

WOOD PLASTIC COMPOSITES MADE OF RECYCLED AND REMEDIATED CREOSOTE TREATED WOOD-ASPECTS ON SCREW WITHDRAWAL PROPERTIES

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Background of the study

CCA, CCB and creosote had been widely used in pressure treated wood as a heavy duty preservative to protect wood against UC3, UC4 and UC5

CCA-treated wood being removed from service annually in the US would increase up to $16 \times 10^6 \text{ m}^3$ by 2020.

In Canada $\sim 2 \times 10^6 \text{ m}^3$ each year.

For Europe, 4×10^6 ton per year of which $\sim 2.4 \times 10^6$ ton is toxic in Germany and France.

Creosote-treated wood amount is expected up to $16 \times 10^6 \text{ m}^3$ by 2020 in US

In Canada, 4.5×10^6 ton per year railway sleepers

For the disposal of treated wood after completing the service life;

**recycling and recovery,
chemical extraction,
bioremediation,
electrodialytic remediation
thermal destruction etc.**



Wood plastic composites

PAH in creosote ??



MATERIALS

Material types	Polymer types		Coupling agent (%)
	HDPE (%)	PP (%)	
Creosote treated wood flour (50%)	50	0	0
	47	0	3
	0	50	0
	0	47	3
Control (virgin pine flour) (50%)	50	0	0
	47	0	3
	0	50	0
	0	47	3
Remediated wood flour (50%)	50	0	0
	47	0	3
	0	50	0
	0	47	3



Wooden posts (pine) treated with creosote



Virgin Scots pine



HDPE + PP



MAPE

WPC Production



POLYMER



AGENT



Wood Flour



Teflon sheet

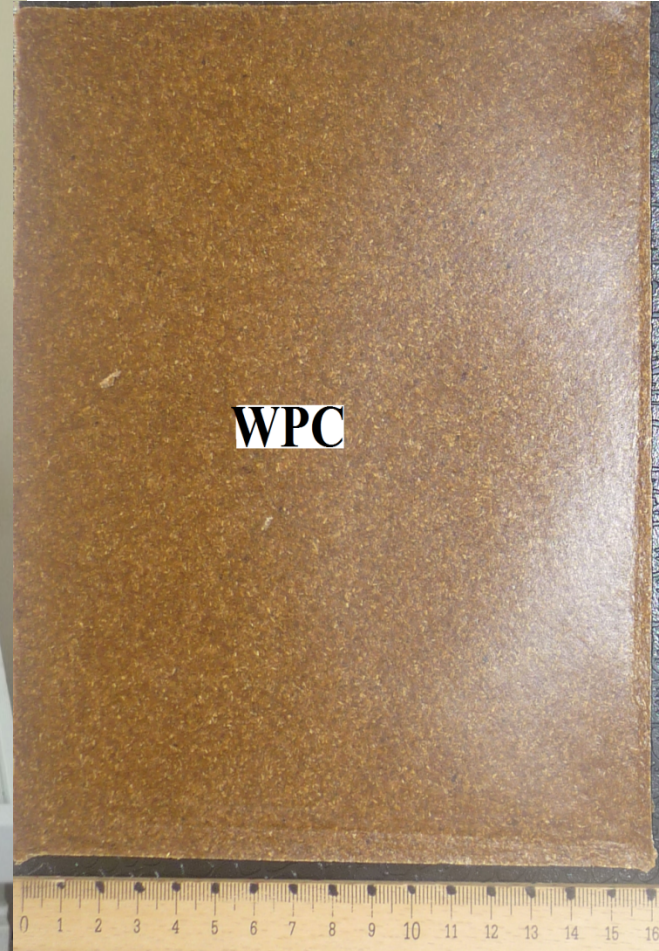


After Extrusion

Press dies



Press



WPC

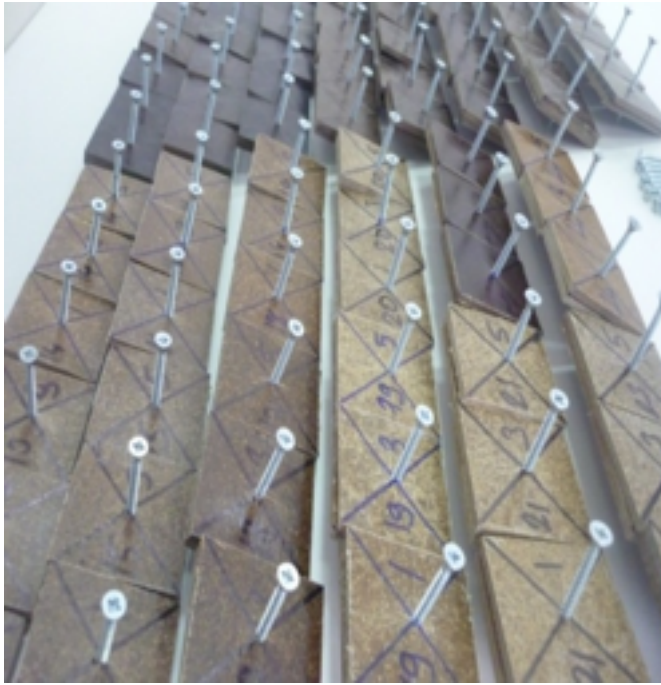
Extraction of Creosote



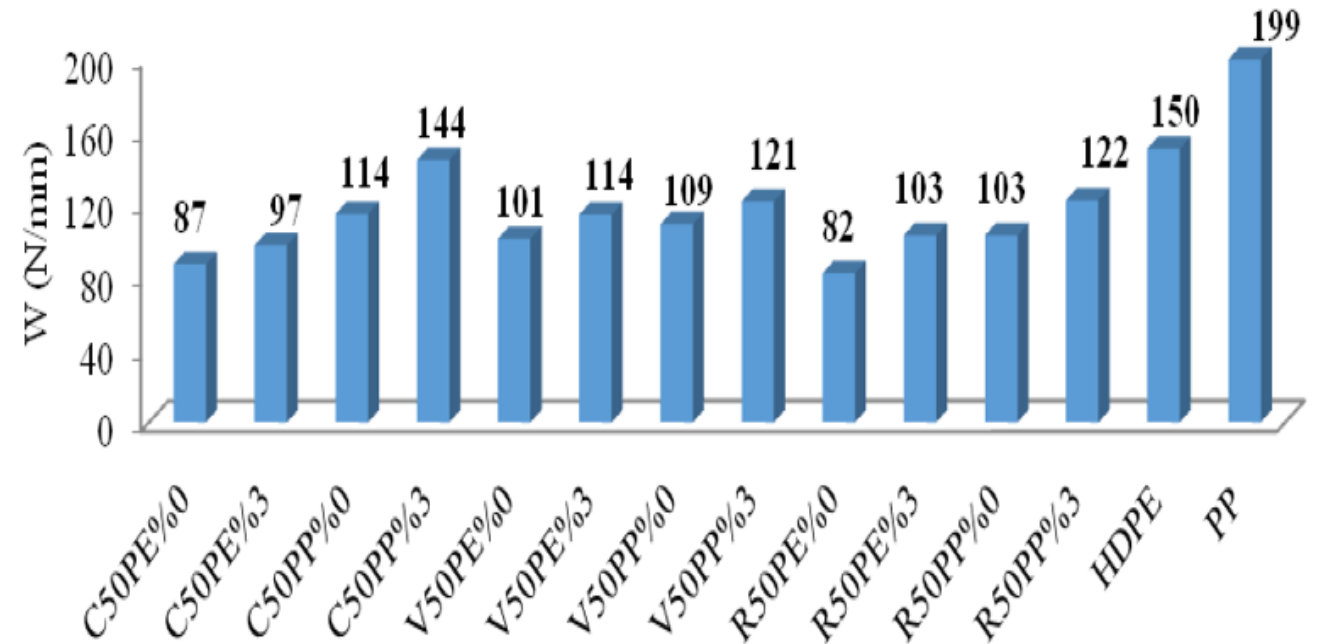
n-Hexane soxhlet extraction

washed with acetone/ethanol solution and dried. Pre and post-remediation processes were analysed by GC/MS, in particular for benzo(α)pyrene and total polycyclic aromatic hydrocarbons (PAHs) content of ground wood flours.

A large part of the PAHs and especially benzo(α)pyrene content were removed through remediation process 66% and 62%, respectively.



Samples for screw withdrawal test is carried out according to the ASTM D1037 standard



➤ As shown in Figure 1, the resistance ranges from 82 N/mm to 114 N/mm and from 109 N/mm to 144 N/mm for HDPE and PP based WPCs, respectively. The greatest increase resistance was observed when using 3 wt% coupling agent in samples made with 50% creosote treated flour/PP composites.

➤ Screw withdrawal resistances were improved with the addition of 3 wt% coupling agents for all WPCs. The type of polymer matrix (recycled or virgin HDPE and PP) significantly affected the withdrawal resistance

Thank you for your attention