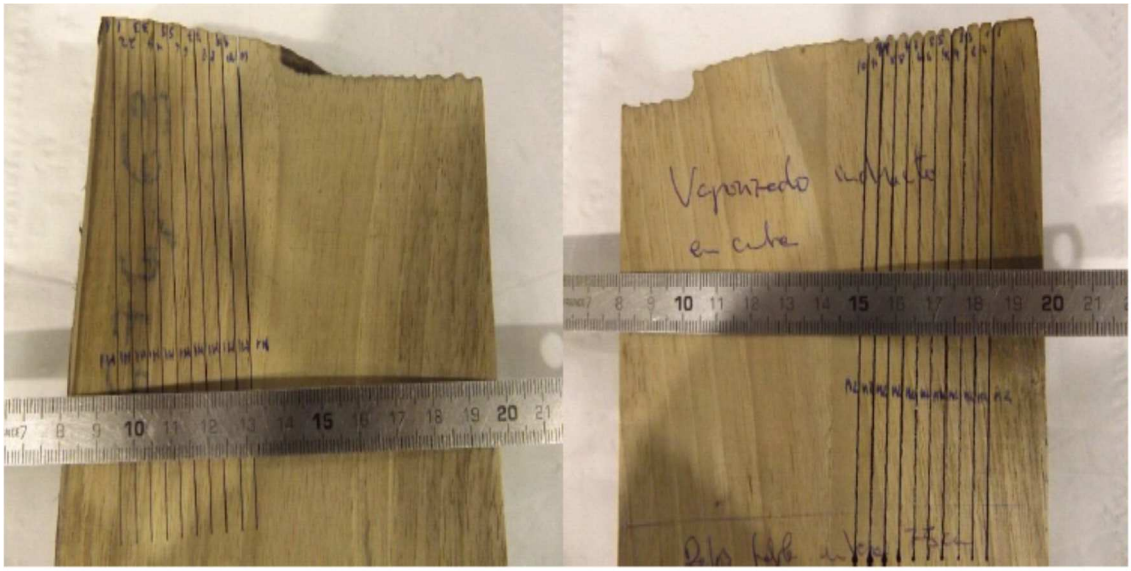
The hardness of the cross section is a well-known characteristic. Using this cut wood paving was made for outdoors. There are still some streets and entrances of buildings paved with wooden paving stones, such as Calle del Tacón in La Habana.

The thermal conductivity in cross section is more than double that in the longitudinal section which makes Woodna Oblique geometrical very suitable for use in underfloor heating systems (the structure of the wooden vessels conducts heat to the cross section without interruptions).

The walnut wood of plantations has a very high density -superior to 700 Kg / m^3, making it an excellent material for underfloor heating. The Standard UNE 56810: 2013: "Specifications for laying parquet on floors with air conditioning systems (heating, cooling)" in section 11.3 says: "- It is recommended to use woods with a density greater than or equal to 550 kg / m^3" The greater the density, the greater the thermal conductivity and this is because there are more vessels or these are thicker.

Laser cutting innovation

The second innovation is the laser cutting of walnut wood. In collaboration with the AIMEN Innovation and Technology Center, a series of tests were developed for the laser cutting of walnut wood, obtaining very satisfactory results.



Picture 4 Laser cuts tests with dry walnut wood in AIMEN

The three main characteristics of laser cutting are:

- Cutting width of tenths of a millimeter, without woodchips.
- The piece of wood does not need support during cutting.
- Cuts can be made in any direction, even making curves with great precision

The use of laser technology offers unique design possibilities.

Pictures 5 y 6 Laser cutting of cross sectional pieces

Final results

Using 100% sustanaible walnut trees as raw material we can obtain pieces with these measures:

- Lenght: 30-40 cm
- Widht: 15-20 cm
- Thickness: 1-2 cm

Once the oblique pieces of walnut are ready, they are subjected to a drying process consisting of two parts:

- 3 month air dry
- 15 days kiln dry until 10% moisture is reached

Once the pieces dry, they are brushed. After that they are ready for the laser cut according to the chosen design

The installation is done with a gluing. In panelling, combinations of different thicknesses can be made, creating sense of depth.

The main characteristics of WOODNA OBLICUA GEOMETRICA are:

- Sustainable, high density walnut wood, 700 kg / m^3
- Walnut pieces very stable in their behaviour
- Due to the cross,oblique cutting, a high hardness is obtained.
- High thermal conductivity, ideal for underfloor heating systems
- Thanks to laser cutting the pieces have versatile design, with a great variety of shapes.
- Innovative product

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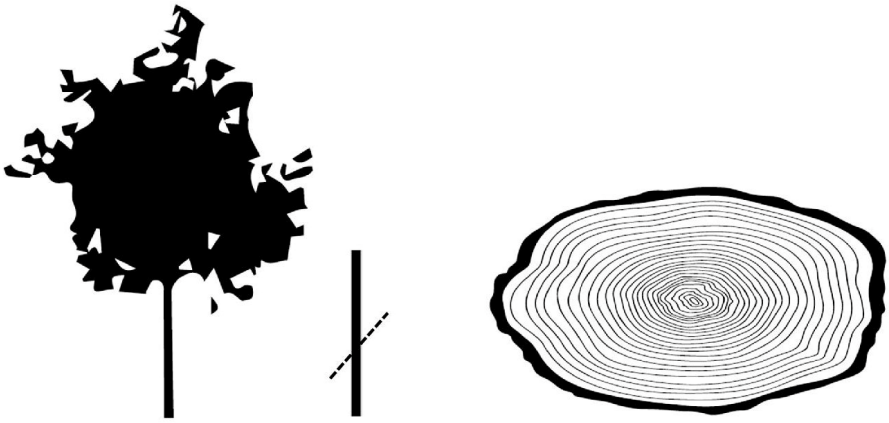

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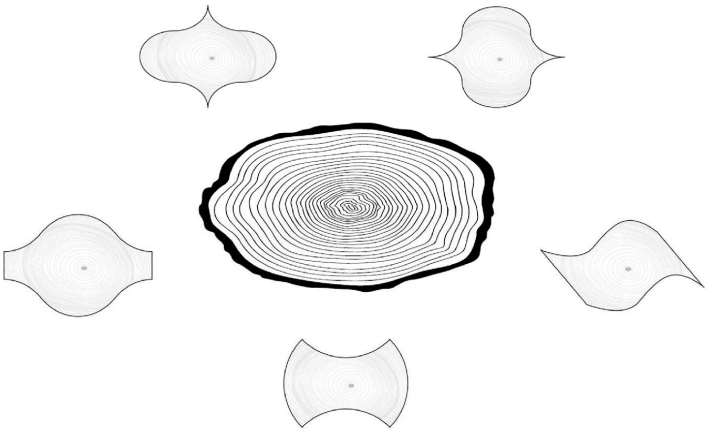
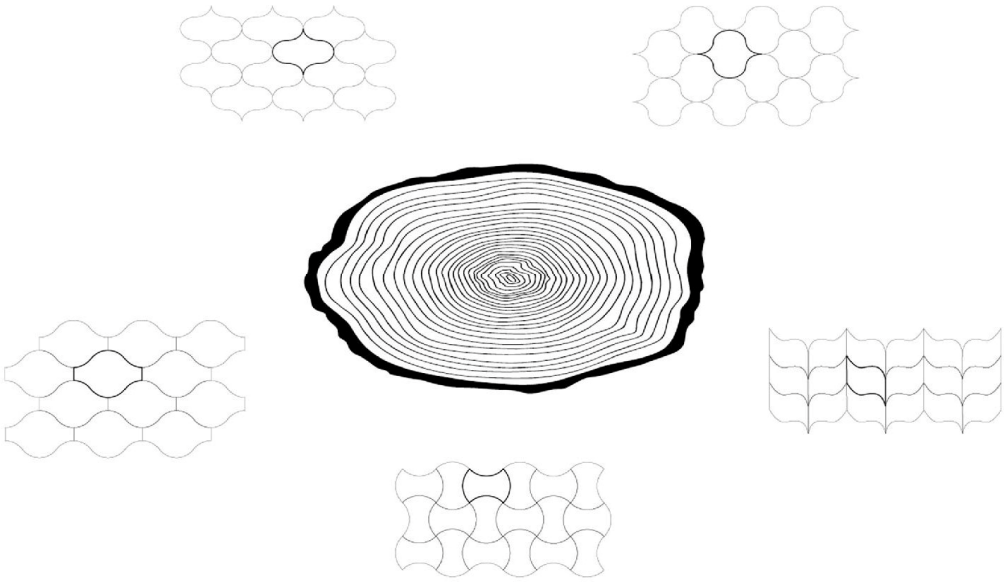
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