



# WINTHERWAX®

## Quick facts about the project

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**Project title:** WINTHERWAX

**Project entire title:** WINdow based on THERmally modified wood with high performance WAX coating

**Project number:** 666206 **Call:** H2020-SMEINST-2-2014

**Project start date:** 1.3.2015 **Project end date:** 31.12.2016 **Project duration:** 22 months

**Project consortium:** M SORA d.d. (SI) and Silvaprodukt d.o.o. (SI)

**Project subcontractors:** University of Ljubljana (SI), Leibnitz Universität Hannover (DE), SP Technical Research Institute of Sweden (SE), Inspiralia (ES), Slovenian Wood Industry Cluster (SI), Kambič Laboratorijska oprema d.o.o. (SI)

**Project web page:** [www.wintherwax.si](http://www.wintherwax.si)

## Background

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Timber is becoming one of the most important materials in the building sector. It is used in manifold applications like construction elements, carpentry, or wood joinery. Based on the use of timber in buildings it is of great importance to select appropriate wood species and wood treatments to assure long lifetime of specific elements and consequently the entire building. Timber windows in Europe are traditionally produced from spruce, pine or larch.



Larch used for windows is generally imported from Siberia (*Larix sibirica*) due to large quantities of this material, whereas spruce and pine are European wood species. Façade elements are also usually made of softwood species and are generally not surface treated whereas windows are coated with synthetic coatings or oils. Due to the goal to use domestic wood species (e.g. *Picea abies*), there is a need for appropriate treatment to improve the durability and prolong the service life of installed elements. Thermal modification is a convenient and one of the most environmentally friendly procedures which significantly increases durability and hydrophobicity, and decreases thermal conductivity of spruce by almost 20 %. To protect wood even better, the hydrophobicity of the wood surface should be increased to slow down the moistening of wood. Application of durable natural waxes is emerging and innovative way to treat wood and make its surface hydrophobic.

## What was done?

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In the scope of the WINTHERWAX project, various wood species with or without surface coatings were exposed to natural environment around Europe. Beside this several samples were parallel tested in laboratories. Around 8.700 samples were prepared and tested in the scope of WINTHERWAX project. Façade elements, windows and doors were tested in different conditions:

- Natural environment at 5 different locations around Europe (Slovenia, Germany, Sweden and Spain) in specially developed test objects (“cubes”) with constant rotation around their axes to diminish the effect of cardinal direction and where a large quantity of samples were tested at minimal space.
- Severe environment of a specially developed accelerated ageing chamber prototype.
- Controlled conditions in laboratories.

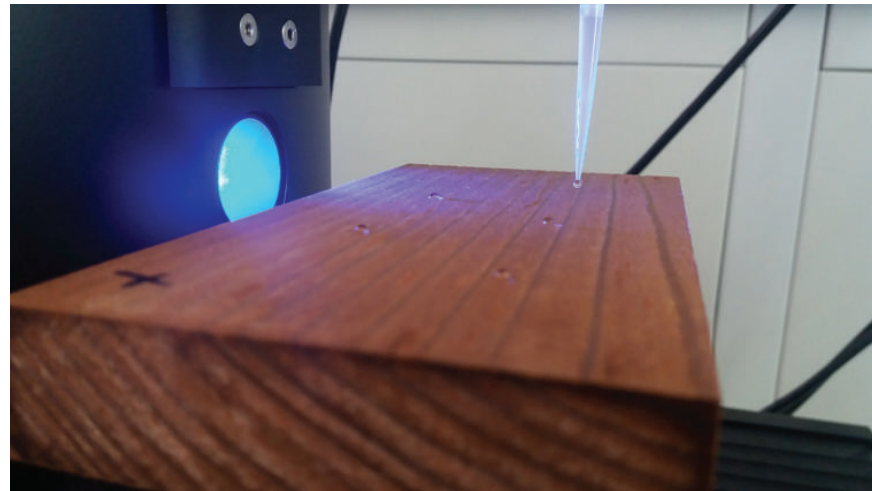
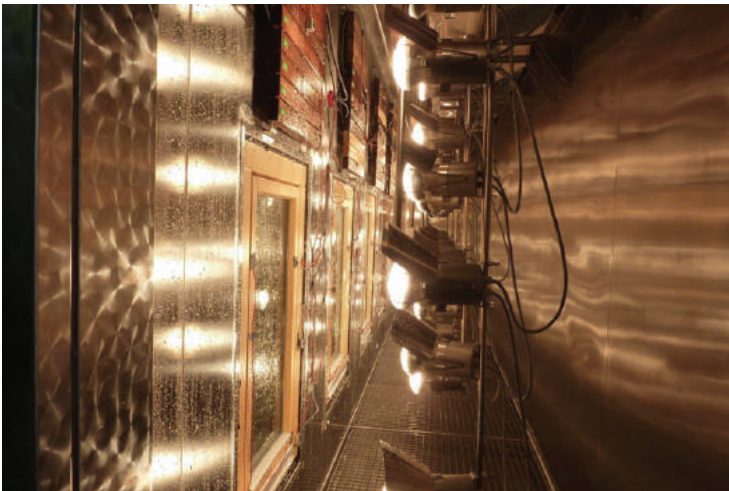


## What was done?

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Different characteristics of wood were monitored to gain information about the influence of different climatic conditions, wood species, thermal treatment and surface treatment on the properties of timber used as windows or façade elements.

One building object with façade made of thermally modified spruce and Silvacera<sup>®</sup> wax and one building object with WINTHERWAX<sup>®</sup> windows were already accomplished until the end of the project and 3 newly developed and tested products were put on market.

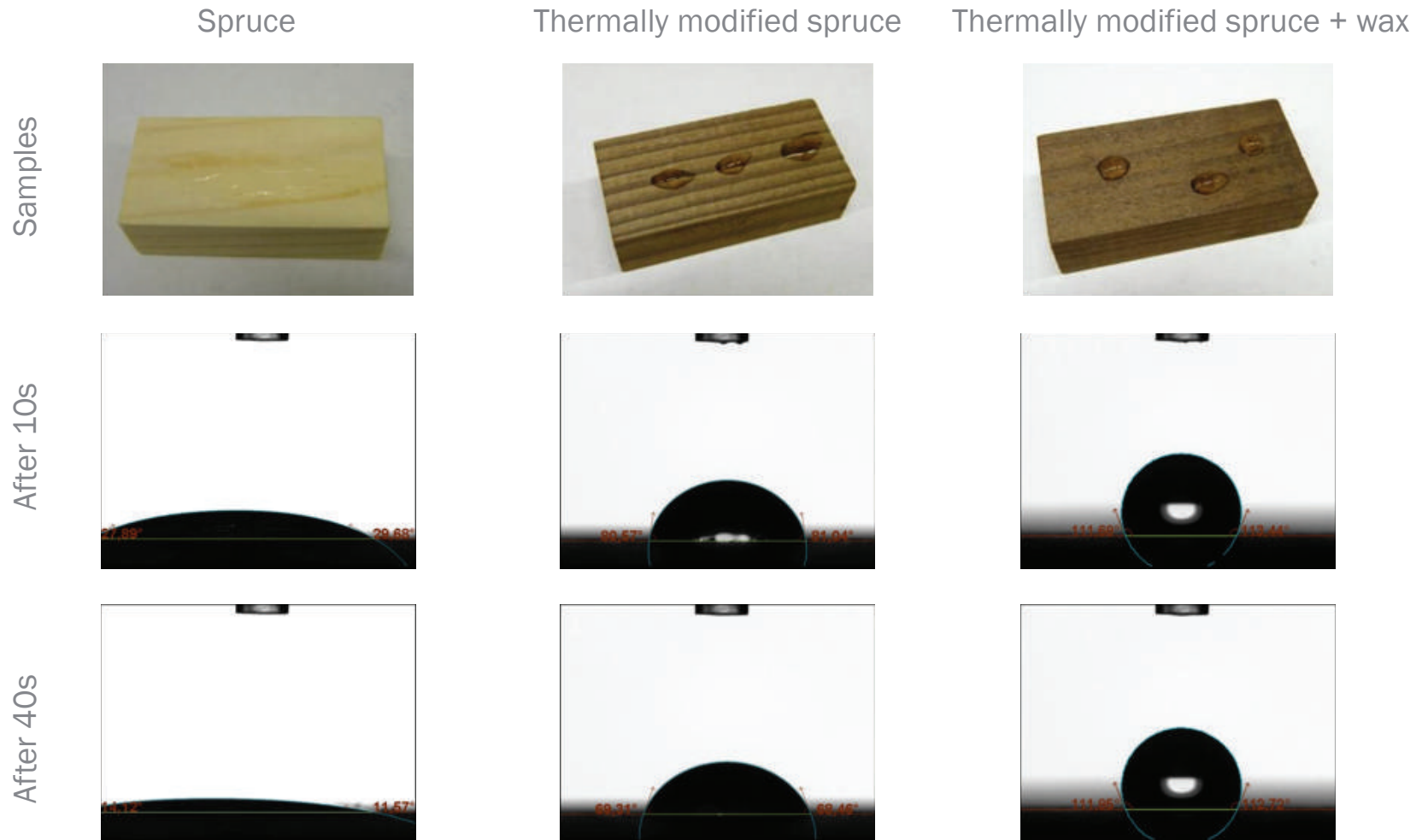


## Most important results

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- Silvapro® thermally modified spruce treated with Silvacera® wax exhibits high water repellent efficiency with contact angles of around 120°.
- When compared to synthetic coatings, Silvacera® wax do not inhibit drying of wax treated wood after its exposure to water which is important positive effect in terms of wooden product's expected life-time.
- Silvapro® thermally modified spruce treated with Silvacera® wax exhibits the highest anti shrinking efficiency (i.e. dimensional stability) of more than 45 %.
- Silvapro® thermally modified spruce coated with Silvacera® wax exhibits up to almost 9-time longer expected life time compared to normal spruce.
- Thermal insulation of WINTHERWAX® windows is higher compared to windows made of spruce and especially larch.
- Wood moisture content of windows made of Silvapro® thermally modified spruce is almost 50 % lower compared to moisture content of spruce windows which results in longer life time WINTHERWAX® windows.
- During weathering lower amount or even no cracks and defects occurred on Silvapro® thermally modified spruce with wax compared to spruce, larch or other wood species.
- Global warming potential of WINTHERWAX® window is 20 % lower (195,5 kg CO<sub>2</sub>) compared to similar Nature Optimo XLT window (242,5 kg CO<sub>2</sub>) which is coated with synthetic coating.

# Contact angle of water drop in different surfaces



## Project consortium

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M SORA d.d. - project coordinator

M SORA is a Slovenian SME which main business is woodworking and production of windows is its speciality. M SORA also has commercial activity concerning wholesale of materials for doors and windows, sale of construction materials and reproductive material for agriculture, sale (wholesale and retail) of hardware, household items/appliances and foodstuffs. A wide range of windows including lift-slide windows and doors are exported to European countries, USA, Canada, New Zealand, Dubai, Azerbaijan and other countries. All products are custom made which demands constant development and great flexibility of company. M SORA is also known as intensively R&D oriented company with successful development and implementation of innovations into the market through internal or co-founded projects e.g. ECO-S, CaReWood, TIGR4smart, Xtremely and WINTHERWAX. Intensive development work also reflects in several awards, innovations and implemented national and European projects.





## Project consortium

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Silvaprodukt d.o.o. - project partner

Silvaprodukt is a Slovenian SME founded in 1951 by the government, with the aim of taking advantage of forestry side products, so it produced essential oils from conifers. Soon, around 1956, company realised that the real needs of the market were slightly different. They shifted their business approach, switching to becoming a producer of wood protection products. Large breakthrough happened in last two decades after demanding ownership consolidation and intensive collaboration with institutions of knowledge. In that time some highly advanced products were developed and introduced to the market, e.g. new environmentally friendly wood preservatives, thermally modified wood, etc. Silvaprodukt has become top expert in wood preservation and is nowadays owned by its employees. They have a long tradition in the field of wood preservation, so they can offer deep professional knowledge and some highly advanced products and industrial equipment developed in recent years.



**Silvaprodukt**  
since 1951



## WINTHERWAX® facade and windows

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## Project summary

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WINTHERWAX resulted in developed innovative products and several dissemination activities. Partners of consortium, together with subcontractors developed:

- Silvacera<sup>®</sup> naturally based wax,
- WINTHERWAX<sup>®</sup> windows and
- façade elements made of Silvapro<sup>®</sup> thermally modified wood and Silvacera<sup>®</sup> wax.

LCA analyses showed that the use of Silvacera<sup>®</sup> wax decreases global warming potential of windows by 20 % and that Silvapro<sup>®</sup> thermally modified spruce coated with Silvacera<sup>®</sup> wax exhibits up to almost 9-time longer expected life time compared to normal spruce.

Dissemination and communication activities resulted in:

- 13 international fairs,
- 32 conferences and public speeches,
- 13 scientific papers,
- 21 other articles,
- 6 TV, radio or journal interviews and
- 6 awards.

WINTHERWAX project also resulted in two registered trademarks:

Silvacera<sup>®</sup> (naturally based wax by Silvaproduct d.o.o.) and WINTHERWAX<sup>®</sup> (windows produced by M SORA d.d.).

## Contacts

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