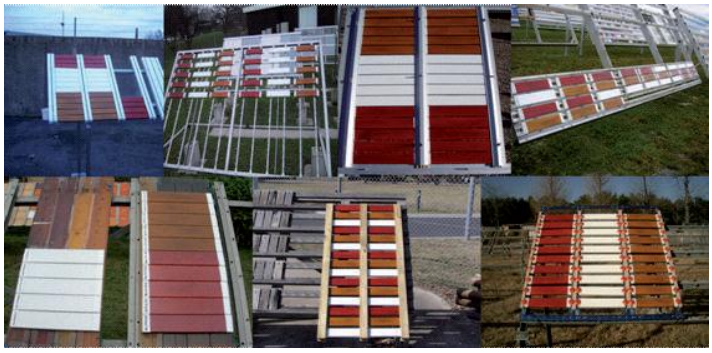
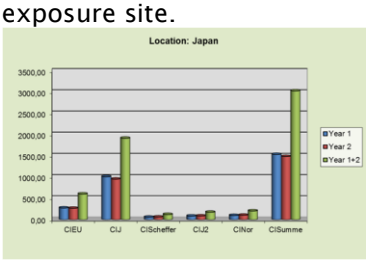
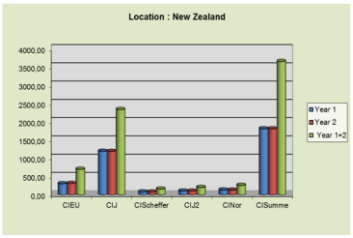
Virtual product qualification for sustainability

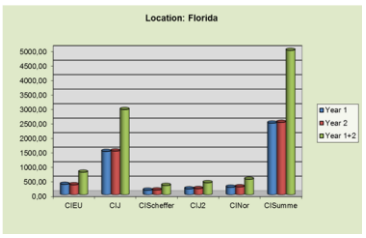


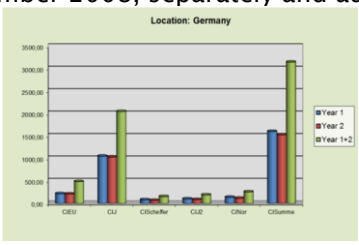
The service life of exterior wood coatings considerably depends on the climatic parameters, which they are exposed to. Coherences between service performance and impacting climatic parameters should be derived by the evaluation of chemical and physical changes in the polymeric matrix in their relation to climate factors and additionally to mathematically calculated climate indices. The properties of wood coatings influencing their lifetime considerably predominantly depend on the locally different climatic factors and the type of polymeric binder. Usually, polymeric materials degrade by photo-oxidizing processes, such as chain scission, cross-linking, and the formation of oxidative decomposition. With continuous exposure duration this photochemical processes lead to physical and mechanical alterations within the coating system. In order to predict the long-term performance of polymer wood coatings, the aging phenomenon of three typical wood coating systems have been investigated. Coated spruce wood panels have been weathered on eight exposure sites in North America, Europe, Asia, and Australia. Based on statistical correlations a dose-response-relationship can be postulated, and analysed and will be discussed in this paper. The investigations have demonstrated that chemical and physical degradation processes caused by climate impact factors in complex polymeric matrices blended with inorganic fillers, pigments, and further additives can be determined by means of FTIR-ATR spectroscopy. The corresponding evaluation results indicate statistical dependencies to impacting climatic indices, which have been concluded and discussed by the models of Pearson and Spearman. The introduced statistical evaluation model of the climatic parameters for the dose and the polymeric degradation rates for the impact must be investigated for shorter weathering intervals and one exposure site.





Display of the climate indices of the selected sites for the two years of natural weathering from December 2006 to December 2008, separately and added up.





Title of project: Virtual product qualification for sustainability (ViPQuali)
Support Program/Supported by/Sponsored by: BMBF via PT DLR
Duration: 2007-2010

Partner: ATLAS, BAM, Clariant, FEMLAB, Fraunhofer ICT und ISE
Responsible for project/Project Leader/Contact: Dr. Guido Hora