



AMORIM

CORK COMPOSITES

■ CORK SOLUTIONS
& MANUFACTURING
PROCESSES



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PROCESSES



AMORIM

CORK COMPOSITES

REINVENTING HOW CORK ENGAGES THE WORLD



CORK ORIGINS

REINVENTING HOW CORK ENGAGES THE WORLD

Cork is the bark of the
CORK OAK TREE
(*Quercus Suber L.*)



CORK HARVESTING

Stripping is a highly specialized process that doesn't harm the tree.



THE BEST PAID AGRICULTURAL WORK IN THE WORLD

Cork oak forests are mainly located in areas prone to desertification.





THE BARK OF THE CORK IS REMOVED
EVERY NINE YEARS

subsequent to the tree attaining
maturity (around 25 years).





■ A NOBLE TREE THAT
CAN LIVE UP TO 200
YEARS,

during which time it may be
harvested 15 to 18 times.

THE BARK RENEWS
ITSELF

CORK FORESTS IMPROVE SOIL'S ORGANIC MATTER
and help regulate the hydrological cycle



2.2 MILLION HECTARES
OF CORK OAK FORESTS
Western Mediterranean Basin



CORK OAK FORESTS ARE
NATURAL CO₂ RETAINERS.
(the major cause of global warming. Up to
14 million tons of CO₂/year)

THE CORK OAK FOREST HAS
THE CAPACITY TO ABSORB 34.7
TONS OF CO₂ PER HECTARE*

14.7 tons of CO₂

*Source: Instituto Superior de Agronomia, Portugal
(Instituto de Agronomia, 2012)

EXTRAPOLATING TO THE GLOBAL AREA OF CORK OAK
FORESTS, THE WESTERN MEDITERRANEAN HAS
A RETAINING CAPACITY OF ABOUT 30.66 MILLION
TONS OF CO₂

30.66 million tons of CO₂

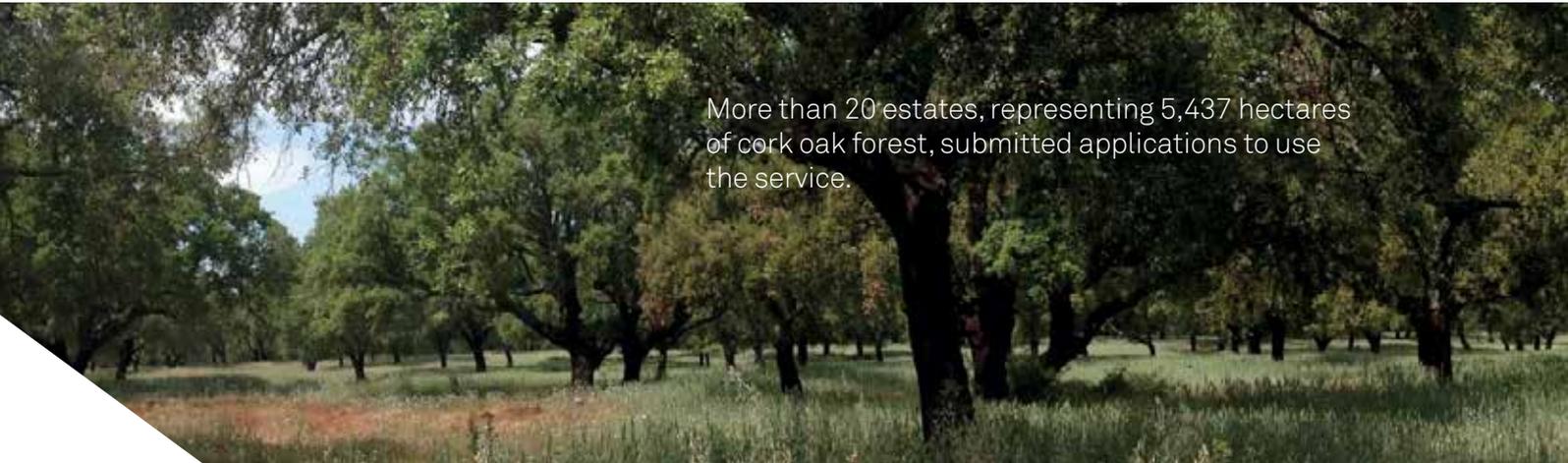
The carbon fixed by the cork oak is stored in the cork,
remaining there for the entire lifetime of the product.

■ MEDITERRANEAN BASIN IS ONE OF THE 35 BIODIVERSITY HOTSPOTS



EUROPE'S BUSINESS & BIODIVERSITY INITIATIVE

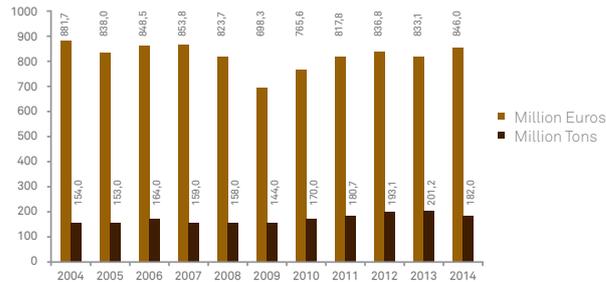
which Corticeira Amorim has joined, included the creation of the biggest award to date for researchers working in the field of “the cork oak and related biodiversity”, as well as a technical advisory serve for forestry producers (totally financed by Corticeira Amorim).



More than 20 estates, representing 5,437 hectares of cork oak forest, submitted applications to use the service.

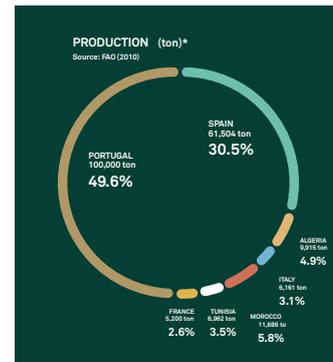
PORTUGAL ACCOUNTS APPROX. 50% of the world cork production.

PORTUGUESE CORK EXPORT



Source: INE e APCOR Year:2014

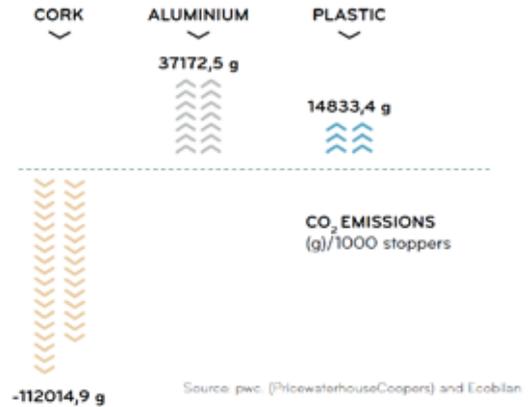
PORTUGUESE CORK PRODUCTION





CARBON FOOTPRINT LEADERSHIP

CORK STOPPERS VS OTHER MATERIALS



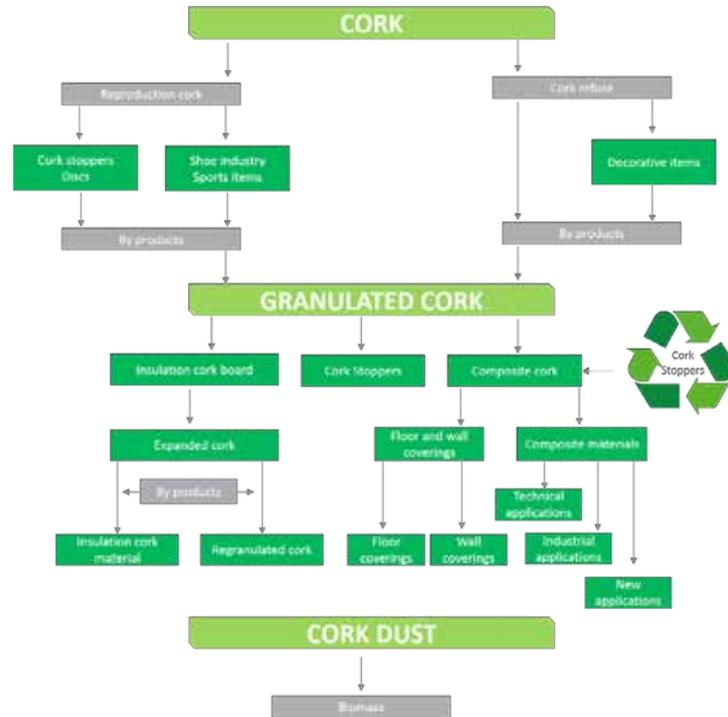
CORK INDUSTRY VALUE-CHAIN

Nothing is wasted and everything is valued.

From natural to highest demanding applications, the cork waste is recycled in all stages of the value-chain.

The cork dust is used in electrical cogeneration, improving energy efficiency.

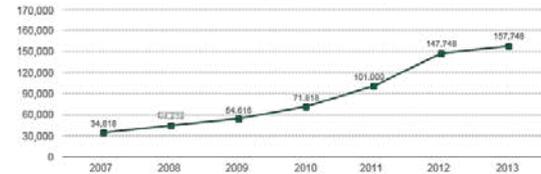
Over 60% of the company's energy needs are met by using biomass (cork dust) which is a CO2 neutral source of energy.



SUSTAINABLE DEVELOPMENT PRACTICES IN THE CORK INDUSTRY

We were the first cork company in the world to have the FSC Certification.

FSC Cork Oak forests on the Iberian Peninsula (ha)



We hold both Forest Stewardship Council (FSC®) chain of custody certification and certification issued by the Programme for the Endorsement of Forest Certification Schemes (PEFC) which together demonstrate those raw materials used in FSC® or PEFC certified products are sourced from responsibly managed forests.



THERE IS NO OTHER MATERIAL IN THE WORLD LIKE CORK

100% natural, reusable and recyclable, cork is, from the environmental, social or economic perspectives, one of the world's most versatile materials.



100%
NATURAL

40 MILLION
CELLS

REUSABLE AND
RECYCLABLE



WARMFEELING



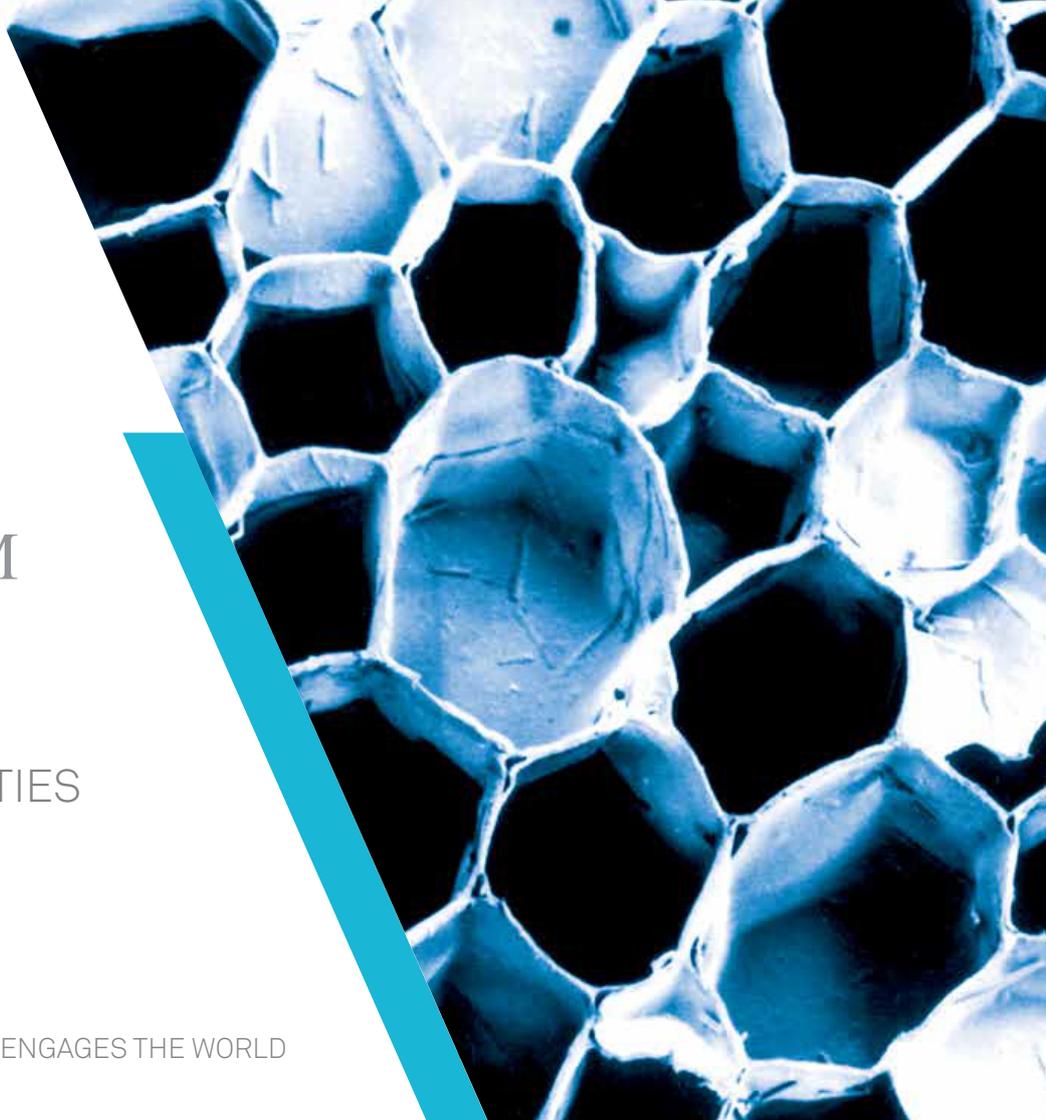


AMORIM

CORK COMPOSITES

| CORK PROPERTIES

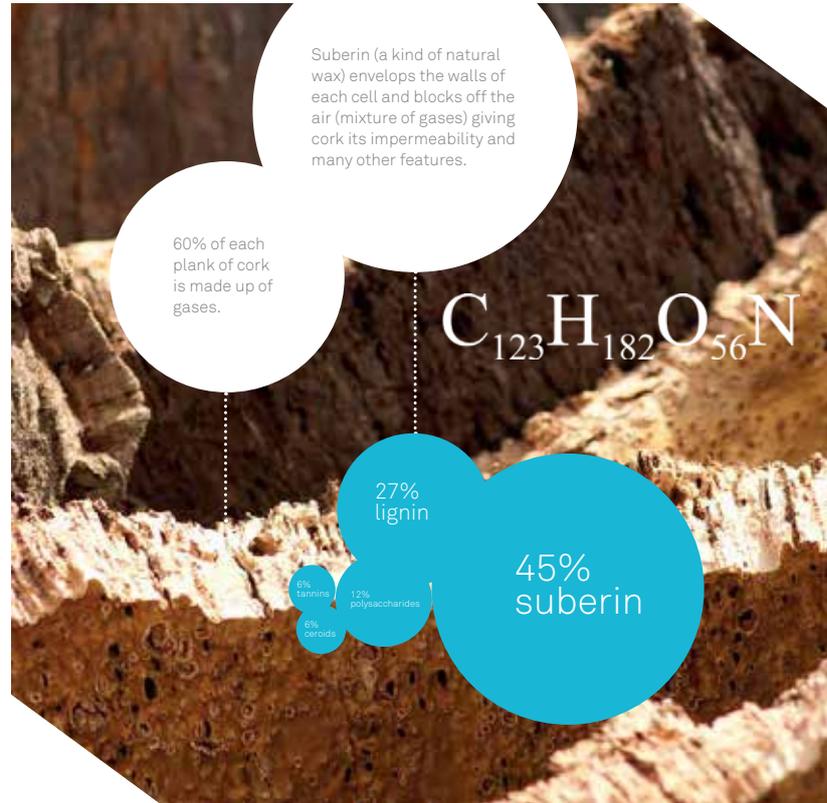
REINVENTING HOW CORK ENGAGES THE WORLD



CORK IS CHEMICALLY NATURAL

Made of suberin (its biggest constituent), lignin, polysaccharides, tannins and ceroids.

It also has a residual moisture content of 5%.



LIGHTWEIGHT

DENSITY

1. Natural Cork 160 - 260 kg/m³
2. Granulated Cork 60 - 160 kg/m³
3. Agglomerated Cork 140 - 600 kg/m³
4. Corkrubber 450 - 1 200 kg/m³

As reference:

- Water 1 000 kg/m³
- Human body 1 010 kg/m³



COMPRESSIBLE

When it is compressed, the air inside the cell is squeezed to a smaller space. The cell walls are flexible, recovering the original shape.



RESILIENT

When pressure is released, compressed cork will bounce back to its original shape.



SHOCK ABSORBENT

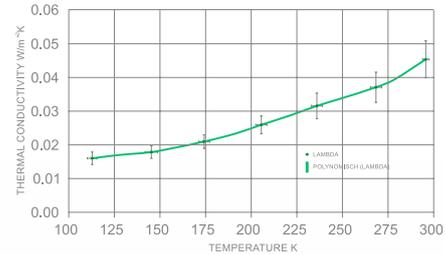
With impact, the cell walls deform, absorbing energy without damaging the cell structure.



STABLE

Temperature and humidity have a slight effect on Cork, so it resists to deterioration and weathering.



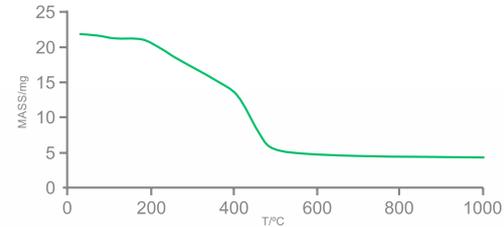


THERMAL EFFECTIVE

The air inside the cells make it an excellent insulator, leading to very low thermal conductivity, over a wide range of temperatures.



MASS REDUCTION VS TEMPERATURE



TEMPERATURE RESISTANCE

Where most of the synthetic materials fail, cork retains its properties. Cork's thermal degradation begins only above 200°C.



MOISTURE PROOF

Water absorption is avoided by the closed cellular structure.
Water covers only the exposed surface.



FLEXIBLE

Cork is a flexible material, even at very low temperatures, as a result of the constituents (Suberine) and geometry of the cell walls.



“SOFT TOUCH”

Due to its basic material and surface characteristics, cork transmits a smooth touch.



“WARM FEELING”

Cork's normal temperature is very close to the human body; it therefore feels warm to the touch.





NO OTHER MATERIAL, ARTIFICIAL OR NATURAL,
COMBINES THE RANGE AND DEPTH
of the properties cork is naturally endowed with.



CORK
SOLUTIONS

REINVENTING HOW CORK ENGAGES THE WORLD

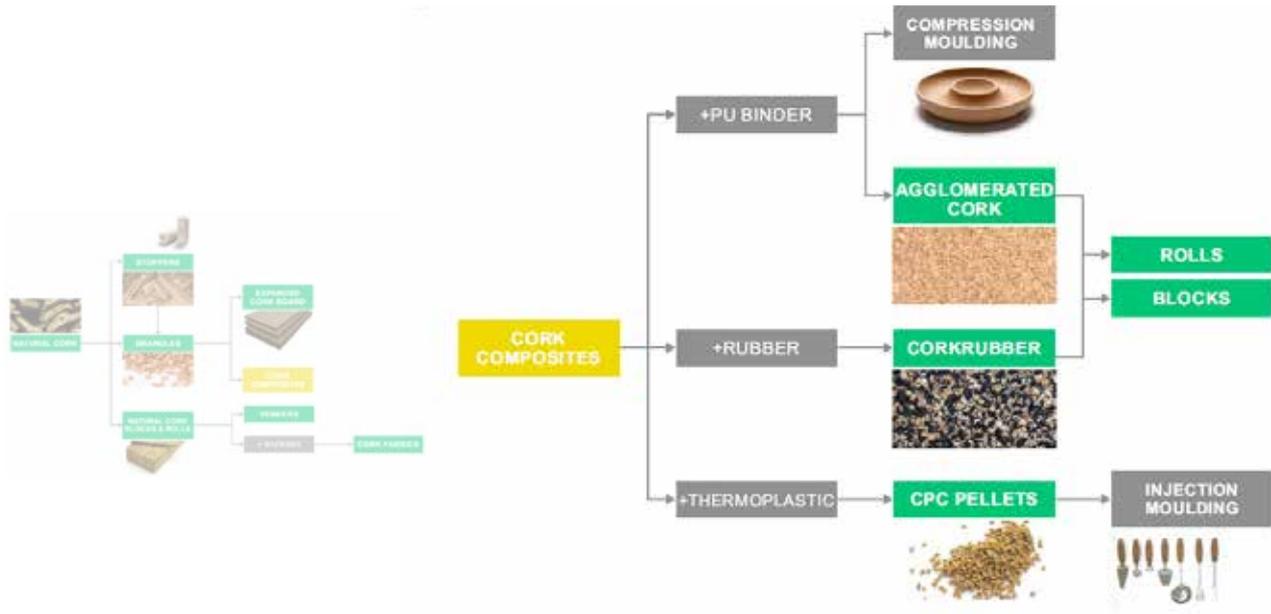
CYCLE OVERVIEW

Materials & Processes



CYCLE OVERVIEW

Materials & Processes



GRANULES

Cork granules are controlled and separated by size and density.



AGGLOMERATED CORK CYLINDERS

CHARACTERISTICS:

- Density: 140-400 Kg/m³
- Dimension: 0,78-1,37 [m]
- Grain dimension: 0,5-25 [mm]
- Compatibility with other additives
- Compressibility recuperation: >70%



AGGLOMERATED CORK BLOCKS

CHARACTERISTICS:

- High cork content (+ 90%)
- Wide range of thicknesses:
from 0,8mm to 210mm
- Wide range of densities:
from 140 kg/m to 600kg/m³
- Wide range of cork patterns
- Different grain sizes
- Possibility of adding colour
- Compressibility recuperation: >70%



AGGLOMERATED CORK ROLLS

CHARACTERISTICS:

- High cork content (+ 90%)
- Min. thickness - 0,8mm
- Max. thickness - 15mm
- Max. width of 1500mm
- Wide range of cork patterns
- Colours available
- Big length rolls
- Allows back printing



■ CORKRUBBER

CHARACTERISTICS:

- Lower cork content than in agglomerated cork (up to 50%)
- Wide range of patterns and colours
- Elastic properties (elongation and damping)
- Available in rolls and blocks:
 - min. thickness - 0,8mm
 - max. thickness - 150mm
- Heat resistance
- Low dimension variability
- Thermal and acoustic insulation
- Ø25"
- Ø30"



DBP

Our new DBP technology is specially optimized to produce high density rolls with a width of 2,1 meters.



CORKFABRIC

CHARACTERISTICS:

- Thin layer of decorative cork, glued to a substrate
- 6 different cork patterns
- 3 different backing materials: cellulose, textile and artificial leather
- Available in rolls
- Easy gluing and sewing
- High flexibility
- Suitable for low/mid temperatures



■ CPC`S (CORK POLYMER COMPOSITES)

CHARACTERISTICS:

- Thermoplastic material with Cork, suitable for injection and extrusion
- Low cork content (max. 40%)
- Limited range of 5 materials

Rigid:

- PE – Polyethylene Polymer + Cork
- PLA - Polylactic Acid + Cork

Semi-rigid | flexible:

- PVC - Polyvinyl Chloride + Cork
- Thermoplastic Elastomer + Cork



EXPANDED CORK BOARD

CHARACTERISTICS:

- 100% natural - cork granules are bound by cork's natural resins
- Available in different thicknesses: from 20mm to 240mm
- Low density: 100 - 160 kg/m³
- Low mechanical resistance
- Great sound insulation properties
- Good fire resistance



FOOD CONTACT

CHARACTERISTICS:

- Our products FC8013 and FC8445 stands as a natural alternative for household and kitchenware items designed to come into direct or indirect contact with food.

COMPLIANT TO EU FOOD CONTACT REGULATION (EC) NO 10/2011*:

- Compliance with overall and specific migrations
- Adhesive substance listed on positive list
- Positive sensorial evaluation
- No safety-concern substances detected

* Detailed information and exclusion list attached to product specification.





■ CORK MANUFACTURING PROCESSES

REINVENTING HOW CORK ENGAGES THE WORLD



■ DIE CUTTING

CHARACTERISTICS:

- Available for rolls and sheets
- Maximum thickness of 7mm
- Maximum area of 1200mm X 700mm
- Not suitable for high density materials
- Low-cost tools
- High cadency





LAMINATION

WOOD, FOAMS, PLASTICS, RUBBER,
METAL, TEXTILES, ADHESIVES, FIBERS

CHARACTERISTICS:

- Available in sheets and rolls
- Customizable layer thickness
- High efficiency process
- Easy gluing (wood, textiles and foams)
- Possible to combine cork with rigid and flexible surfaces
- Possible to associate multi-materials
- Wide range of cork visuals and densities
- High resistance & low weight
- Suitable for acoustic/thermal applications remaining natural cork visual



■ MACHINING STICKLE BOARD MILLING

CHARACTERISTICS:

- Thicknesses from 5mm to 30mm
- Diameters from 90mm to 300mm
- Rectangular shapes till 600x450mm
- Low cost tools
- Good for fast prototyping



MACHINING

MILLING | CILINDRICAL | CUTTER | TURNING

CHARACTERISTICS:

- High waste of material
- Suitable for high density materials
- Low cost tools
- Small grain size
- Suitable for sample/prototype production

Cilindrical cutter

- maximum height of 180mm
- irregular interior finishing

Turning

- maximum height of 300mm
- maximum diameter of 300mm



CNC MACHINING

CHARACTERISTICS:

- Allows more complex shapes than milling
- Best surface finishing with small size granules
- Suitable for high/mid density materials
- High-tech process
- 5-axis machining



COMPRESSION MOULDING

CHARACTERISTICS:

- Maximum area of 450x900mm
- Maximum height of 95mm
- Complex geometries possible with no material waste
- Faster production cycles than machining
- Refined grain size is used (0,5-1mm)
- Mostly suitable for high quantities (requires investment in moulds)



OVERMOULDING

WOODEN, METALLIC OR POLYMERIC SUBSTRATE (threaded inserts, screws, etc)

CHARACTERISTICS:

- Suitable for big production batches
- Low unit cost
- High Cadency
- No material waste
- No additional stages required
- Possible to add flexible parts to a rigid component
- Cork associated to heavy mechanical solicitations (Traction, Torsion and Compression)





3D MOULDING

CHARACTERISTICS:

- Complex geometries
- Cork look & high resistance materials
- Customizable Thickness
- Wide range of core materials
- Compatible with all Cork references
- Surface Resistance (Stains, Scratches)
- Suitable for furniture applications
- High rates of acoustic insulation or mechanical resistance
- Customized coating for 3D Moulding production



PLASTIC INJECTION MOULDING

CHARACTERISTICS:

- Allows more complex geometries
- Possibility of adding colour
- Possibility of overmoulding with other materials
- Possible to adapt corkrubber composition
- Suitable for big production batches
- To be used under injection moulding technologies
- Good grip for demanding applications





BOARD ON FRAME

CHARACTERISTICS:

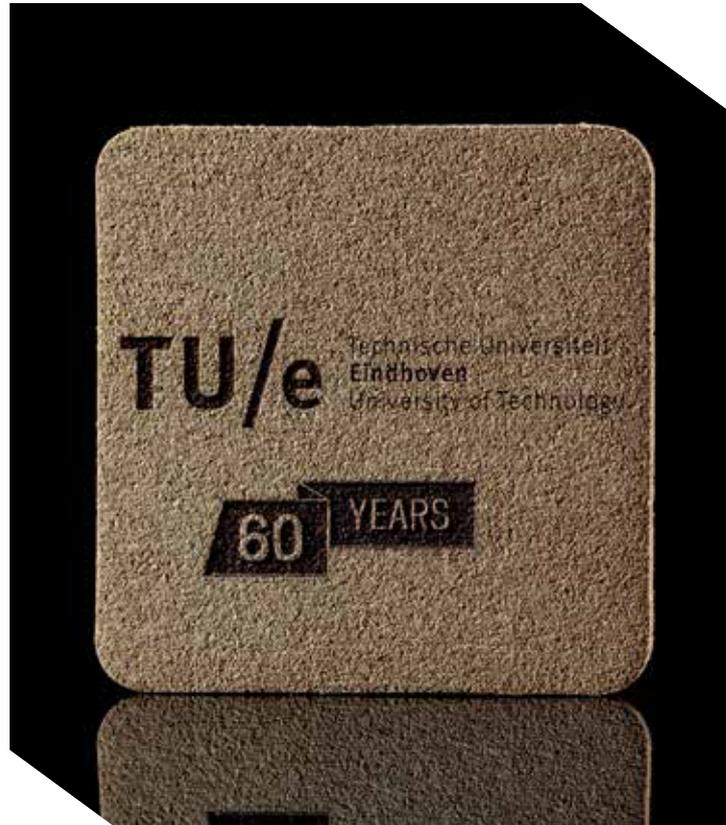
- Lightweight
- Rigid surface
- Possible to work with a wide range of geometries
- Core with an honeycomb structure
- Stiff surface layers
- Compatibility with other materials (ex: metal, wood,...)



LASER ENGRAVING

CHARACTERISTICS:

- High cadency
- Possible to be used in several materials
- No limit of batches dimensions
- High resolution



PRINTING

SILK SCREEN, OFFSET AND
DIGITAL PRINTING, SERIGRAPHY

CHARACTERISTICS:

Silk screen printing

- Max. Area of 900x600mm
- Max. Height of 80mm for small components
- Max. Height of 30mm for wide sheets
- Only used up to two colours

Offset printing

- Max. Area of 600x400mm
- Max. Thickness of 0,8mm

Digital printing

- Max. Area:
- Sheets: 1900x3000mm
- Rolls: 1450mm width
- Max. Thickness of 30mm





AMORIM

CORK COMPOSITES

THANK YOU!

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