

HYBRID

hybrid, adjective [Latin: hybrida] = combination of two or more different things, aimed to achieve a particular objective or goal.

The current situation shows a wide range of very special and different definitions, depending on the context and profession. In the special case of architecture, "hybrid" is not determined at all. To fill in the blank, we searched for something really ad-able to mix with the existing types of concrete.

On closer inspection of day-to-day appearance of concrete it attracted our attention, that every now and then, concrete serves as a biotope for algae and moss. Especially if we look at moss [and its structures], we realize that there couldn't be more varieties to concrete:

Concrete as an inorganic, unlivened system versus moss as an organic, alive system.

Static vs. dynamic principle.

Moss as a local-interactive network structure, being responsive to local climatic conditions versus concrete, being a monolithic system.

A new aspect of ecological architecture.

Merging these different aspects and extending them by the use of an already existing phenomena as a tool for design, promise to be fascinating and tense in creating a hybrid FA-MO[U]SS concrete.

Consequently moss has the bargain to conquer a new habitat. As a result, we could have species living in new regions, that originally have not been their environment [e.g. due to lack of water].



new concrete



aged concrete



FA-MO[U]SS concrete

FA·MO[U]SS concrete

1

IMPLEMENTATION

Moss is a quite simple and frugal organism - all it needs to grow is enough water containing ions and sunlight. Furthermore they are very resistant to various conditions like surviving temperatures up to +40°C [some species even 52°C] as well as periods of less water.

Normally, following different types of moss can be found on concrete beside algae an tresses:

- cypress feather moss [hypnum lacunosum]
- twisted moss [tortula ruralis; latifolia]
- grey cushioned moss [grimmia pulvinata]

The most important limiting factor for moss is the availability of water. Moss can regulate its water balance on a very small scale. Therefore, an elementary framework can be created for all kind of moss by mixing concrete with a very strong water-absorbing / -storage substance.

Throughout our research we found so called SAP, which are already used in landscape architecture and agriculture. These polyacrylate/ polyacrylamid-copolymers can absorb all kind of liquids very quickly from 50% up to 400% of their own weight by transforming into a kind of gel. Absorption and release of liquid are managed by osmotic pressure and can not be crushed like a punk. Therefore, the water and ion-concentration will stay stable over a long period of changing outer conditions. Examples of common types of SAPs are: Soil Moist, Stockabsorb®, Oasis Super Absorbent Fiber, PetroGuard and Watersorb®.

Characteristics of the SAPs can be adopted in many ways: size of the particles, coated in order to make them hydrophobic, etc. Beside an inoculation of the wall with spores of special species, this would be one option to control which moss should grow on the wall and which not.

Triggered by natural dry-periods (late spring and summer), we expect a change in the haptic of the moss - it will become "harder" through this time of the year and stop growing, especially when the temperature raises beyond 30°C. Across very long periods of too less water, the moss will dry out and change its colour into shades of brown.

Classical concrete itself is also a very unspectacular system - a simple mixture of water, cement and aggregates (gravel, colour pigments, chemical substances).

Since we do not manipulate the concrete mixture in any way, this hybrid-system follows the simple character of its components. Only the SAPs - just like any other aggregate - must be added as "linking modul".

In the end we now have a new hybrid-structure which can be used as architectural style-component: A monolithic System with an inscribed pattern that can only be seen through the intended growing of the moss.

As a result, there can be a variety of design opportunities combining colour, size, concentration and growth of chosen moss with color and structure of the concrete.

BASIC ELEMENTS



1 coating



2 activation by grinding



3 impregnate



4 inoculation

TECHNICAL ASPECTS

One of the main problems we were facing, was to define and create moss areas on the front. While same areas originally used to function as a protection from atmospheric conditions, they now, in order to enhance growth of moss, need to be supplied with water on a controlled basis. A „supporting level“ consisting of any usual concrete mixed with 5-15% SAP (super absorbing particles).

Those SAPs are coated [1] with a hydrophobic layer, that will be cracked [2] by grinding the whole wall or through a chemical treatment. [The surplus of the SAP in the outer layer is an improvement of the thermal conductivity in all regions, where no moss should grow.] The supporting layer is embedded in the chosen concrete. This main section of the wall is concerned with the load bearing functions.

To bring the design 'up the wall', all areas intended to be moss free will be treated with a fungicide, such as Elastoflex or Fungosil IC [3]. These water-based impregnations will stop the growth of algae, moss and other herbs by filling the SAPs and penetrating the whole concrete surface, building up an invisible, totally plain and closed protection layer. Moreover, they are very easy to handle - just paint the wall in the common way while the design(area) is taped with a foil or any other water-resisting material.

2



UTILISATION

Actually there is no comparable product on the market yet, but obviously there is a market whose demand will grow as urbanization and the connected environmental impacts are increasing worldwide. The need for green areas in cities and bioindicators, new ideas to create unique buildings and a contra point to the fastening times - moss grows very slow - will make the FA-MO[U]SS concrete an attractive new option for architects worldwide.

Multiple-use options arise from the structural configuration and the variety of each component: green noise protection walls, minimal gardens as relaxing zones in skyscrapers or metropolitan structures, guidance systems, architectural patterns, interactive themed bio-indicator fronts. It creates a new range of opportunities to apply already existing architectural patterns to a concrete wall such as ornamental [1], shadowy images [2], abstract structures [3] etc. Especially the variety of moss colours provides an unproven and very delightful new playground for creative minds, opening up a new field of design, reaching from replacing ordinary colours till a deeper visual - haptic level [4].

