

# 3° ICAP Project Meeting

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## WELCOME !

Kompetenzzentrum Holz GmbH (W3C)

St. Veit, 21.09.2017

# Agenda

- 1 Welcome and opening of the meeting
- 2 Adoption of the draft agenda
- 3 Project managing: progress-report
- 4 WEBSITE: a tool to inform SME.
- 5 Planning of Workshops
- 6 Any other business
- 7 Proposed date of the next meeting
- 8 Closure of the meeting

# W3C-Workshop 2018

**Date:** February/March 2018

**Location:** W3C

**Subject (preliminary):** Plasma activation and plasma coating of different substrates (plastic, metal, wood-based materials) for various applications (improvement of printing and adhesion; anti-scratch, wear-resistant, anti-reflection and conductivity coatings,..)

**Lecturer:** W3C, Certottica, Universität Innsbruck, INNOVA FVG

**External lecturer (max.2):**

- Plasma coater / company
- Institutes / research centres working on the topic of plasma technologies

Selective invitations to the workshop will be sent to SMEs and stakeholders in Carinthia in advance.

## W3C-Activities in the reporting period

- 1. Progress report was submitted in the CoheMON-System
- Communication: Various press texts for the Kplus homepage, ICAP website and regional print media; ICAP poster; article for newsletters (Wood Kplus); technical reports / conference report for ICAP website were prepared
- Experiments:
  - Plasma treatment and subsequent contact angle measurements of different wood-based panels
  - Plasma treatment of WPC boards for a subsequent powder coating
  - Measurement of the thermal impact of the plasma treatment under atmospheric pressure
  - First coating tests of wood-based panels by means of sputtering

# Experiments

## Plasma treatment and subsequent contact angle measurements of different wood-based panels

Table 1: Surface energy [mJ/m<sup>2</sup>] with indication of the polar and dispersive energy part for the different untreated and plasma treated substrates

No.	Sample	Treatment state	Surface energy [mJ/m <sup>2</sup> ]		
			total	dispersive	polar
1	Moisture resistant MDF	plasma treated	66,86	35,43	31,43
		untreated	37,02	37,02	0,00
2	Flame resistant MDF	plasma treated	57,45	36,91	20,54
		untreated	39,25	35,75	3,49
3	WPC board	plasma treated	57,69	30,59	27,10
		untreated	20,57	19,74	0,83
4	Cement bonded particle board	plasma treated	67,19	35,92	31,27
		untreated	22,66	11,92	10,74
5a	Oak in fibre direction	plasma treated	64,68	32,26	32,42
		untreated	63,48	32,66	30,82
5b	Oak transverse to the fibre direction	plasma treated	64,32	31,70	32,61
		untreated	56,47	32,64	23,83

# Experiments

## Plasma treatment of WPC boards for a subsequent powder coating

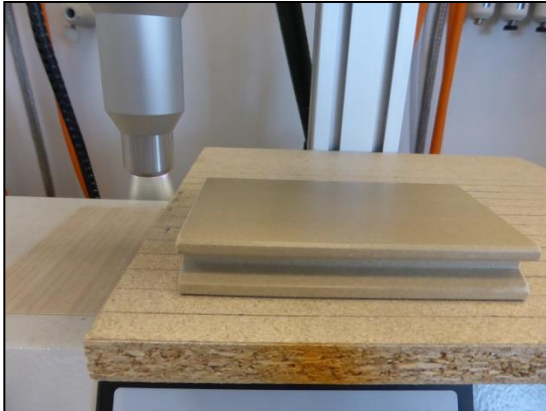


Fig. 1: Plasma treatment

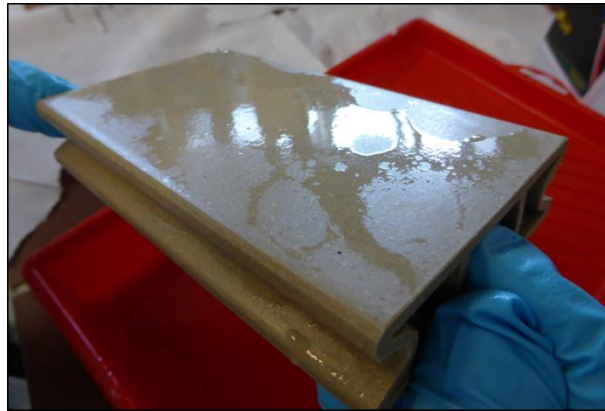


Fig. 2: Impregnation of the WPC with the static fluid solution;  
without plasma treatment (left) → Wetting difficulties on the WPC surface;  
with plasma treatment (right) → Leading to improved wettability

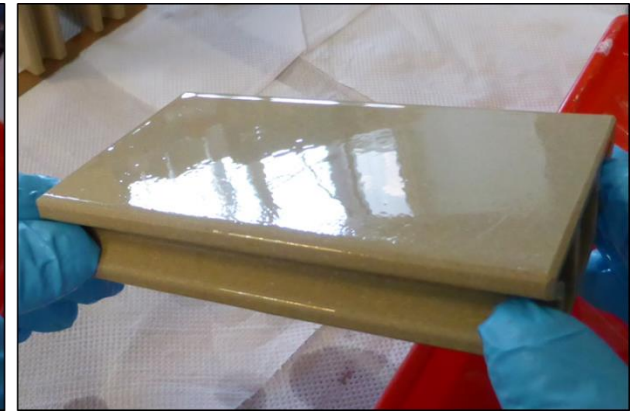


Fig. 3: Powder coated WPC

### Results:

- The plasma treatment of the WPC boards increased the wettability to the static fluid solutions
- But: A further plasma treatment of the impregnated board did not improve the adhesion to the powder coating → the static fluid solution can not be activated by means of plasma

# Experiments

## Measurement of the thermal impact of the plasma treatment under atmospheric pressure

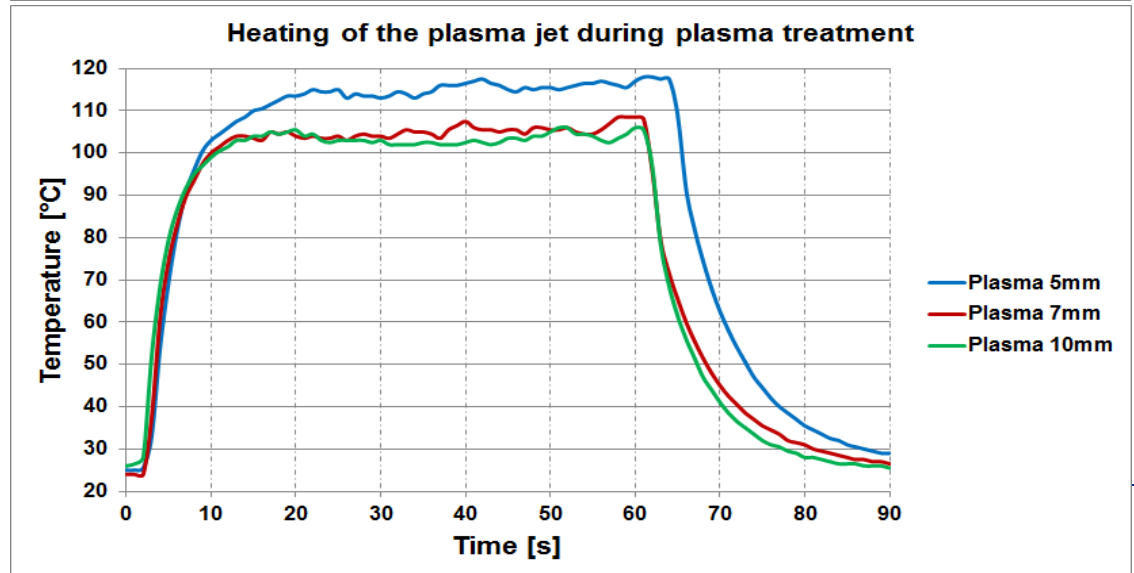
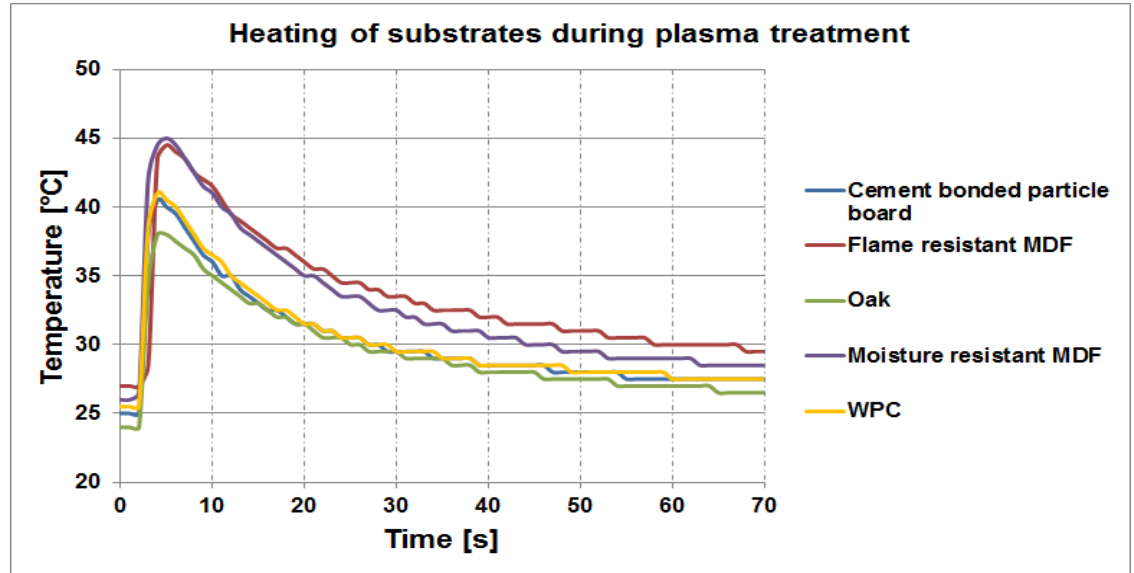


Fig. 4: Fixing the sensor to the substrate surface

Fig.5:

Above: Temperature/Time curves recorded during the plasma treatment of the wood-based panels by means of the sensor

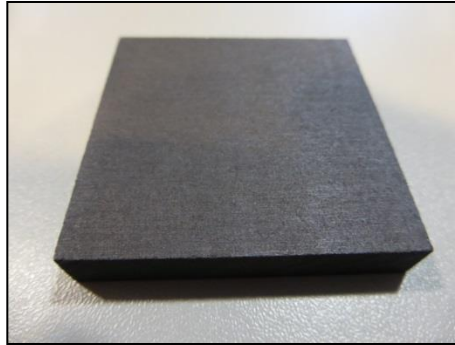
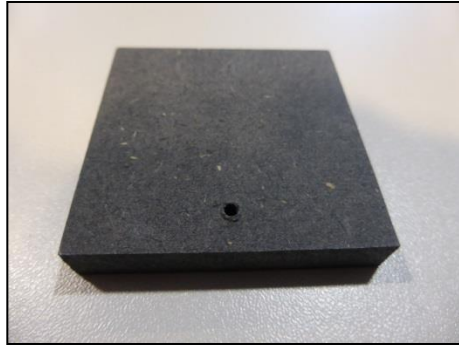
Below: Temperature/Time curves of the plasma jet during the plasma treatment



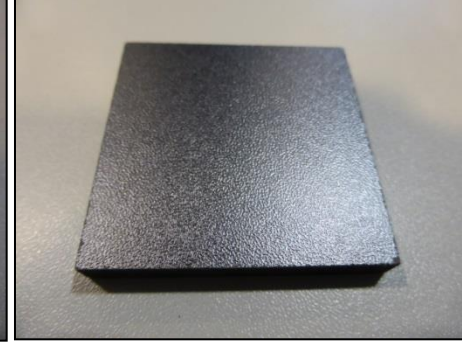
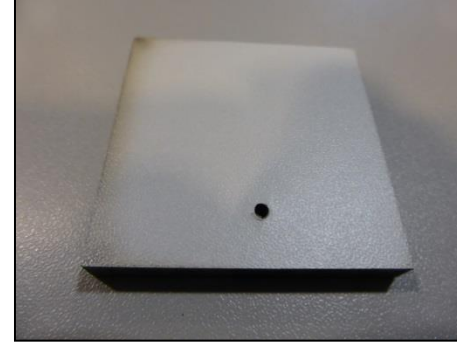


# Experiments

## First coating tests of wood-based panels by means of sputtering



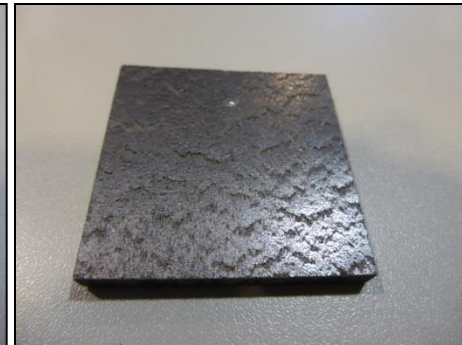
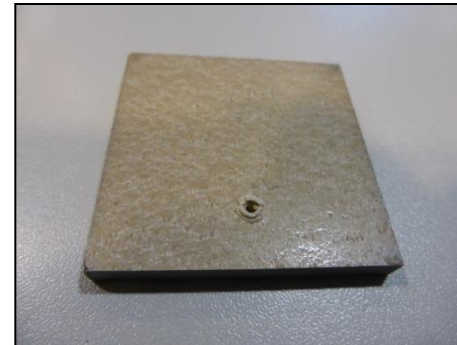
**Fig. 6: Black coloured compact wood fibre board (left) and with an additional chrome coating (right)**



**Fig. 7: Compact wood fibre board with a white decorative paper (left) and with an additional chrome coating (right)**



**Fig. 8: Oak wood (left) and with an additional chrome coating (right)**



**Fig. 9: WPC board (left) and with an additional chrome coating (right)**



## Next steps – W3C

- Further coating tests of wood-based materials by means of sputtering
  - Molybdenum or copper layers (conductivity layers):
    - WPC (the conductivity layer should enable electrostatic powder coating application)
    - Papers (for printed electronics applications - printed circuits)
  - Decorative layers ("Rainbow") on powder-coated MDF (for individual design, possibly with masking in order to obtain, for example, only logos in a metal effect)
  - Transparent scratch-resistant layers on coated substrates:
    - Melamine coated compact wood fibre boards (CDF)
    - Powder coated medium density fibre board (MDF)
- Measurement of the penetration depth of oils, waxes, resins and varnishes before and after a plasma treatment of wood-based materials
- Plasma treatment of powders, natural fibres and chipped wood