Entropic Stone Floor-Lamp

Preface

The concept of entropy posit that there exists finite amount of energy in the universe. This energy cannot be created nor destroyed. This energy may be utilized and transformed, though through usage and conversion some of this energy is transformed into low level state increasing the total amount of irreversibly low level energy.

This entropy interacts with all aspects of life. In erecting the homes, towns, and monolithic cities we have removed matter and energy from one place to bring it to another. Along the way part of this energy is lost forever and the material changes in a way that can never be reversed.

Proposal Statement

Project Description: In engaging with the philosophical interpretation of entropy in humanities appropriation and repurposing of earths materials, I created a cement furniture piece that acknowledges and embraces the beauty of this entropic decay. By highlighting the highly manufactured and structural aspects of cement construction as well as the chaotic beauty of the shortened lifespan of reconstructed limestone, I hope to articulate the power that can come from a wholistic understanding of the appropriation of materials validating the idea that in designing it is possible to succeed by empathizing with the materials you use.

Questions: How do I articulate a finished form both in decay and in the first moments after completion? Does a finished form have to carry a load to fully acknowledge the industrial uses of cement? Is there a way to marry sculptural architectural and industrial uses of cement? How do I accelerate the deterioration of cement while maintaining authentic cracking and rusting or the appearance of it?

The Beauty of Decay

Rebecca Louise Law

(conceptual reference)

An installation comprised of 8,000 flowers strung from the ceiling by copper wire and left to dry and decay until the conclusion of the exhibition

El Encanto
Maite Irabarren

Visual reference

Three Walls
Amrita Raafat

Visual reference:

brutalist architecture

Lecture Centre, Brunel University, London, UK, 1968,
Richard Sheppard

GEISEL LIBRARY 1970, SA
DIEGO, C
WILLIAM PERE

Types of Concrete Deterioration

The Portland Cement association

In order to mimic the language of decay I first had to understand how and why cement decays. Using publications by the Portland Cement Association I was able learn more on the chemistry and physics of concrete and cement decay.

CONCRETE *Information*

PCA Portland Cement Association

Types and Causes of Concrete Deterioration

Corrosion of Embedded Metals . . . 1
Concrete and the passivating layer . . . 3
The role of chloride ions . . . 3
Carbonation . . . 3
Dissimilar metal corrosion . . . 4
Freeze-Thaw Deterioration . . . 4
Deicer scaling . . . 4
Aggregate expansion . . . 5
Chemical Attack . . . 5
Acids . . . 5
Salts and alkalis . . . 6
Sulfate attack . . . 7
Alkali-Aggregate Reactivity . . . 8
Alkali-silica reactivity . . . 9
Alkali-carbonate reactivity . . . 9
Abrasion/Erosion . . . 9
Traffic surfaces . . . 9
Hydraulic structures . . . 10
Fire/Heat . . . 10
Restraint to Volume Changes . . . 12
Plastic shrinkage cracking . . . 12
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Thermal stresses . . . 12
Overload and Impact . . . 12
Loss of Support . . . 13
Surface Defects . . . 13
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The exceptional durability of portland cement concrete is a major reason why it is the world's most widely used construction material. But material limitations, design and construction practices, and severe exposure conditions can cause concrete to deteriorate, which may result in aesthetic, functional, or structural problems.

Concrete can deteriorate for a variety of reasons, and concrete damage is often the result of a combination of factors. The following summary discusses potential causes of concrete deterioration and the factors that influence them.

CORROSION OF EMBEDDED METALS

Corrosion of reinforcing steel and other embedded metals is the leading cause of deterioration in concrete. When steel corrodes, the resulting rust occupies a greater volume than the steel. This expansion creates tensile stresses in the concrete, which can eventually cause cracking, delamination, and spalling (Figs. 1 and 2).

Steel corrodes because it is not a naturally occurring material. Rather, iron ore is smelted and refined to produce steel. The production steps that transform iron ore into steel add energy to the metal.

Steel, like most metals except gold and platinum, is thermodynamically unstable under normal atmospheric conditions and will release energy and revert back to its natural state—iron oxide, or rust. This process is called corrosion.

For corrosion to occur, four elements must be present: There must be at least two metals (or two locations on a single metal) at different energy levels, an electrolyte, and a metallic connection. In reinforced concrete, the rebar may have many separate areas at different energy levels. Concrete acts as the electrolyte, and the metallic connection is provided by wire ties, chair supports, or the rebar itself.

Fig. 1. Corrosion of reinforcing steel is the most common cause of concrete deterioration. (46080)

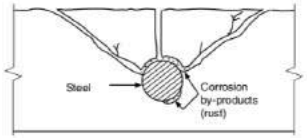


Fig. 2. The expansion of corroding steel creates tensile stresses in the concrete, which can cause cracking, delamination, and spalling.

Corrosion is an electrochemical process involving the flow of charges (electrons and ions). Fig. 3 shows a corroding steel bar embedded in concrete. At active sites on the bar, called anodes, iron atoms lose electrons and move into the surrounding concrete as ferrous ions. This process is called a

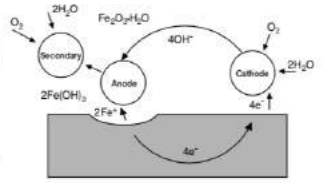
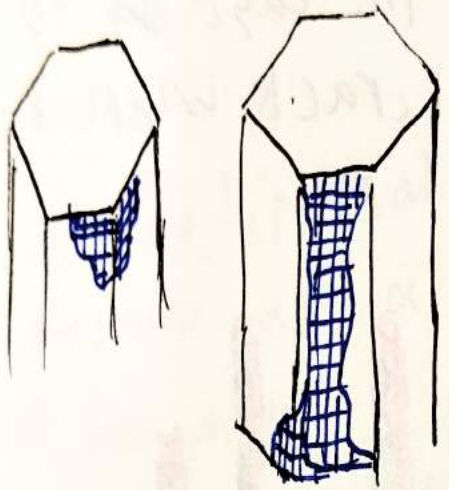


Fig. 3. When reinforcing steel corrodes, electrons flow through the bar and ions flow through the concrete.

Sketches and Notes

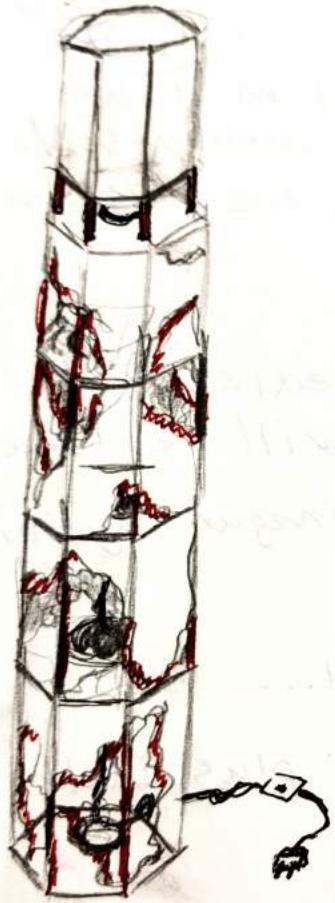
will have to map each block where mild steel mesh is to know where to chissel if it pokes out of top and bottom that would solve the problem

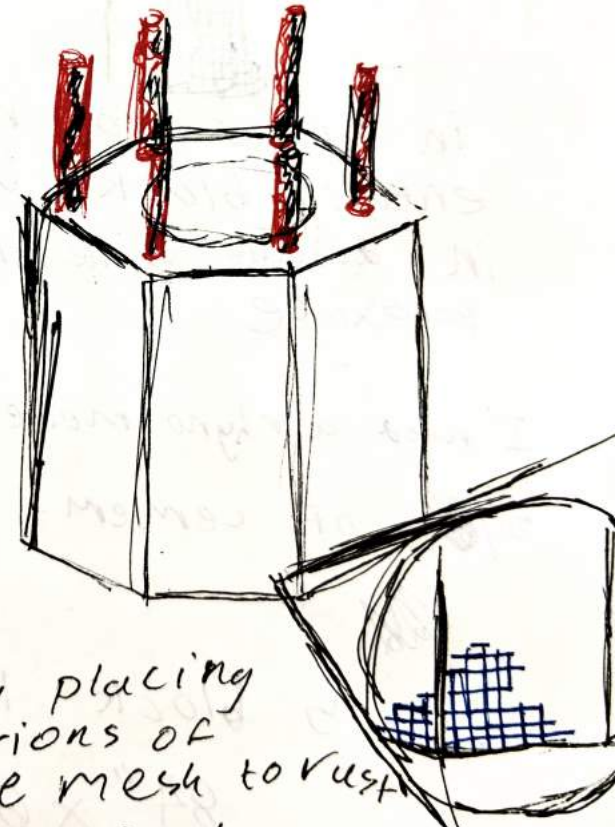


in order to create rust entire blocks will be soaked in distille white vinegar + hydrogen peroxide

steel bars prerusted and sealed

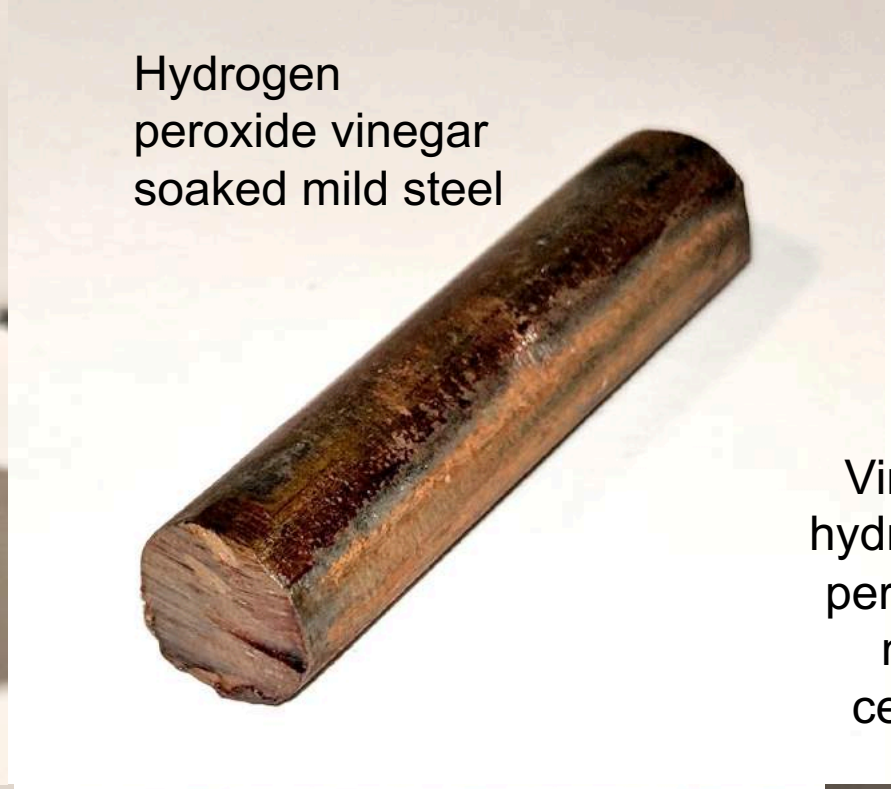
scraps of clean steel placed in cast to crack when rusted





by placing sections of wire mesh to rust there will be week points when chisseling these meshes out-


vinegar soaked bar
regular cement


Hydrogen
peroxide vinegar
soaked mild steel


Vinegar
hydrogen
peroxide
mixed
cement


vinegar
soaked bar
regular
cement


Vinegar
mixed
cement


Vinegar
hydrogen
peroxide
mixed
cement

First Mockup and Tests

Process

- Cement block casted from carboard molds reinforced by a wooden brace.
- The blocks were caste with plain steel bars and chicken wire to mimic rebar while enabling rusting.
- LED strips were attached to a steel tube to create a light source

Final Documentation

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