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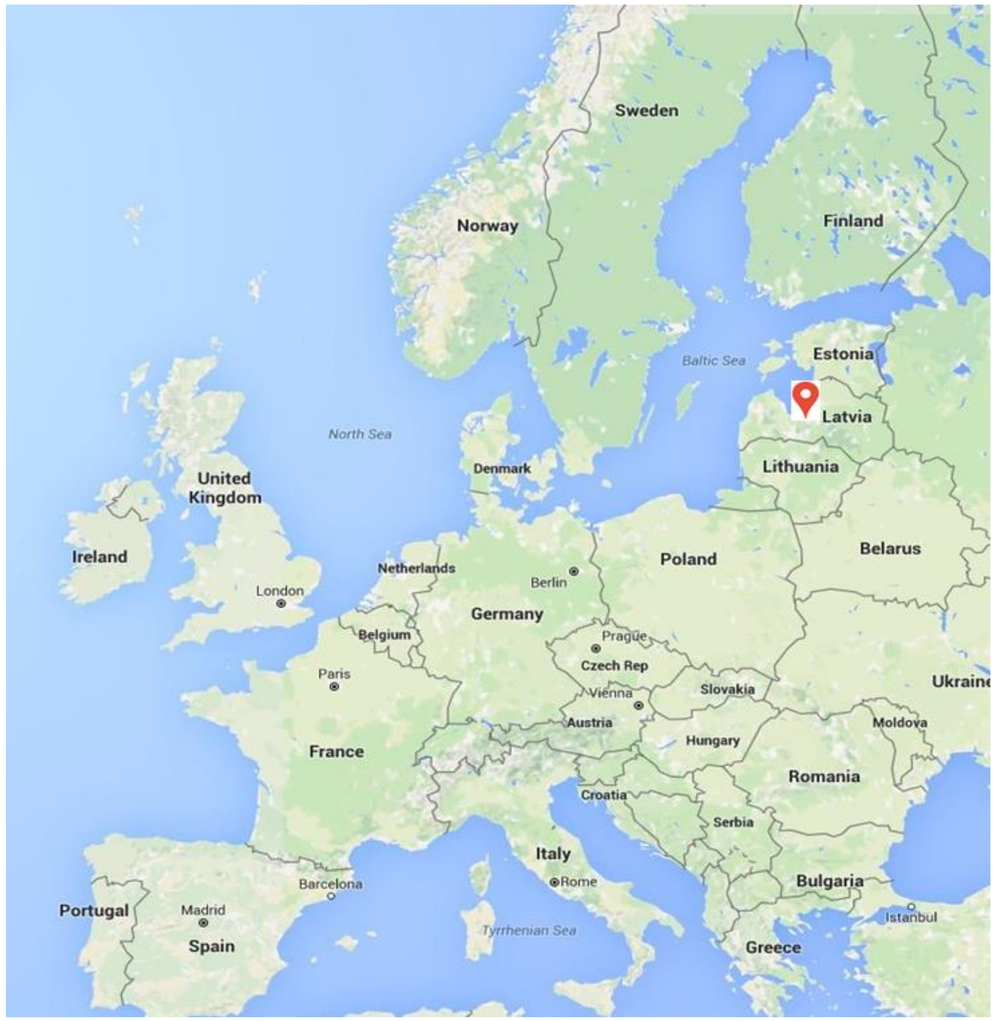
SURFACE FINISHING FOR IMPROVEMENT OF THERMALLY MODIFIED WOOD RESISTANCE TO DISCOLORATION

Karlsson O., Moren T. Colour stabilization of heat modified Norway spruce exposed to out-door conditions. In: Proceedings of the 11th International IUFRO Wood Drying Conference – 2010, pp. 265-268

Fenton's reagent:
10% ($FeSO_4 \times 7H_2O$) + 35% H_2O_2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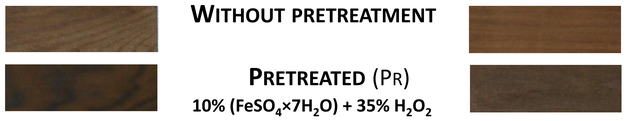
TOPICALITY AND OBJECTIVE

Lighter or darker brown colour of wood acquired during thermal treatment has often been regarded as an additional advantage. However, the colour of TM wood cannot be regarded as weathering resistant as it gradually turns grey when exposed outdoors thus losing its visual appeal. Therefore development of protective surface finishing is important to prolong good appearance period and reduce maintenance requirements. The objective of the present research was to test the efficiency of pretreatment with Fenton's reagent on resistance to discolouration of TM wood finished with pigmented non-film forming coating.

MATERIALS AND METHODS

THERMALLY MODIFIED WOOD SPECIMENS

PINE (*Pinus sylvestris*) — **(370 × 70 × 25) mm** — **ASPEN** (*Populus tremula*)



WITHOUT PRETREATMENT

PRETREATED (PR)

10% ($FeSO_4 \times 7H_2O$) + 35% H_2O_2

COATING TYPES (laboratory-prepared)

solvent-borne — water-borne — oil-based

All coating types contained equal amount of solid content (30%) and transparent red iron oxide pigment (4%).

(According to Directive 2004/42/CE of the European Parliament the coatings corresponded to the coating subcategory - Interior and exterior minimal build wood-stains)

OUTDOOR EXPOSURE

COLOUR MEASUREMENTS

The reflectance spectra of coated specimens and weathering of the specimens was controlled by spectrophotometrical measurements applying Minolta CM-2500d spectrophotometer (D65, d/8°). The discolouration ΔE was calculated from CIELAB colour system parameter differences ΔL*, Δa*, Δb*.

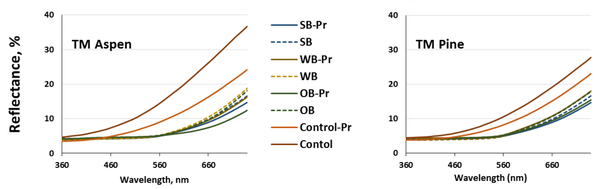
RESULTS

Amount of applied coatings (g/m²)

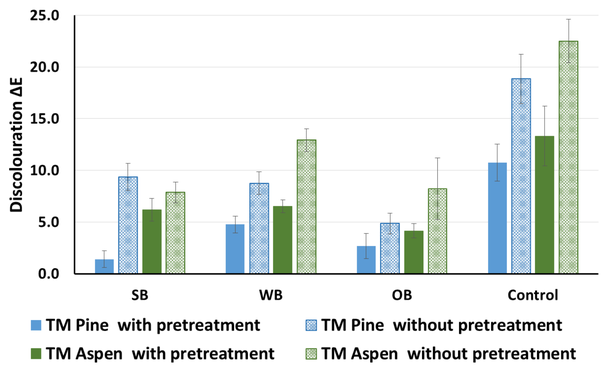
	TM Pine		TM Aspen	
Coating type	Pretreated	Without pretreatment	Pretreated	Without pretreatment
SB	158 (20)	199 (42)	192 (16)	202 (4)
WB	115 (24)	119 (9)	111 (9)	123 (39)
OB	190 (10)	196 (43)	184 (12)	212 (25)

Based on preliminary experiments, all coatings were applied in such a quantity that no coating film was formed on the surface.

Reflectance spectra of reference and coated specimens before weathering



Discolouration after one year outdoor exposure



CONCLUSIONS

TM wood darkens due to pretreatment with iron (II) sulphate and hydrogen peroxide but it does not substantially affect the visual appearance of TM wood specimens when non-film forming coatings containing transparent iron oxide are used for finishing. However, the pretreatement improves TM wood colour stability during outdoor exposure as pretreated specimens discoloured considerably less during one year weathering in comparison with the specimens finished with the same coating formulation but without pretreatment.

ACKNOWLEDGEMENTS

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