

Ecological Relationships Between Material, Colonizing Organisms, and Resulting Performances

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Abstract : Due to the continual demand for material to build, and a limit of good environmental material credentials of 'normal' building materials, there is a need to look at new and reconditioned material types - both biogenic and non-biogenic - and a field of research that accompanies this. This research development focuses on biogenic and non-biogenic material engineering and the impact of our environment on new and reconditioned material types. In our building industry and all the industries involved in constructing our built environment, building material types can be broadly categorized into two types, biogenic and non-biogenic material properties. Both play significant roles in shaping our built environment. Regardless of their properties, all material types originate from our earth, whereas many are modified through processing to provide resistance to 'forces of nature', be it rain, wind, sun, gravity, or whatever the local environmental conditions throw at us. Modifications are succumbed to offer benefits in endurance, resistance, malleability in handling (building with), and ergonomic values - in all types of building material. We assume control of all building materials through rigorous quality control specifications and regulations to ensure materials perform under specific constraints. Yet materials confront an external environment that is not controlled with live forces undetermined, and of which materials naturally act and react through weathering, patination and discoloring, promoting natural chemical reactions such as rusting. The purpose of the paper is to present recent research that explores the after-life of specific new and reconditioned biogenic and non-biogenic material types and how the understanding of materials' natural processes of transformation when exposed to the external climate, can inform initial design decisions. With qualities to receive in a transient and contingent manner, ecological relationships between material, the colonizing organisms and resulting performances invite opportunities for new design explorations for the benefit of both the needs of human society and the needs of our natural environment. The research follows designing for the benefit of both and engaging in both biogenic and non-biogenic material engineering whilst embracing the continual demand for colonization - human and environment, and the aptitude of a material to be colonized by one or several groups of living organisms without necessarily undergoing any severe deterioration, but embracing weathering, patination and discoloring, and at the same time establishing new habitat. The research follows iterative prototyping processes where knowledge has been accumulated via explorations of specific material performances, from laboratory to construction mock-ups focusing on the architectural qualities embedded in control of production techniques and facilitating longer-term patinas of material surfaces to extend the aesthetic beyond common judgments. Experiments are therefore focused on how the inherent material qualities drive a design brief toward specific investigations to explore aesthetics induced through production, patinas and colonization obtained over time while exposed and interactions with external climate conditions.

Keywords : biogenic and non-biogenic, natural processes of transformation, colonization, patina

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