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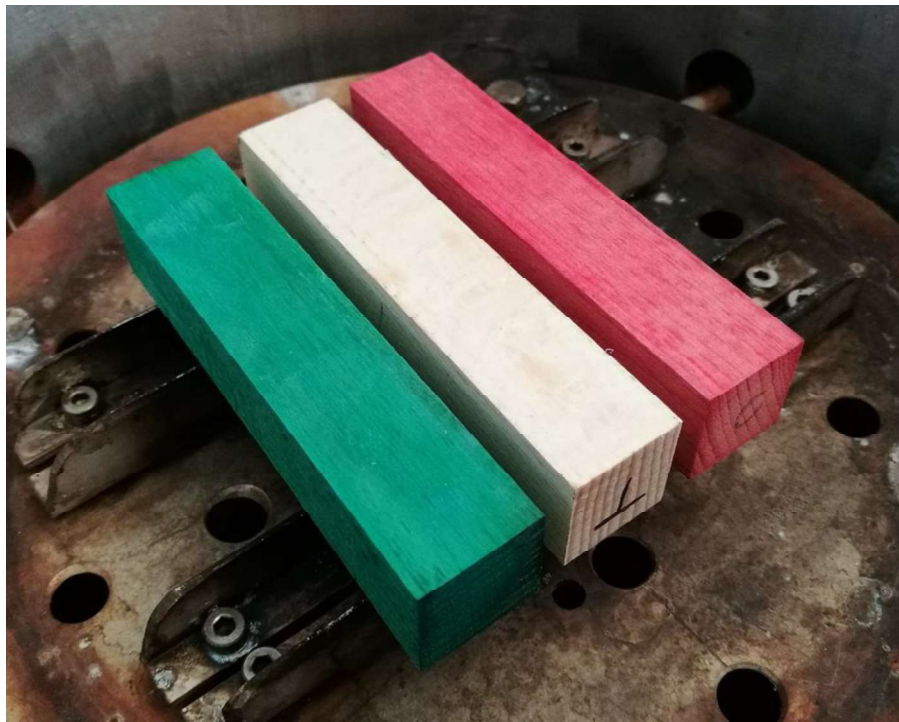
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**COST Action FP1407 WG1 and WG4 meeting**  
**Wood modification in Europe:**  
**processes, products, applications**

26<sup>th</sup> February 2018, Firenze, Italy

**PROCEEDINGS**



**EDITORS: GIACOMO GOLI AND LUIGI TODARO**

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**BIGonDRY**  
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## **COST ACTION FP1407**

Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife)

COST ACTION FP1407 WG1 AND WG4 MEETING

# **Wood modification in Europe: processes, products, applications**

26<sup>th</sup> February 2018  
Firenze, Italy

**Editors:** Giacomo Goli and Luigi Todaro

GESAAF – University of Florence



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### Proceedings of the workshop «Wood modification in Europe: processes, products, applications»

26<sup>th</sup> February 2018, Firenze, Italy

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



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



[www.evolen.hr](http://www.evolen.hr)



[www.wde-maspell.it](http://www.wde-maspell.it)

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#### Local organizers:

GESAAF - University of Florence, Piazzale delle Cascine, 18 - 50144 Firenze, Italy;

RIS-BIO - Laboratory for Research and Sustainable Innovation on Biomaterials, Located at PIN S.c.r.l., Piazza Giovanni Ciardi, 25 - 59100 Prato (PO), Italy

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**Scientific committee:** *Giacomo Goli, Jakub Sandak, Luigi Todaro, Ottaviano Allegretti, Anna Sandak, Dick Sandberg, Edo Kegel, Dennis Jones, Mike Burnard, Marco Fioravanti, Marco Togni, Andreja Kutnar*

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## Final program

Begin	End	Title	Speaker	Page
<b>Welcome</b>				
08.30	09.00	Welcome coffee and registration		
09.00	09.10	University of Florence	Giacomo Goli	
09.10	09.15	COST FP1407	Andreja Kutnar	
09.15	09.30	Introduction to the day	Dick Sandberg	
<b>National presentations - Chairman Joris Van Acker</b>				
09.30	09.46	Sweden	Dennis Jones	1
09.46	10.02	Netherlands	Edo Kegel	3
10.02	10.18	UK	Dennis Jones	5
10.18	10.34	Slovenia	Mike Burnard	7
10.34	10.50	Germany	Holger Militz	9
10.50	11.20	Coffee break		
<b>National presentations - Chairman Dick Sandberg</b>				
11.20	11.36	Spain	René Herrera	11
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11.52	12.08	Belgium	Joris Van Acker	15
12.08	12.24	Ukraine	Pavel Krivenko	17
12.24	12.40	Italy	Giacomo Goli	19
12.40	13.55	Lunch		
<b>National presentations - Chairman Holger Militz</b>				
13.55	14.11	Bio4ever Project - Italy	Anna Sandak	21
14.11	14.27	Poland	Anna Rozanska/Izabela Burawska	23
14.27	14.43	Estonia	Tõnis Teppand	25
14.43	14.59	Turkey	Engin Derya Gezer	27
14.59	15.15	Macedonia	Aleksandar Petrovski	29
15.15	15.45	Coffee break		
<b>National presentations - Chairman Dennis Jones</b>				
15.45	16.01	Slovakia	Zuzana Vidholdova	31
16.01	16.17	Norway	Lars G. F. Tellnes	33
16.17	16.33	Hungary	Miklós Bak	35
16.33	18.00		Final remarks	

## Wood modification in Italy

Giacomo Goli<sup>1</sup>, Luigi Todaro<sup>2</sup>, Ottaviano Allegretti<sup>3</sup>, Manuela Romagnoli<sup>4</sup>

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**Keywords:** thermal modification, chemical modification, physical modification

### Introduction

With the development of thermal modification technologies in northern countries, Italy has also developed its own processes and technologies starting since the years 2000. In the country the industries active in the wood drying process, starting from their technologies, have developed different treatment processes. As regards the physical modification of wood intended as densification processes, the sector is active in Italy since 50 years ago. Products and plans for the chemical modification of wood are also very rare apart impregnation with salts with different purposes such as durability or fire-retardant. Mild processes, such as treatment with water, at temperature below 100°C in alkaline medium and vaporization, are often used in Italy.

### Modification technologies and production volumes

As shown in Table 1, in the field of thermal modification technologies plants, 4 industries are actually active in Italy.

Wood modification technology	Producer, process short description and website	Annual volumes produced and companies involved in the process
Thermal modification	Baschild - <a href="http://www.baschild.com">http://www.baschild.com</a> – produces plants for thermal modification since 2002. The ovens operate in superheated steam under very small overpressure conditions. Ovens vary between 10-12m <sup>3</sup> to 80-100m <sup>3</sup> . Treatment temperatures can be up to 230°C. A complete cycle is 2 or 3 days.	Baschild has installed about 60 plants. One in Italy of 60m <sup>3</sup> - <a href="http://www.pozzialbino.it">http://www.pozzialbino.it</a> – the others in Croatia, Germany, Latvia, Romania. The Croatian company Evolen is directly owned by Baschild - <a href="http://evolen.hr">http://evolen.hr</a>
Thermal modification	BIGonDRY - <a href="http://www.bigondry.com">http://www.bigondry.com</a> – The ovens operate under superheated steam conditions in controlled overpressure and controlled conditions of oxygen. Samples conditions moisture content is also monitored during cycle and used as an input of the process. Ovens vary between 9 and 30 m <sup>3</sup> .	BIGonDRY has installed 18 plants. Three plants in Italy for a total volume of 56 m <sup>3</sup> . <a href="http://www.segherivallesacra.it">http://www.segherivallesacra.it</a> <a href="https://www.cpparquet.it">https://www.cpparquet.it</a> <a href="http://www.fabianolegnami.it">http://www.fabianolegnami.it</a> Other plans in Serbia, Russia, Romania, Poland, Turkey, Mexico.
Thermal modification	ISVE - <a href="http://www.isve.com">http://www.isve.com</a> – produce small plans working under vacuum (0.2 bar) conditions where the heat transfer is done by contact using electrically heated plates. Ovens vary between 2 and 4 m <sup>3</sup> . Treatment temperatures can be up to 230°C. A complete cycle can be 3-5 days.	ISVE has installed a total number of 10 plans for thermal modification of wood. The main business of ISVE is the production of plans for double vacuum impregnation.
Thermal modification	WDE Maspel – TermoVuoto - <a href="http://www.wde-maspell.it">http://www.wde-maspell.it</a> – produce plans working under vacuum (0.2 bar) where heat is transferred by a high efficiency air ventilation system. Wood is dried under	WDE Maspell has installed a total number of 21 plans whom one of 6 m <sup>3</sup> in Italy. Alac –Recanati (MC). Alac produce between 500 and 600

	vacuum condition and treated at temperature varying between 150 and 230°C. Ovens vary between 6 and 30 m <sup>3</sup> but ovens up to 80 m <sup>3</sup> are under development. The complete cycle can be 1 or 2 days. Patented process and hardware. Vacwood registered trademark.	m <sup>3</sup> year of Vacwood. The other plans are installed Belgium, Brazil, Chile, France, Korea, Norway, Poland Portugal Sri Lanka and USA.
Physical modification	Rancan – Ranprex - <a href="http://www.rancan.com">http://www.rancan.com</a> – produces technological laminates by impregnation of beech wood with thermosetting resins and by densification.	Rancan offers 5 types of product made with parallel sheets, crossed, crossed at 90 and 45°, crossed in more than four directions.
Chemical modification	Renner – PAA – New consolidating and preservative products based on Polyamidoamines (PAAs) functionalized with siloxanes.	Patent WO2015004590 A1, Renner Italia SpA, 2015.

Table 1: Wood modification technologies, producers, companies and production volumes

### Practical examples

Thermally modified material is at present produced in Italy for different purposes such as durability in external applications, aesthetics in internal applications. Practical uses are furniture, boat flooring, cladding, decking, fences. Ranprex is used in different contexts where a stable, light and resilient material is needed. Some examples are shown in Fig. 1 and Fig. 2.



Figure 1: [a] certified window in thermally modified beech (courtesy Luigi Todaro), [b] decking in thermally modified ash (courtesy Margaritelli), [c] furniture in thermally modified ash (Courtesy WDE Maspell).

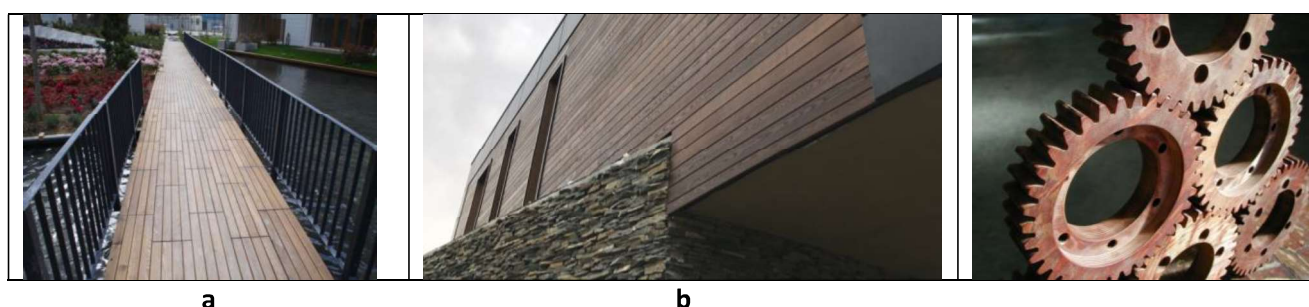


Figure 2: [a] decking in thermally modified ash (courtesy of Evolen), b) cladding in thermally modified ash (courtesy Alac), [c] gears made of Ranprex.

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1. Project “STABILEGNO”, BigOnDry / CNR IVALSA; Bando POR CRO Regione Veneto, DGR n. 1581 10/10/2016, parte FESR 2014-2020.
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