

D R O S S

Re- Genesis of *diverse matter* _ A Design *Post-Praxis*

By Lydia Kallipoliti

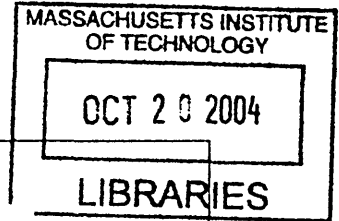
Professional Diploma in Architecture & Engineering [2001]

Aristotle University of Thessaloniki, Greece [A.U.Th]

Submitted to the Department of Architecture
in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Architecture Studies
at the Massachusetts Institute of Technology
September 2004

© 2004 Lydia Kallipoliti. All rights Reserved.

The author hereby grants to MIT permission to reproduce and to distribute publicly
paper and electronic copies of the thesis document in whole or part.



Signature of Author:
Department of Architecture
August 6, 2004
Certified by:
Thesis Advisor

ARCHIVES

Ann M. Pendleton - Jullian
Associate Professor of Architecture
Certified by:
Thesis Advisor
Mark Goulthorpe
Associate Professor of Architecture
Accepted by:
Chair, Committee on Graduate Students

Julian Beinart
Professor of Architecture

Thesis Reader: Arindam Dutta
Title: Associate Professor of the
History of Architecture

Thesis Reader: John A. Ochsendorf
Title: Assistant Professor of Building
Technology

Thesis Reader: William Lyman Porter
Title: Norman B. and Muriel Leventhal
Professor of Architecture and Planning

D R O S S

Re- G e n e s i s of *diverse matter* — A design Post-Praxis

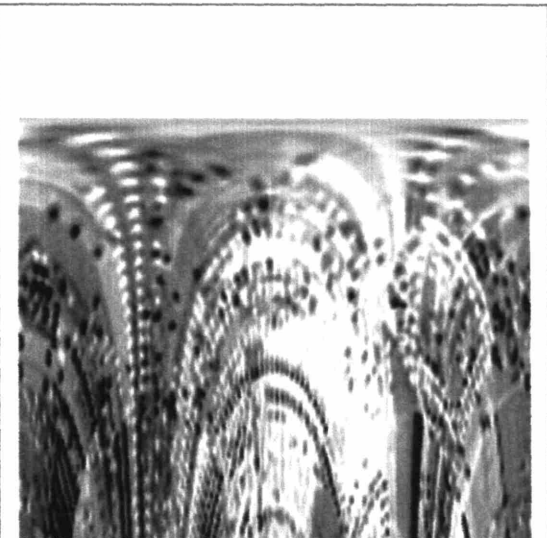
By Lydia Kallipoliti

Submitted to the Department of Architecture on August 6th, 2004
in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Architecture Studies

Abstract

The word *dross* refers to matter that is foreign, worn out and **impure**, such as the scum formed by oxidation at the surface of molten metals. Based on a perception of material impurity, this thesis encompasses the generative potential of obsolete objects and spaces, or in other words *waste* material that is displaced culturally or functionally from its previous identity.

The cultural fabric for this thesis revolves around the material ramifications of unprecedented technological evolutions in communications, in terms of unparalleled waste production of defunct apparatuses. As rapid growth rates in technology have



irreversibly shifted our consumption modes, immense amounts of 'techno-junk' are being produced, not only in the size of objects (defunct computers), but also in the size of rooms (oil tanks, air-conditioning tubes, containers etc.) and buildings ('brownfields', abandoned landscapes). The content of this thesis engages 'obsolete matter' in various scales of reference, or 'techno-excrements' as an emerging city-born condition, derivative of the urban system's internal erosion.

Since it is impossible to dispose of these objects due to their extremely high-embodied material energy, this thesis lies on the premise of their 'architectural' reuse and the development of post-praxis design strategies. The mandate behind this intention is to revisit our design and material culture, not by attempting to create new memory, but by recycling meanings of objects and spaces with embedded memory. In terms of the methodology used, the intent is to go beyond existing techniques, such as reuse through signification and collage of unrelated building parts and to explore the possibilities of cast materials and generative processes of 'moulding' related to computation.

Thesis Advisor:

Ann M. Pendleton - Jullian
Associate Professor of Architecture

Thesis Advisor:

Mark Goulthorpe
Associate Professor of Architecture

Acknowledgments

Coming from a middle-class family in Thessaloniki Greece, I owe my first words of gratitude to the foundations and institutions which have fully supported my education financially and made it possible for me to be here when at first I thought of it as inconceivable:

The National Scholarship Foundation of Greece (I.K.Y), which has funded me throughout the entire duration of my studies;

The Fulbright Foundation; the 'Michelis' Foundation; M.I.T and the M.I.T Building Technology Program for awarding me with fellowships. I would also like to thank the professors who have offered me Teaching Assistantships; Pierre Thibault, Mark Goulthorpe and most of all Ann Pendleton-Jullian.

I wish to express my most sincere gratitude to my thesis committee for their guidance and support:

Ann Pendleton-Jullian to whom I cannot stress enough how thankful I am, for her unparalleled support throughout the past two years, her incredibly incisive criticism and for always seeking something profound in any step towards innovation;

Mark Goulthorpe, for being meticulously attentive in every review, for revealing to me the 'madness' that architectural production necessitates and for teaching me that in the frustrating moments of 'conceptual chaos' one has to keep going and keep producing;

William Porter, for the provision of his wisdom and continuous support, with rare kindness;

John Ochsendorf for his words of encouragement;

and Arindam Dutta to whom I am forever in debt, for immersing me deep into the fields of theory and releasing from within me thoughts that I never thought were present. Without his insight, I would hesitate to continue my education in a Ph.D, which I will begin the Fall of 2004.

I then wish to thank the people I love for keeping sane throughout my time at M.I.T:

Fabiola Lopez-Durand, a Ph.D Candidate in the H.T.C of M.I.T, for being my family in Boston and a gift in my life;

Stelios Dritsas, a fellow SMArchS student and a friend, for being so generous in his exquisite knowledge on computation;

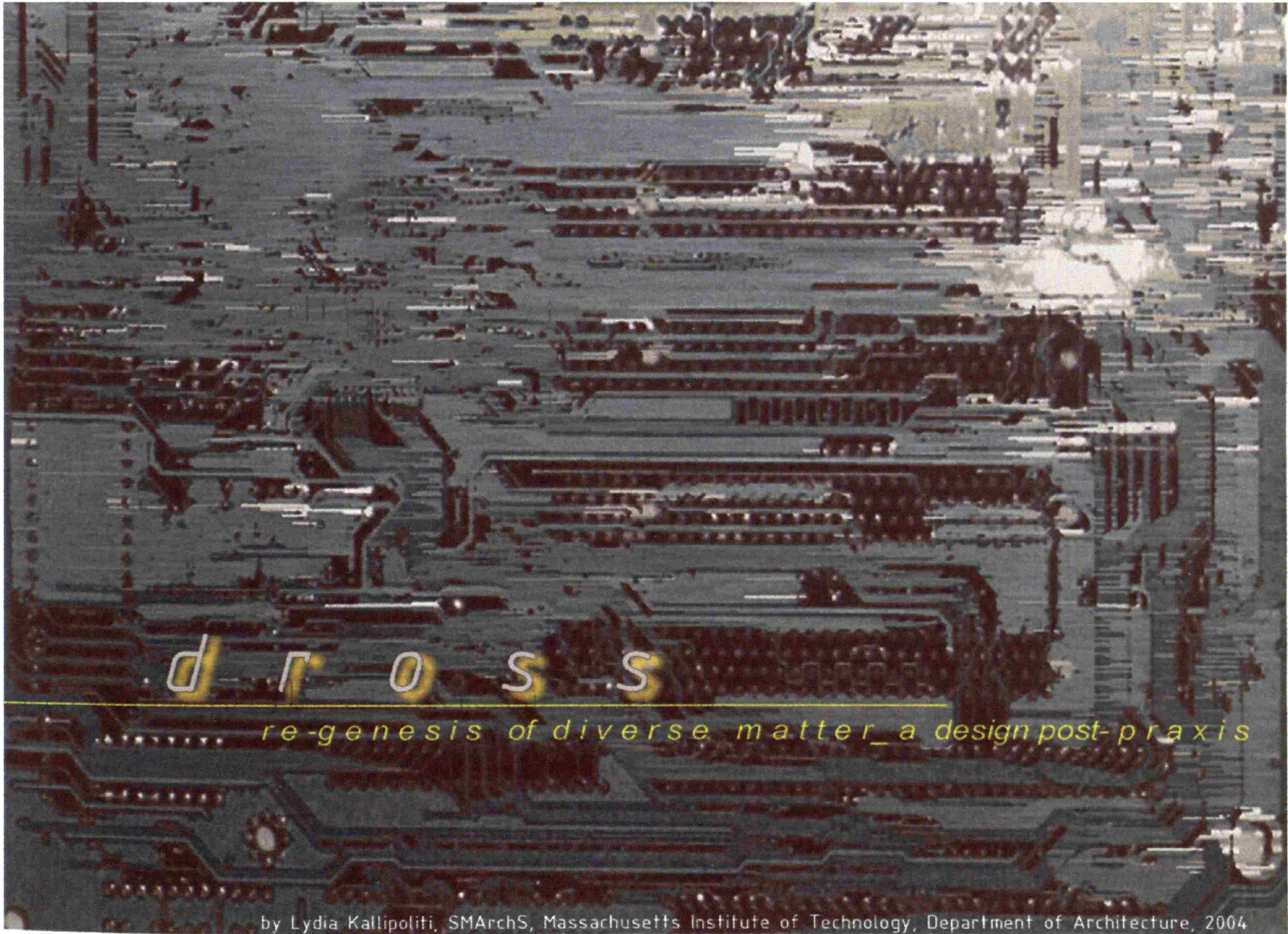
Lefki Andreadou, my aunt, for always sticking with me in good times and bad times;

Charalambos Kallipolitis and Tatiana Andreadou, my parents, because no matter what else, they have always respected and supported my decisions in life;

Elpida Andreadou, my grandmother, for raising me with unconditional love;

and Vana Tentokali, my mentor and professor of architecture in Greece, for bothering to instill me with an architectural education.

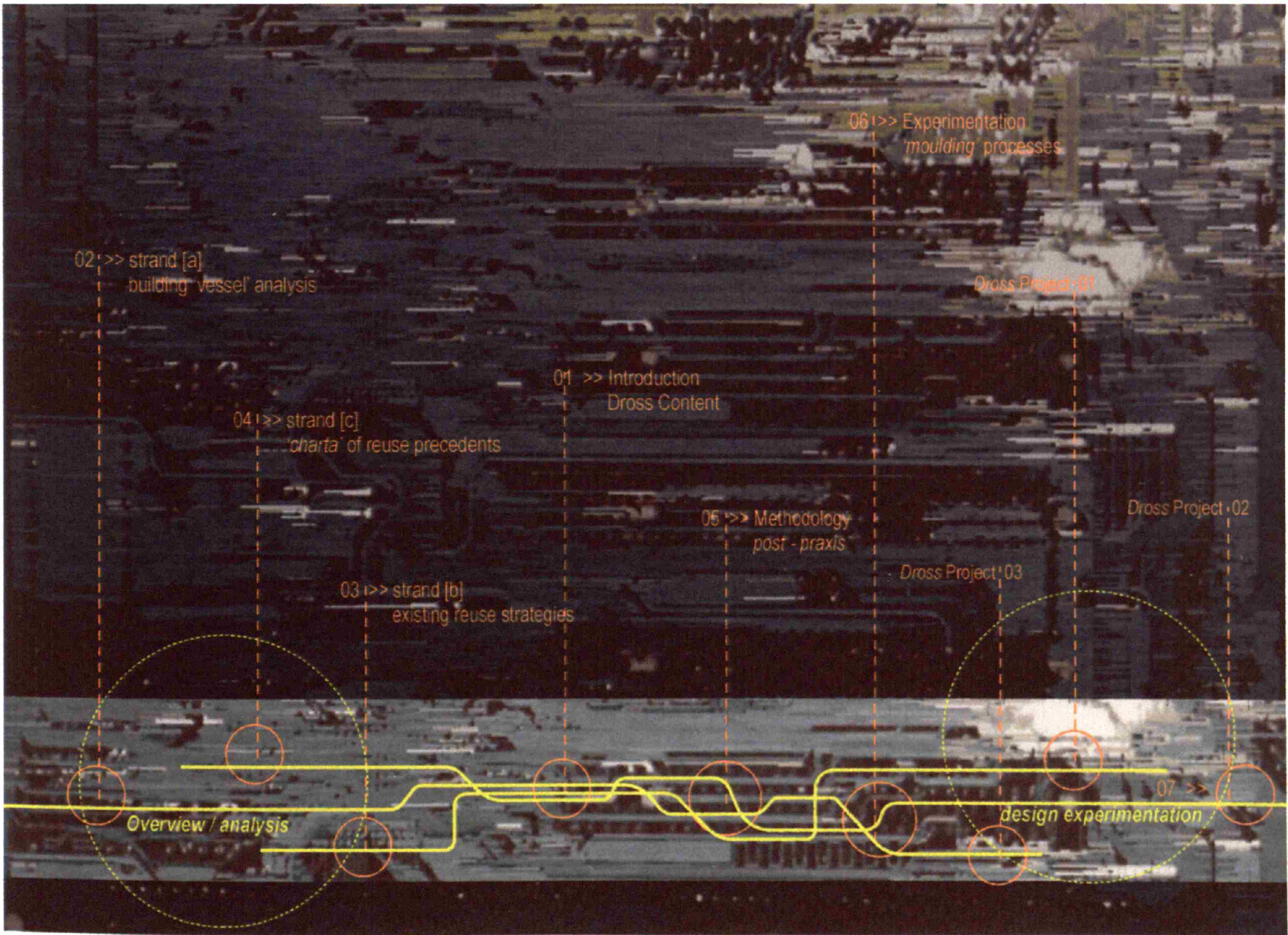
Last but not least, I would like to dedicate this thesis to Alexandros Tsamis, the 'half or more than half' of my architectural education and my partner in all.



dross

re-gensis of diverse matter_a design post-praxis

by Lydia Kallipoliti, SMArchS, Massachusetts Institute of Technology, Department of Architecture, 2004



t a b l e o f c o n t e n t s

Chapter 01 >> *Dross*

- 1.1 *Dross matter*
- 1.2 *Dross culture*
- 1.3 *Dross praxis*

Introduction / Content

Chapter 02 >> *'Building Vessel' Involution*

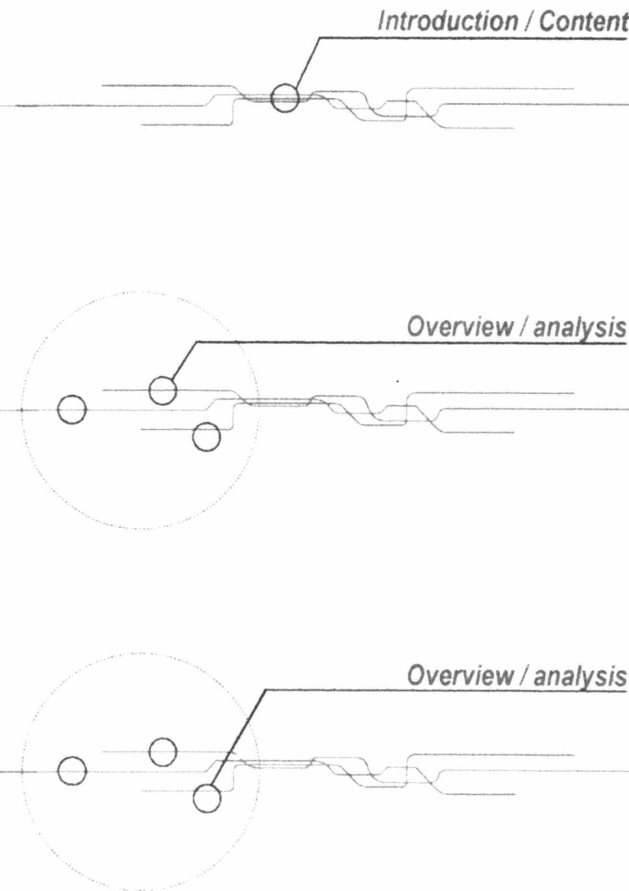
- 2.1 *Obsolescence; on the onset of a post-production era*
- 2.2 *'Sheared' Building Layers*
- 2.3 *Open Building Approaches*
- 2.4 *The discourse of the residual 'techno-excrement'*

Overview / analysis

Chapter 03 >> *Existing Reuse Strategies and the 'fuzz of green tactics'*

- 3.1 *Documentation of Reuse Strategies*
- 3.2 *The Effects of 'Verdolatry'*
- 3.3 *[Object -Room- Building] Reuse Strategies*

Overview / analysis



Chapter 04 >> *'Charta' of Reuse Precedents in Art & Architecture*

4.1 Historic Synthesis

4.2 'Collage' & 'Moulding' Operations

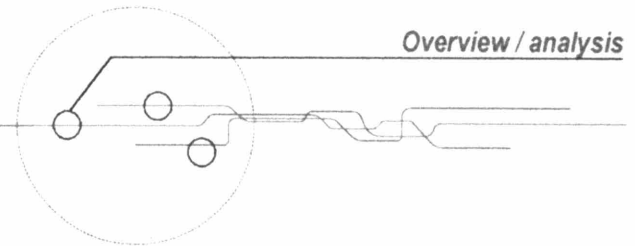
4.3 'Collage' Case Studies__

__LoTek, Mas Yendo, Santiago Cirugeda Parejo, Rural Studio

4.4 'Moulding' Case studies__

__LoTek, Rachel Whiteread, Antony Gormley, Mateo & Matias Pinto, Kurt

Schwitters & the Merzbau, Harpman Specht

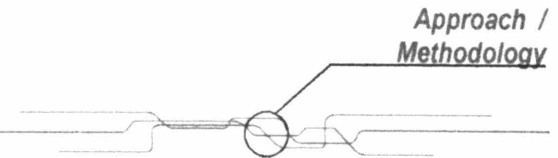


Overview / analysis

Chapter 05 >> *Post-Praxis*

5.1 Parameters of a design *post-praxis*

5.2 Methodology for a design *post-praxis*



*Approach /
Methodology*

Exploration

Chapter 06 >> *Design Exploration of Moulding Processes*

6.1 Moulding Processes

6.1.1 Mimetic Moulding >> Material Transfer

6.1.2 Flexible Moulding >> Orchestrated Variability

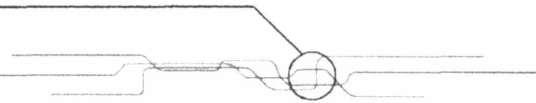
6.1.3 'Precision Loss' Moulding >> Deteriorating Mould

6.1.4 'Micro-Material Exchange' Moulding >> Porous Scaffold Mould

6.1.5 Particle Interaction Moulding >> Moulding of Aggregates

6.2 Object Matrix and Operations

6.3 Design Exploration



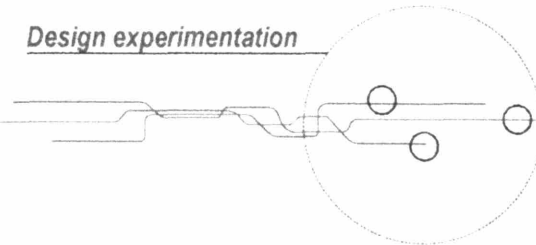
Chapter 07 >> *Design Experimentation*

7.1 Dross Projects 01

7.2 Dross Projects 02

7.3 Dross Projects 03

7.4 Discussion



Chapter 08 >> *Appendix*

8.1 Bibliography

8.2 Figures

8.3 Illustrations



CHAPTER 01 >> INTRODUCTION / CONTENT

DROSS

[OE. *drós* = MLG. *drós*, MDu. *droes* dregs. A lengthened form, DROSEN, ME. *drasne*, OE. *drósna*, corresponds to OHG. *truosana*, MHG. *truosen*, Ger. *drusen* pl. husks of grapes, lees, dregs. See *Kuhn's Zeitschr.* XXXIV. 513 (1896).

1.1 >> *DROSS* matter

The word *dross* refers to matter that is foreign, worn out and **impure**, such as the scum formed by oxidation at the surface of molten metals. Dross is a *phantom material condition*, one that is unnoticeable to such an extent that it almost does not exist in our perception. Dross is worthless; it is a *displaced material*, an incidental by-product of chemical reactions that serves no purpose.

Nevertheless, when it appears, a necessity is created for its removal.

In time and through the use and misuse of language, the word has ended up in signifying waste, impurity [1] or any incongruous accumulation of disparate elements, pieces and material fragments. However the origin of the word 'dross' etymologically derives from the English word 'dregs' [2] and refers to a residual substance that emerges in *transitional material stages*, such as the process of melting a metal or the process of sedimentation of a liquid.

There was always a mystery revolving around the erratic, metamorphic power of materials. The Roman poet Publius Ovidius Naso, known to the English-speaking world as Ovid [3] [figure 1], spoke of the marvel of '*metamorphoses*' in fifteen books using Greek and Roman myths as material for his enterprise. He began his epic by claiming "Of bodies changed to other forms I tell;" [4]. And as much as he was interested in the apparent wonder of the mythological transformation of creatures into new bodies and new forms, he was in parallel using the same techniques in his writing, by transforming one myth verbally into the other in order to achieve integral transitions, "as being themselves metamorphosis in action, verbalizations of the continuous flux of events" [5]. For E.J Kenney, the literary prevalence of

[1] Merriam- Webster Online
Dictionary,
<http://www.m-w.com/dictionary.htm> .

[2] The Etymology of the word
'dross' can be found in Cambridge
Dictionaries Online,
<http://dictionary.cambridge.org/> .
Middle English *dros*, is derivative
from Old English *drOs* *DREGS*
>> dregs, grounds, settlings – [
sediment that has settled at the
bottom of a liquid]
>> [a small amount of residue] .

[3] Wikipedia, The Free
Encyclopedia,
[http://en.wikipedia.org/wiki/
Main_Page](http://en.wikipedia.org/wiki/Main_Page)

waste or foreign matter: IMPURITY

[01]

dross as an aggregation of worthless materials

dross -- (worthless material that should be removed; "there were impurities in the water")
=> waste, waste material, waste matter, waste product -- (any materials unused and rejected as worthless or unwanted; "they collect the waste once a week"; "much of the waste material is carried off in the sewers")

[02]

dross as substance

dross -- (The scum, recrement, or extraneous matter thrown off from metals in the process of melting) --
>> (an alloy incidentally formed in the zinc-bath, by the action of the zinc on the iron pot and iron articles dipped) (Wahl *Galvanopl. Manip.* 1884) - (Dreggy, impure, or foreign matter, mixed with any substance, and detracting from its purity; e.g. the dregs or lees of oil or wine, the chaff of corn, etc.)

[]

Etymology: Middle English dros, from Old English drōs DREGS

dregs, grounds, settlings -- (sediment that has settled at the bottom of a liquid)
-- (a small amount of residue)

d r o s s

'metamorphoses' is dual; both in the use of material that refers to physical and natural phenomena of metamorphosis, but also in the conceptual comprehension of the epic, as a *perpetuum carmen* [6] of found myths that had to be 'deformed' in order to feed one another and delineate an integral narrative.

And even then, when Ovid was composing "Metamorphoses", "there was nothing new in the idea that the universe was in continual flux. This was the teaching of Heraclitus and Ovid's admired Lucretius, following in the steps of his master Epicurus" [7]. Material transitions provoked wonder and bewilderment throughout history; they invoked an incessant drive towards infinity, through the perpetual transformation of matter. In this viewpoint, matter does not come to an end, it is not wasted; instead it changes state. For many artists "such as Gilberto Zorio, infinity was rooted in the alchemical, elemental and metamorphic power of materials and their mercurial effect on another, whether they are chemicals reacting to moisture or substances or phenomena—including, for example, sound-transformed through an encounter with another" [8].

Alongside the belief that all matter is subject to metamorphoses, the material condition of *dross* reveals an alternate perspective. It simply conjures that material transitions are not pure operations. They not only release energy but they may also

Figure 1 >> Ovid the Poet



[4] Ovid, **Metamorphoses**

translated by A.D. Melville (Oxford, UK: Oxford University Press, 1986), Book 1, p.1.

[5] E.J Kenney, "Introduction" in

Ovid, **Metamorphoses** translated by A.D. Melville (Oxford, UK: Oxford University Press, 1986), p.xxi.

create material by-products that are rarely described as outcomes of chemical reactions. In this sense, *dross* is a new substance, an **incidental material** occurring in a chemical reaction as a material changes state, for instance as a metal changes phase from solid to liquid. During this transition, impurity occurs which cannot be calculated or predicted in the chemical reaction diagram. Such incidence can occur during transitional stages or *mesophases* [9]. Therefore, *dross* is unrelated to the natural decay of a material and the passage of time. It is by definition "the scum, recrement, or extraneous matter thrown off from metals in the process of melting" [10] or "an alloy incidentally formed in the zinc-bath [11], by the action of the zinc on the iron pot and iron articles dipped. (Wahl *Galvanopl. Manip.* 1884)" [12].

Probing deeper into the examination of *dross* substance, Harn Wei Kua [13] identifies it as a chemical compound instead of a mixture. This means that the substance has its own unique physical and chemical properties, instead of being "a combination of two or more chemicals, in which the chemicals retain their previous identities" [14]. At the same time, these properties are extracted from the internal structure from their material predecessor; they are not entirely new or foreign to the system that produced them.

[6] Ibid.

[7] Ibid (p.xv).

[8] Richard Flood & Frances Morris (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001), p.17.

[9] Intermediate states of objects in a phase diagram, such as between solid to liquid and liquid to gas. The phase diagram of an object records its material state in different temperatures and pressures.

[10]

Oxford English Dictionary Online, http://dictionary.oed.com/entrance_dtl

Marcos Novak refers to this phenomenon by naming it "*allogensis*" [15], suggesting the production of an alien species from initially genetically compatible lineages, or the alien *from-within*. While the *xenogeneic* is that which is derived from another species (xeno- is the Greek word for 'foreigner'), the *allogeneic* is that which is formed from within a species as that species evolves to become alien to its origins. Consequently, he locates major problems in the contemporary, technologically driven culture as *allogeneic*, meaning problems that were unexpectedly created via alienation from the root.

Then, dross as a material condition comes to signify more than an entropic landscape or a disparate accumulation of worthless materials. It depicts material derailment and the production of displaced matter [figure 2]. It reminds us, that pure operations of making, seem to belong to the sphere of impossibility.

Primo Levi, an aspiring Italian chemist, wrote in 1977 the Periodic Table. In this book he used the elements, their reactions and operations, as a medium in order to narrate his life, "as a function of materials... The elements came to figure into his education, his experiments his work, his life. His understanding of the Fascist

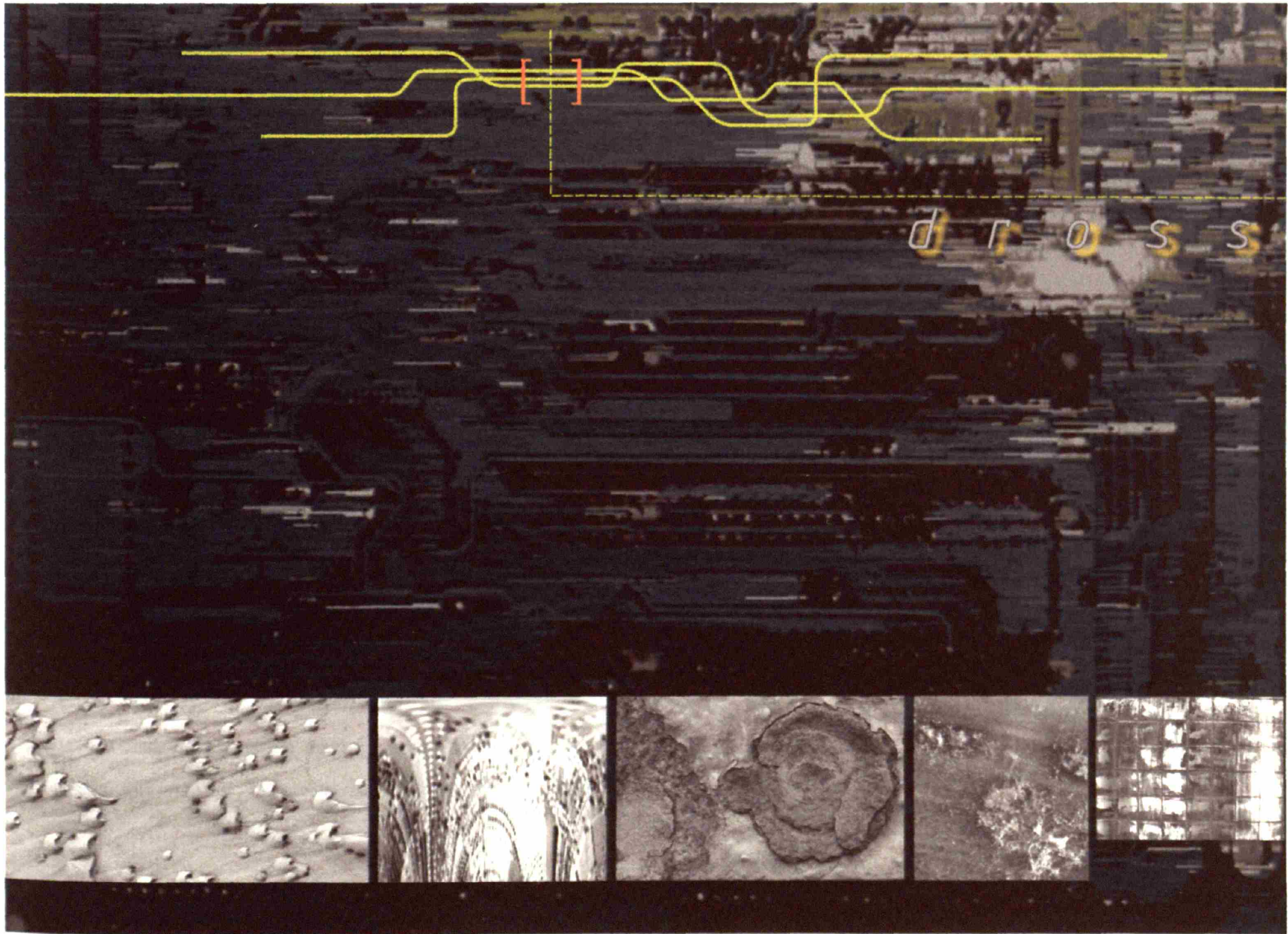
[11] Zinc bath is the process of heating up a metal.

[12]

Oxford English Dictionary Online,
<http://dictionary.oed.com/entrance.dtl>

[13] Harn Wei Kua is a PhD Candidate in the Building Technology Program in the Department of Architecture at the Massachusetts Institute of Technology. He was consulted in June 2004 in order to identify the chemical properties of 'dross', due to his background as a physicist.

[14] Definition of a mixture in Wikipedia, The Free Encyclopedia,
http://en.wikipedia.org/wiki/Main_Page.



rhetoric of racial purity was filtered through his newfound concepts of chemical impurity: he became the defender of impurity" [16]. Levi wrote: "I am the impurity that makes the zinc react... I am the grain of salt or mustard" [17].

The purpose of analyzing thoroughly the ingredients and the properties of dross substance lies beneath the fascination of metamorphic materials. *Dross* may be an *alchemical fiction* and a *phantom material condition*, but at the same time it is a product, or better stated a by-product, of social reality, paraphrasing Donna Haraway. Quoting the same writer, "the boundary between science fiction and social reality is an optical illusion" [18].

The intrinsic properties of dross substance are analyzed to serve as a medium for the comprehension of a cultural phenomenon of *incidentally displaced matter* that is automatically rendered meaningless and serves no purpose whatsoever. Our production and consumption modes, especially during the past two decades in the electronics industry, are producing immense amounts of 'techno-junk', tons of purposeless and indestructible matter. Based on the perception of material impurity, this thesis will attempt to encompass the generative potential of obsolete objects

[15] Marcos Novak, "Speciation, Transvergence, Allogenesis: Notes on the Production of the Alien" in **Architectural Design (AD)**, Vol.72, No.3, (London: Wiley- Academy, 2002) p.67.

Figure 2 >> Antony Gormley's Coconut Lead Shell contaminated by an incidental, undefined material that originated from the lead's interaction with the coconut.



and spaces, or in other words *waste* material that is displaced culturally or functionally from either its previous or its original identity.

[16] Molly Nesbit, "Casting Out" in Rachel Whiteread: Transient Spaces (New York: The Solomon R. Guggenheim, 2001), p.135.

[17] Primo Levi, The Periodic Table, trans. Raymond Rosenthal (New York: Schocken Rose, 1984), p.35.

[18] Donna J. Haraway, Simians, Cyborgs and Women. The Reinvention of Nature (New York: Routledge, 1991), p.149.

1.2 >> DROSS Culture

The cultural fabric for this thesis revolves around the material ramifications of unprecedented technological evolutions in communications, in terms of unparalleled waste production of defunct apparatuses. By the term technological evolutions, I mean the rapid advancements in computer software and hardware that have irreversibly changed our needs and our desires for consumption. My claim is that these advancements are not disconnected from their material consequences. The technological evolution that has been producing these novel tools, such as the computer, has produced at the same time an immense quantity of 'techno-garbage', almost impossible to dispose of. If we use the computer as an example, we realize that every new type of software that is produced and ultimately redefines the possibilities of the previous medium of representation, resolves in the obsolescence of the previous computer and eventually in its discarding [figure 3]. But this fact does not only involve miniaturized technologies such as the computer that could not possibly have any consequences in the production of space. It involves infrastructure, which is an essential component of built space. The ephemeral useful life of the material devices that support this kind of technology to proliferate, contradicts the impossibility of eliminating their matter.

Figure 3 >> Best Buy Advertisement



The issue of waste in relationship to consumption modes has been widely discussed in the 70s. Frederic Jameson, one of the main literary critics and theorists advocating the penetration of consumer culture into the unconscious, suggested that "non-Marxists and Marxists alike, have come to the general feeling that at some point after World War II a new kind of society began to emerge, variously described as post-industrial society, multi-national capitalism, consumer society, media society and so forth; new types of consumption; planned obsolescence; an ever more rapid rhythm of fashion and styling changes" [19]. Jameson then notes: "We have seen that there is a way in which postmodernism replicates or reproduces –reinforces– the logic of consumer capitalism; the more significant question is whether there is also a way in which it resists that logic. But that is a question we must leave open" [20]. In parallel, the echoes of this discourse in the discipline of architecture were quite emphatic, as architects such as Witold Rybczynski, Martin Pawley and Forrest Wilson, mostly known as 'garbage architects', were overwhelmed with statistics of left-over materials and attempted to practically take hold of the problem. These architects have engaged with the byproducts of consumer culture, such as the waste of packaging materials and disused materials with no practical value, excrements of the building industry –sulphur, copper waste and others. The industry for production of pure materials mostly metals, was accompanied with more than double amounts of

[19] Frederic Jameson, "Postmodernism and Consumer Society" in Hal Foster (Ed.), The Anti-Aesthetic. Essays on Postmodern Culture (New York: The New Press, 1998), p.143.

[20] Ibid, p.144.

unused waste material. For instance, "the production of one ton of copper produces 500 tons of waste" [21]. However, their endeavor to engage with waste creatively did not go very far. This was mainly due to the fact that the architects were driven solely by an 'environmental ethos' and the noble motive of a 'wasteless world'. Their attempts were soon to be banned even from their own judgment, since they failed to provide either pragmatic solutions for affordable housing, or the necessary appeal to charm the architectural crowds.

In 1990, Kevin Lynch attempted to readdress the issue of waste and its correlations to the environment in his seminal book 'Wasting Away'. He wrote that waste "is what is worthless or unused for human purpose. It is a lessening of something without a useful result; it is loss and abandonment, decline, separation and death. It is the spent and valueless material left after some act of production or consumption, but can also refer to any used thing: garbage, trash, litter, junk, impurity and dirt. There are waste things, waste lands, waste time and wasted lives" [22].

The past decade though, the concerns related to waste have slightly shifted in their orientation. Waste is no longer an issue that relates solely to quantity. It now also

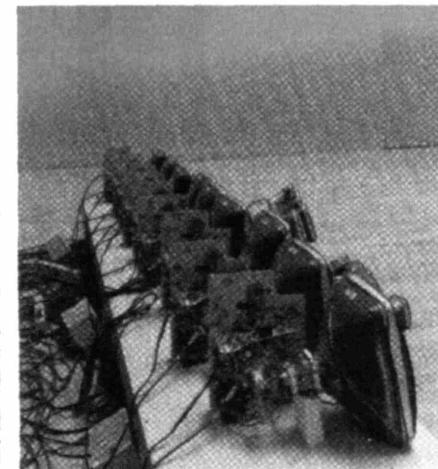
[21] Witold Rybczynski, "From Pollution to Housing" in Monica Pidgeon (Ed), Architectural Design (AD), Vol. XLIII 12 (London: The Standard Catalogue Co Ltd, 1973), p.786.

[22] Kevin Lynch, Wasting Away, edited by Michael Southworth (San Francisco, CA: Sierra Club Books, 1990).

relates to the intricacy of the waste matter and its material composition, which sheds emphasis not only on the immense amounts of produced waste, but also on the impossibility of eliminating its matter. With the advent of highly advanced manufacturing methods and processes, many products that are displaced from their original roles and reach the end of their useful lives quickly and unexpectedly, are highly complex in form and material composition, containing in parallel high amounts of embodied energy [figure 4]. A characteristic example is computer hardware. Electronic waste, known as e-waste, is the largest growing industry of waste in a global scale. The rates of computer obsolescence are so extreme that "in the year of 2005, one computer will become obsolete for every new one put on the market" [23] [figure 5]. Alongside the numbers, a personal computer "contains over 1,000 different substances, many of which are toxic, and creates serious pollution upon disposal" [24].

The question arising out of this discussion for a consumption culture demanding 'ephemerality' and enforcing obsolescence is to what extent this phenomenon affects architectural design and in what manner. My hypothesis to this inquiry is that '*obsolete and nondisposable matter*' is influential in diverse scales of reference such as the scale of an object -defunct computers-, this of a room -oil tanks, air

Figure 4 >> *Between Cinema and a Hard Place*, viewers left back view of nine modified Panasonic 13-inch color monitors which attached circuitboards on pedestal. Bill Viola & Gary Hill Art work.



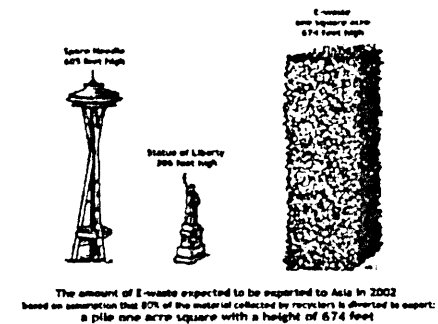
conditioning tubes, containers etc.- and that of a building -partially abandoned buildings, 'brownfields' etc. The content of this thesis engages 'obsolete matter' in various scales of reference, or 'techno-excrements' as an emerging city-born condition, derivative of the *urban system's internal erosion*.

1.3 D R O S S space / praxis

Side by side to the waste derivative from the electronics industry, a mundane reality of *big* defunct objects -literally technical garbage displaced out of their built context- is overwhelming the contemporary city. "Techno-junk" is an emerging city-born condition. Defunct oil tanks, air-conditioning tubes, advertising billboards, containers and other apparatuses articulate a new urban language that violates the building envelope or attaches itself to it as an *outgrowth*. If one identifies in the city fabric, a stratum of buildings that can be easily mapped due to their longevity, equivalently he could identify a stratum of mechanical appendages that cannot easily be mapped due to their 'ephemerality'. The significantly different lifetime of the two *strata* is the cause for an erosion of the outer building shell that cannot adapt to the change, taking place in it or around it. The *unmappable* urban condition of this "floating matter" in the city has been yet unexplored by contemporary architecture.

[23] Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, "Exporting Harm. The High-Tech Trashing of Asia", Prepared by The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC), (February 25, 2002) in http://www.svtc.org/resource/pubs/pub_index.html.

Figure 5 >> Amount of E-waste exported in Asia yearly



The necessity of such a discourse is not only driven by the formulation of an ecological awareness, but also by the need to manipulate this kind of "raw material". Potentially, it could lead to an alternate practice of recycling, based on questions of "matter", rather than on questions of representation.

Again, the argument of reuse is not bonded merely to ethical and practical concerns. It is about manipulating the material aspect of an unprecedented flow in the urban fabric. The notion of "meta-polis" (polis- is the Greek word for the city and meta- is the Greek word for after) refers to a post-urban condition of congestion, mobility and transformation, than succeeds urbanization.

This condition of flow and unremitting transformation is characterized by Kepes as a fundamental reorientation of the 20th century. He explains that "the dominant matrix of nineteenth-century attitudes was the use of Marx's term 'reification'; relationships were interpreted in terms of things, objects or commodity values. Today a reversal of this attitude has begun to appear; there is a steadily increasing movement in science and in art toward processes and systems that dematerialize the object world and discredit physical possessions. What scientists considered before as substance shaped into forms, and consequently understood as tangible objects, is now recognized as energies and their dynamic organization" [25].

[24] Ibid.

[25] Kepes Gyorgy, 'Art and Ecological Consciousness' in Gyorgy Kepes (Ed.), Arts of the Environment (New York: George Braziller, 1972), p.11.

Although Kepes' argument concerns immaterial entities and the issue of discussion here involves *material* entities, I use it deliberately to depict that an essential part of my argument on reuse, besides the issue of *matter*, involves an engagement of energy flow, of fluctuation of identity and thus mutation of meaning.

Then, *dross* space does not merely refer to defunct machinery, but encompasses a more generic condition of *spatial displacement*. Just like inoperative service components of buildings, there are equivalently obsolete, displaced spaces and programs, parts of buildings, derelict areas and voids. In an urban scale, dross space potentially represents an alternate fractured fabric comprised of *unused niches or 'black holes'* and 'floating techno-junk' in diverse scales of reference. However, defining dross space is an elusive task because dross does not actually refer to a particular attribute or a configuration of space.

In attempting to put into words the spatial expression of the 'residual' and the 'displaced', the dross discourse intertwines at various points with the discourse of the 'uncanny' as a spatial expression of estrangement. Antony Vidler's endeavor to identify 'uncanny space' is particularly useful in perceiving space as an occasional host of 'uncanniness', rather than defining the uncanny as a resolute spatial quality;

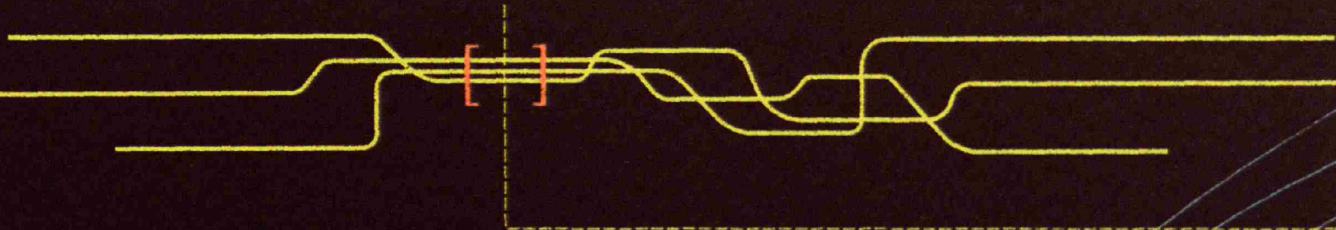
in this sense, there is no such thing as architecture intentionally designed as 'uncanny'. Vidler characteristically points out that "the 'uncanny' is not a property of the space itself nor it can be provoked by any particular spatial conformation; it is, in its aesthetic dimension, a representation of a mental state of projection that precisely elides the boundaries of the real and the unreal in order to provoke a disturbing ambiguity, a slippage between waking and dreaming. In this sense, it is perhaps difficult to speak of an architectural uncanny, in the same terms as a literary and psychological uncanny; certainly no one building, no special effects of design can be guaranteed to provoke an uncanny feeling...

If actual buildings or spaces are interpreted through this lens, it is not because they themselves possess uncanny properties, but rather because they act, historically or culturally, as representations of estrangement. If there is a single premise to be derived from the study of the uncanny in modern culture, it is that there is no such thing as an uncanny architecture, but simply architecture that, from time to time and for different purposes, is invested with uncanny qualities" [26].

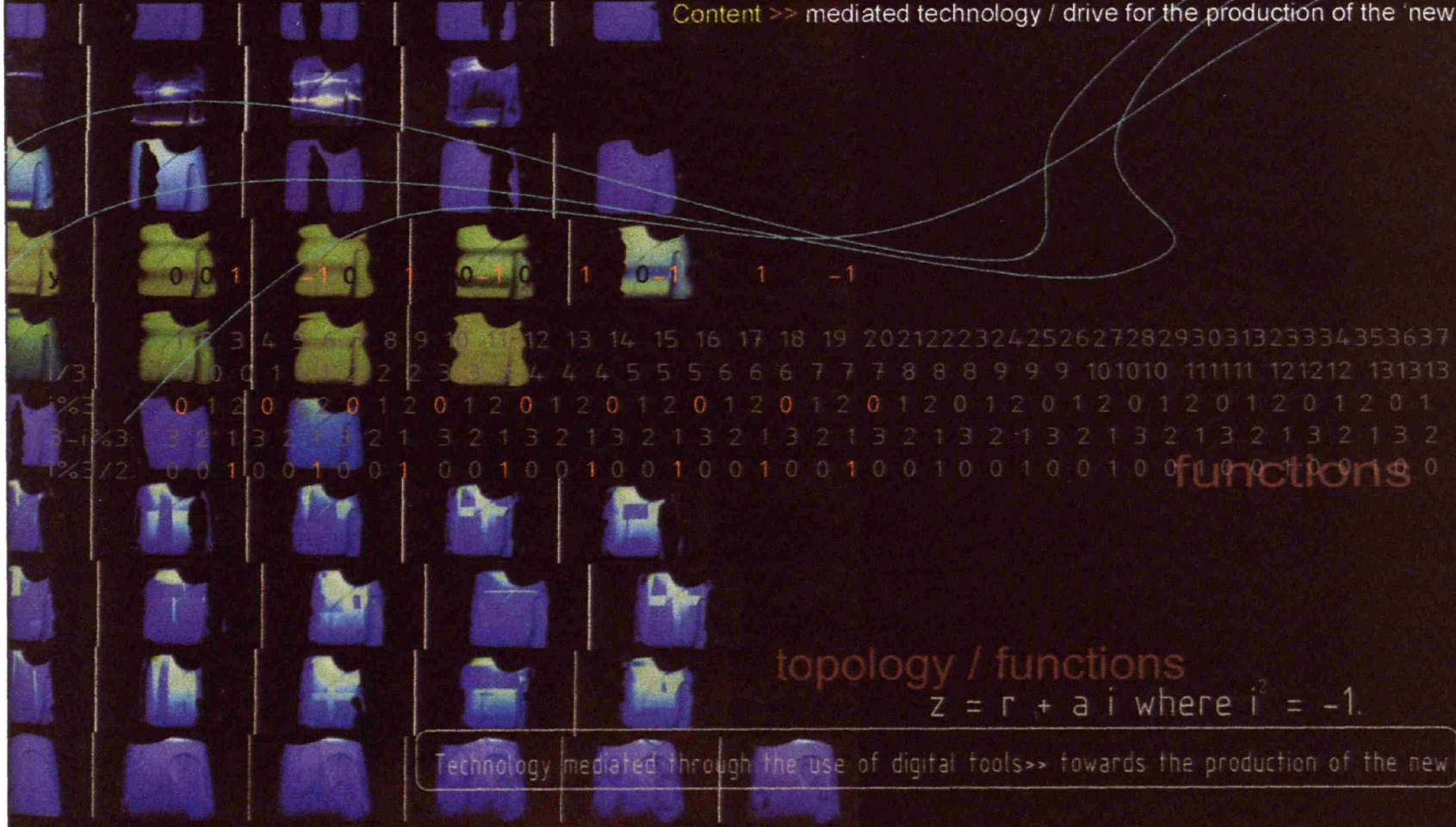
Equivalently, dross is a dormant or latent spatial condition that 'lies beneath space'; it is more of a spatial occurrence that when it appears it needs to be dealt with.

[26] Anthony Vidler, The Architectural Uncanny. Essays in the Modern Unhomely, (Cambridge, Massachusetts: MIT Press, 1992), p.11.

At the same time in a parallel world, the main stream of architectural discourse is intensely preoccupied with the production of the 'new' as an expression of emerging technologies, meaning mostly digital tools. Advances in technology are habitually mediated through the realm of the 'computer screen' and the use of software. The new realm of algorithmic processes is indeed revolutionary for the design praxis, since meaning is shifted from the production and design of finite objects to a set of rules and instructions that can have variable prospective results. This shift to an evolutionary and procedural comprehension of production is in fact novel, at least to my perception. Nevertheless, the products of such a discourse in most cases fail to come to contact with the complexity of 'real' contexts, which is not only derivative of the geometric attributes of a given site, but also of the programmatic and social aspects of an environment. One of the major downsides of the digital realm's 'polished' aesthetic is precisely its purity and its lack of chemical interaction with the impurity of everything else. Of course, the goal here is not to find a universal solution for the cosmos of the architectural discipline, but simply to wonder and experiment. Can there be an impure expression of digital media, one that encompasses the imperfections of displaced material, waste space; *dross*? If we have begun to exploit the software version of technological advancements, could we possibly consider the hardware side-effects of technology, in various of its



Content >> mediated technology / drive for the production of the 'new'



$0 \ 0 \ 1$ $-1 \ 0$ 1 $0 \ -1 \ 0$ 1 $0 \ -1$ 1 -1
 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
 1/3 0 0 1 2 2 3 3 4 4 4 5 5 5 6 6 6 7 7 7 8 8 8 9 9 9 10 10 10 11 11 11 12 12 12 13 13 13
 % 0 1 2 0 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1
 3-1%3 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2
 1%3/2 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0

functions

topology / functions
 $z = r + a i$ where $i^2 = -1$.

Technology mediated through the use of digital tools >> towards the production of the new

manifestations? With the risk of projecting uneducated futuristic guesses, we might have to consider alternative modes of production by engaging physically with obsolete matter and also by recycling meanings and contexts. We conceive of urban congestion as a figure of speech, but will it be as simple in the near future?

These inquiries neither insinuate the return to a 'craft-oriented design culture', nor negate the significance of the use of digital tools. "The momentary apprehension of remnants of cultural production is not a nostalgic enterprise" [27]. Rather than romanticizing about the return to outmoded endeavors, one could begin pondering of a *renegade post-praxis*, that encompasses not only the use and reuse of displaced material, but unfolds the imagination through the engagement with existing spatial information and material; a post-praxis though, which uses the potential of the newly launched digital media to transform and manipulate matter and information in ways that were not previously plausible. Again paraphrasing Donna Haraway, *dross praxis*, is not a blameless, environmentally sensitive operation; it "is about the power of survival, not on the basis of original innocence, but on the basis of seizing the tools to mark the world that has marked them as the other" [28].

[27] Elizabeth Burns Gamard, "We Play until Death Shuts the Door" in Michael Bell & Sze Tsung Leong (Eds), Slow Space (New York: The Monacelli Press, 1998), p.285.

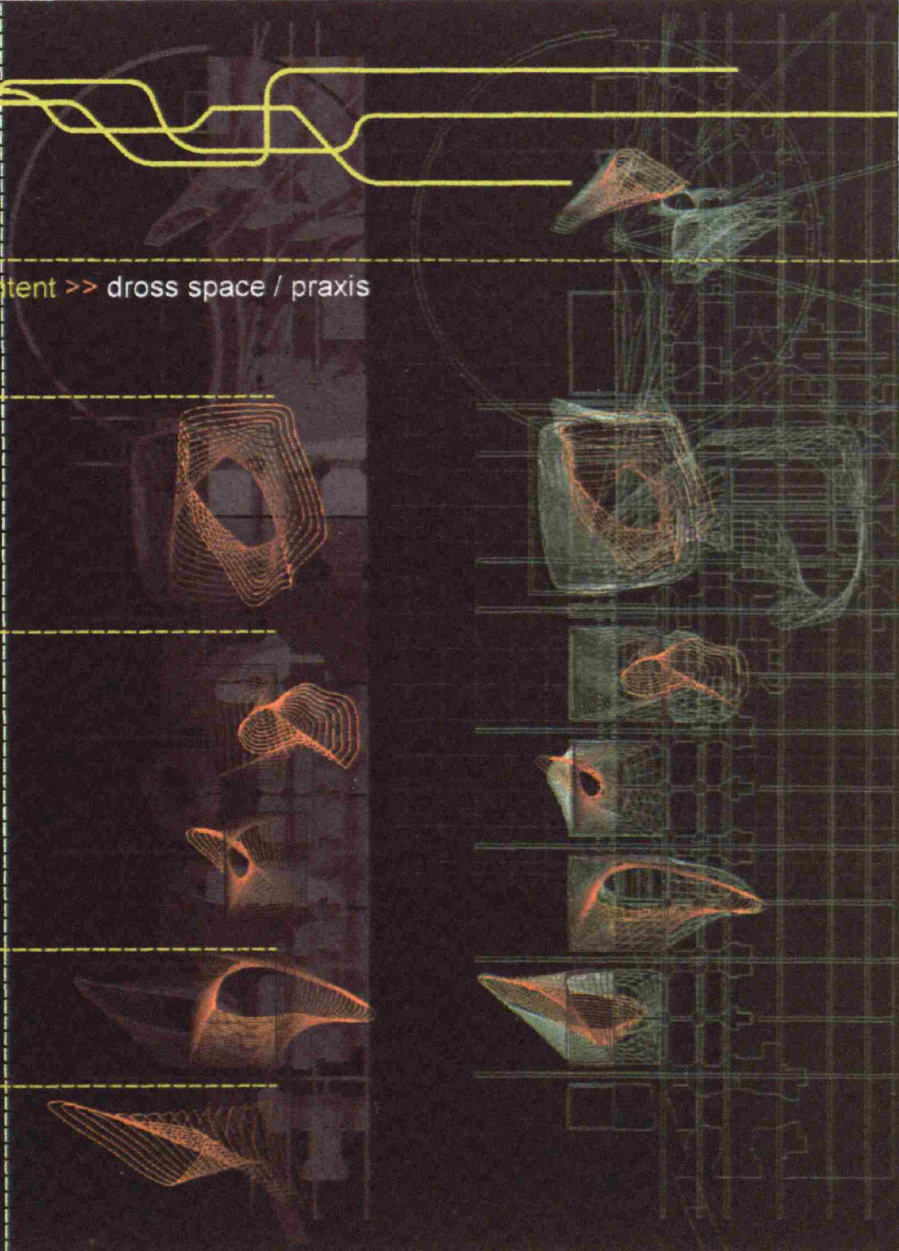
[28] Donna J. Haraway, Simians, Cyborgs and Women. The Reinvention of Nature (New York: Routledge, 1991), p.175.

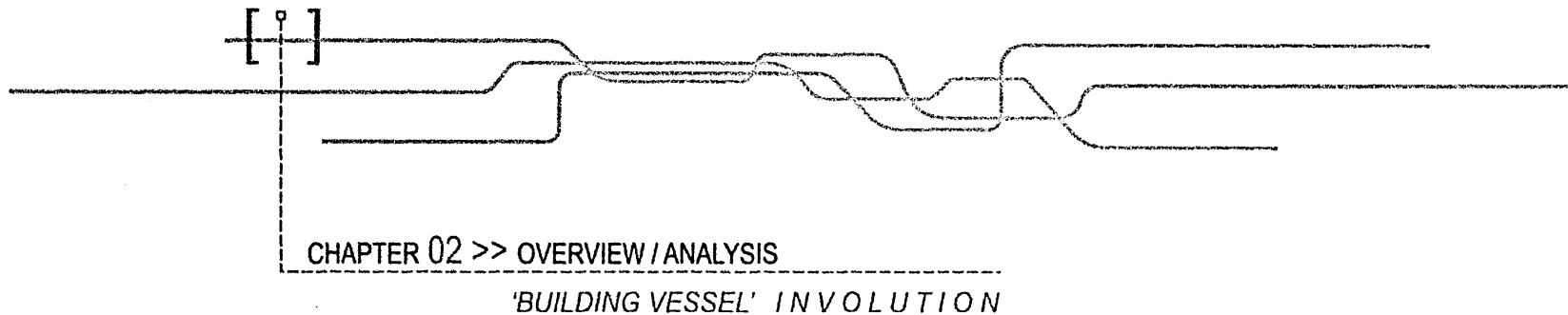
Dross praxis does not begin from scratch, but from the reality of an existing inoperative component, or a programmatically displaced space; therefore, *meaning* is inevitably shifted. It can no longer be located in the process of representing an abstract concept, but in the act of manipulating matter and bonding new functions to objects that have lost their previous, fixed identity. Instead of a *genesis* of meaning, there is a *regeneration* of meaning and identity.

technology as 'dross',

as a side effect of the everyday,
as friction
as impurity
as unpredictable, non-designed spaces
as density

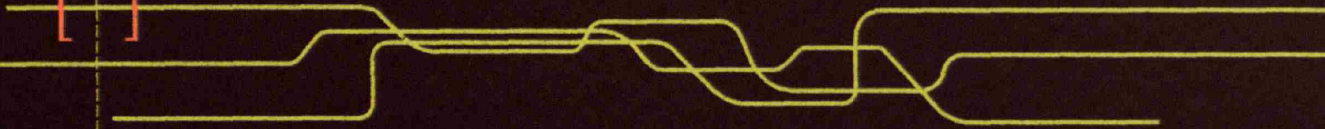
Content >> dross space / praxis





"... We think of Picasso's bicycle seat [Bull's Head] of 1944:

You remember that bull's head I exhibited recently? Out of handle bars and the bicycle seat I made a bull's head, which everybody recognized as a bull's head. Thus a *metamorphosis* was completed; and now I would like to see another metamorphosis take place in the opposite direction. Suppose my bull's head is thrown on the scrap heap. Perhaps some day a fellow will come along and say: 'Why there's something that would come in handy for the handle bars of my bicycle...' and so a double metamorphosis would have been achieved." [29]



Overview / Analysis >>

techno-junk_ an emerging city-born condition



By engaging a strategy of irony as a legitimate method of approaching phenomena, Colin Rowe & Fred Koetter assert that there is no social or constructed reality "that we have to accept in toto" [30], but a composite present realm consisted of fragments. A discourse of *collaging* fragments is ironic, because it resists utopia. It recognizes a "loss" in objects, buildings or urban domains that have misplaced their previous fixed identity and encompasses this condition as a generative potential. The significance of this citation, resides in its unique interpretation of meaning. Here, *meaning is not an inscribed, static quality, embedded in objects*. Conversely, it is a tacit, malleable status perpetually redefined, as the object is appropriated and reused, as it undergoes a metamorphosis. In this sense, the tactics of *reuse* is not solely an environmental strategy directed to the utopian idea of the world's salvation. When dealing with *meaning*, reuse "fuels a reality of change, motion, action" [31].

Louis Kahn had similar thoughts with Picasso, in imagining the demise of his built work and the poetic reuse of the occurring ruins as raw material for new structures. "Kahn imagined a time when his buildings would no longer be satisfying need... This metaphor of architecture as a post-functional pure ruin in effect represents the ultimate sublimation of obsolescence, of the difficulties of architecture under capitalism" [32].

[29] Alfred Barr, **Picasso: Fifty Years of his Art**, (New York: Published for the Museum of Modern Art by Arno Press, 1946), p.241.

[30] Colin Rowe & Fred. Koetter, **Collage City** (Cambridge, Massachusetts: MIT Press, 1978), p.149.

[31] Ibid.

[32] Daniel M. Abramson, "Obsolescence: Notes towards a History", **Praxis: Journal of Writing + Building 2003**, No.5 (Cambridge, MA: Praxis Publications, 2003), p.111.

2.1 >> OBSOLESCENCE; on the onset of a post-production era

Obsolescence is the condition of being antiquated, old fashioned, outmoded, or out of date. The obsolete item is not necessarily broken, worn out or otherwise dysfunctional, although these conditions may underscore the obsolescence. Rather, the item simply does not measure up to current needs or expectations.

Consequently, obsolescence is unrelated to either the physical deterioration or the operational dysfunction of an object. Rather, it stands as a mischievous condition, derivative of drastic changes in cultural desires that turns functional material into 'raw matter'. Obsolescence is a uniquely new phenomenon, generated at the onset of the twentieth century as an outcome of rapidly advancing industrialized modes of production. Daniel Abramson, in his attempt to outline a history of obsolescence in relationship to built space, refers to the accountant Joseph Klein who first attempted to analyze obsolescence in the Annual Convention of the National Association of Building Owners and Managers in 1922. Klein explained: "obsolescence, connotes sudden and uncertain displacements in values, due not to physical uselessness, but rather to decreased worth predicated on a comparison of the greater efficiency of new devices over old ones" [33].

[33] Joseph J. Klein, "Depreciation and Obsolescence", **Proceedings of the Annual Convention of the National Association of Building Owners and Managers** (Chicago 1922: 240).

The radical transformations of the Chicago downtown area have alarmed significantly the building owners and managers, back in 1922. Replacing an entire building, after a few years of useful life was not in their immediate agendas; this was a costly and excessively complex venture, looming into the building realm. Quoting again Abramson, he remarks that "the early twentieth-century discourse on obsolescence aimed in part to explain the unexpected demolition of a series of significant late nineteenth-century commercial structures. In New York, the sixteen-story Gillender Building at the prominent corner of Wall and Nassau streets came down in 1910 after a mere fourteen years of life. In Chicago, the Women's Christian Union Temple (1890-91, Burnham & Root) fell in 1926, the Tacoma building in 1929, the Marshall Field Wholesale Store in 1930, and the Home Insurance building (1884-85, W.B. Kenney) in 1931. Each of these major losses occasioned a study for the demolished building's obsolescence, published by the Chicago-based National Association of Building Owners and Managers (NABOM)" [34].

Escalating from an object, such a computer circuitboard, to the scale of a building complex, the manifestations of obsolescence shift significantly. One of the main differences lies in the "inability of the building to cease to be present and our incapacity to easily remove it from its context. Buildings, for reasons of their shear

[34] Daniel M. Abramson in his essay "*Obsolescence: Notes towards a History*", **Praxis**, No.5, p.107, outlines the data provided by the "Study Obsolescence in W.C.T.U Temple", NABOM 107 (October 1926): 43; Bailey, "Office Building Obsolescence"; Paul E. Holcombe, "Depreciation and Obsolescence in the Tacoma Building", NABOM 137 (June 1927) : 13-22; John Roberts & Paul E. Holcombe, "Historic Landmark Passes: Home Insurance Building, Chicago", **Skyscraper Management** 16/11 (November 1931): 14-17 and 16/12 (December 1931):13-16. In 1922 NABOM published its executive Earle Shultz's national study **The Effect of Obsolescence on the Useful and Profitable Life of Office Buildings**. See also generally The Bulletin, National Association of Building Owners and Managers, and **Skyscraper Management**.

[]

Overview / Analysis >> *obsolescence in the building realm*



3 April 1910

12 May 1910

09 June 1910

17 June 1910

size, material cache and need to enclose large volumes, are literally rooted in a site- a piece of land" [35]. And even today, the consequences of building obsolescence that most involve demolitions, are estimated as one of "the largest sources of pollution" [36]. Figures are indicative:

- The US EPA has estimated that the materials debris from building renovation and demolition comprise 25 to 30% of all waste produced in the US each year [37].
- The demolition of building structures produces enormous amounts of materials that in most countries results in a significant waste stream. In the U.S., demolition waste amounts to 92% of the total construction and demolition (C&D) waste stream of 136 million tons annually or about 125 million tons of demolition that is for the most part landfilled. In the Netherlands, C&D waste amounts to 15 million tons per year; however due to a high degree of environmental awareness and government regulation, over 80% of this waste stream is recycled, mostly into sub-base for roads [38].
- In Tokyo (1993) they demolish 12,339 sq.m. of buildings, and newly construct 62,861 sq.m. daily, while 455 of new housing units of new housing start every day [39].

[35] John E. Fernandez,
"Diversified Longevity: Orchestrated
Obsolescence for Intelligent Change"
in **Thresholds No.24**;

Reproduction and Production

(Cambridge, Massachusetts: M.I.T
Department of Architecture
Publication, 2002), p.14.

[36] McCarthy Battle, "Multi-Source
Synthesis. Embodied Energy",
Architectural Design (AD), Vol.66,
No.11/12, 1996, p.III.

[37] Guy Bradley & Shell Scott
(2002). "Design for Deconstruction
and Materials Reuse" in
[http://www.deconstructioninstitute.co
m/download.php?dow_ID=18](http://www.deconstructioninstitute.com/download.php?dow_ID=18), p.1.

Partially, the significance of these numbers and percentages lies beneath their quantitative value; it lies in the absence of methods and techniques to handle and manipulate materials, objects or buildings that have been unexpectedly turned into waste, *dross*.

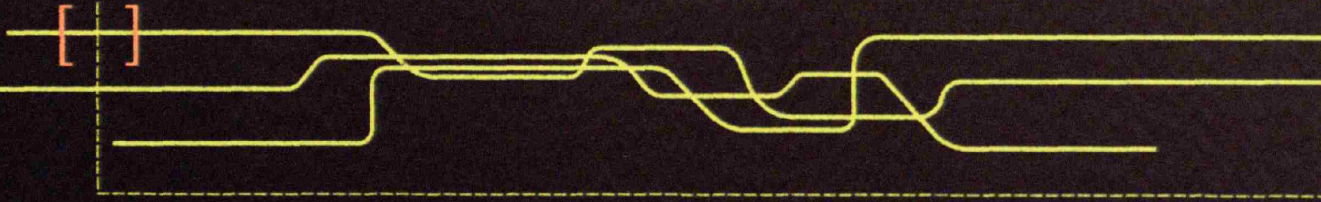
Objects and materials are immediately discarded and dismissed; Building components in the size of rooms are suspended from function, floating purposely in the voids of urban fabrics or they are landfilled as they are; Buildings are most commonly demolished or abandoned, unless otherwise indicated by historians. In fact, we have very few cunning strategies to manipulate obsolete matter; to regenerate it and use it as a territory for creative endeavors or a scaffold of new meaning.

[For reasons of classification, obsolete matter will be divided from here and on in three scales: the scales of an **object**, a **room** and a **building**. The first scale refers to a utility object such as a computer circuitboard, an electrical appliance, a bicycle helmet etc. The intermediate scale of a room refers to a functional object either building excrement or not, which can accommodate the human body in some manner. Examples of this category are defunct oil tanks, containers, aircrafts, car parts, water tanks, tubes etc. Finally, the third scale refers to unused parts of buildings, derelict buildings or building areas].

[38] Kibert, J.Charles.

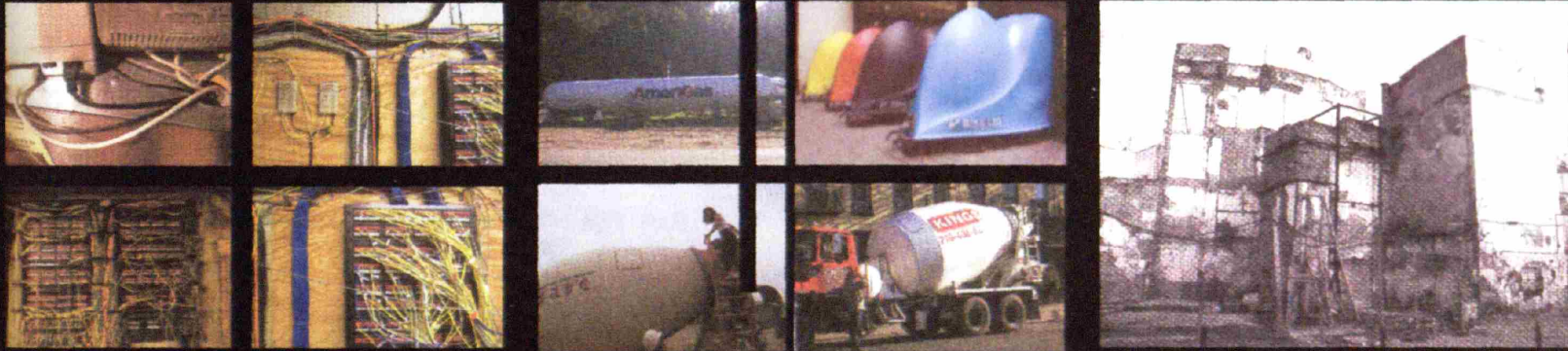
"Deconstruction as an Essential Component of Sustainable Construction", **Proceedings: Strategies for a Sustainable Built Environment** (Pretoria, August 2000), p.1.

[39] Botond Bogner, *"The Japanese Example – The Other End of Architecture"* in Andreas Papadakis (Ed.) **New Architecture (NA) No.2** (Windsor, UK: Andreas Papadakis Publisher, 1998), p.50.



emergence of *'indestructible' residues* in diverse scales of matter

the technological evolution that has been producing these novel tools, such as the computer, has produced at the same time an immense quantity of 'techno-garbage', almost impossible to dispose of. By this I mean, that technological advancements are not disconnected from their material consequences/ The significantly different lifetime of the two *strata* is the cause for an erosion of the outer building shell that cannot adapt to the change, taking place in it or around it. The *unmappable*, urban condition of this "floating matter" in the city has been yet unexplored by contemporary architecture.



object

room

building

A major factor, for which obsolete matter is left 'untouched' in various scales of reference, is the waste of energy and uneasiness that its reconfiguration necessitates. The operations that can potentially be performed upon dross matter after its useful life entail difficulties and constraints that make design a frustrating task. On the other hand, the *embodied energy* that dross matter embeds is momentous. Let me note here that by the term 'dross matter', I identify the *material* that is not only incidentally displaced from its previous identity, but is also nondisposable due to its intricate material constitution. It is also useful at this point to cite the definition of embodied energy of materials, which refers to the energy required to acquire a material from nature, convert it into usable items for the manufacturing industry (processing), manufacture it into a functional and commercial component (manufacturing) and transport it to its destination. The materials recovered from derelict buildings, defunct apparatuses and building or transportation components are estimated to carry eminent amounts of embodied energy. Moreover and beyond the pragmatics involved in advocating the instigation of *post-production* strategies, *dross matter* is accompanied with additional stimulating and bizzare features that could yield the imagination; such features are the 'memory' obsolete matter carries, its elaborate manufactured form, and its complex material synthesis.

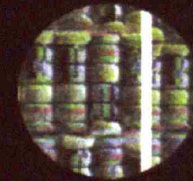


embodied energy

mass produced industrialized repetitive processes

Comparative energy requirements of a selection of building materials

Very high energy	(GJ /tonne)
Aluminum	200-500
Plastics	50-200
Copper	100+
Stainless Steel	100+
High Energy	
Steel	300-600
Lead, Zinc	25+
Glass	12-25
Plasterboard	8-10
Medium energy	
Lime	3-5
Clay Bricks and Tiles	2-7
Gypsum Plaster	1-4
Concrete	0.8-3.5
Sand-Lime bricks	0.8-1.2
Timber	0.1-5
Low energy	
Sand, aggregate	<0.5
Flyash, RHA, Volcanic Ash	<0.5
Soil	<0.5



Dennis Kaspori in his essay on 'Open-Source Architecture' [40] refers to Nicolas Bourriard, who engages in his writings with an emerging cultural practice that he entitles '*post-production*'. Bourriard writes: "In the face of the economic abstraction that makes daily life unreal, or an absolute weapon of techno-market power, artists reactivate forms by inhabiting them, pirating private property and copyrights, brands and products, museum-bound forms and signatures. If the downloading of forms (these samplings and remakes) represents important concerns today, it is because these forms urge us to consider global culture as a toolbox, an open narrative space rather than a univocal narrative and a product line... Within this perspective, the artist is a kind of hacker, changing existing social and economic systems by entering them and manipulating them: 'In this way, social objects, from habits to institutions through the most banal structures, are pulled from their inertia. By slipping into the functional universe, art revives these objects or reveals their absurdity" [41].

[40] Dennis Kaspori, "A
*Communism of ideas: Towards an
open-source architectural practice*" in
Archis, No.3, 2003.

[41] Nicolas Bourriard,
**Postproduction, Culture as
Screenplay: How Art Reprograms
The World** (New York :Lukas &
Sternberg, 2002), p.67, 29.

For a considerably long period of time, buildings have been *hosts* of change. Besides being the final product of an architectural practice, a building can be viewed like a 'vessel', where everything inside it or around it is in constant flux. Frank Duffy's remark that "there is no such thing as a building" [43] is significant towards an understanding of the inherent incompleteness of a built entity. While the predominant preoccupation of contemporary architectural investigations is how to incorporate meaning in the process of formation of a design project, it is an indisputable fact, that after the completion –manufacturing– of any project, everything –along with its meaning– is radically shifted.

The hypothesis delineated here is the following: as we address buildings, in the creative process, as closed systems –fixed entities, meaning evades us. It departs to unknown destinations. In his attempt to articulate the idea of a building as a spatial 'vessel' receptive of variable flows in time, Steven Groak explains that a great portion of the difficulty to characterize buildings as 'vessels' is derivative from our perception of buildings as closed systems. He notes that "first of all, we should distinguish three kinds of physical systems:

- Open Systems, which allow flow and energy of matter to and from their domains.
- Closed Systems, which retain all matter but allow flows of energy across their boundaries.
- Isolated Systems, which have no flows of energy or matter across their boundaries.

Building systems have too often been considered as closed or isolated. This has led us to treat their developments as if they could be organized without reference to the wider world... We may have to give much more attention to the possibility that buildings –as systems– comprise many overlapping systems, each being more than the sum of its parts.

In the most general formulation, taking buildings and their surroundings as open systems, we can describe buildings as affected by, receiving, filtering, storing, processing, dispatching, repelling or discarding the following physical entities: People, machines (vehicles, maintenance etc.), information and communications (tv, telecoms etc), electromagnetic energy (light, electricity, radiant heat etc.), kinetic energy and forces (wind, external noise, earthquakes etc.), materials (gases, liquids, solids etc.), mixtures of materials (sewage, chemical contaminants etc.)” [44].

[43] Stewart Brand in his book, **How Buildings Learn: What happens after They’ re Built**, (New York: Viking, Penguin Books, 1994) refers to Frank Duffy’s statement in Frank Duffy, “Measuring Building Performance”, **Facilities**, May 1990, p.17.

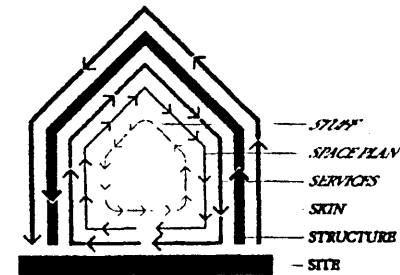
[44] Steven Groak, **The Idea of Building. Thought and Action in the Design and Production of Buildings** (London: E& FN Spon, 1992), p.21, 22.

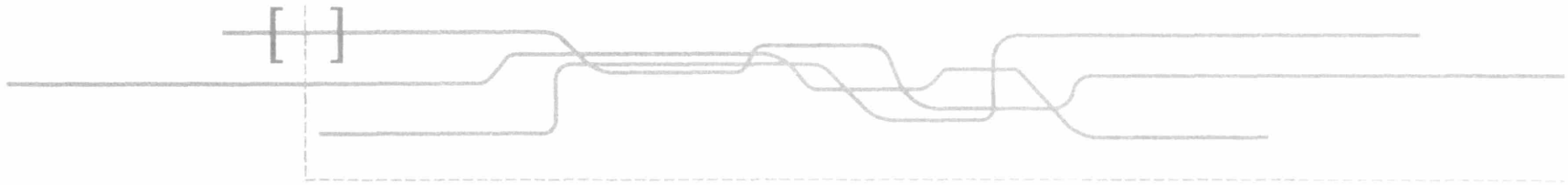
The perception of buildings as open systems has resulted in the development of a discourse according to which built entities are consisted of variable functional layers, each with a different lifetime. The discrepancy of the layers' lifetimes affects the entirety of the building, which is *eroded from the inside*; each moment a particular layer, such as service pipes, has to be replaced by a newer version, erosion comes about. This kind of '*surgical operation*' that occurs several times throughout the lifetime of a building is what Stewart Brand refers to as 'shearing layers'. He notes that "because of the different rates of change of its components, a building is always tearing itself apart... A building properly conceived is several layers of longevity of built components" [45]. To begin his analysis, Brand expands Frank Duffy's previous scheme of the "Four S's" - which are Shell, Services, Scenery, and Set to "Six S's" - Stuff, Space Plan, Services, Skin, Structure and Site [figure 6].

The roots however of a cognitive approach targeting a response to issues of adaptability and change can be located in the 1960's. With the integration of new technologies and service lines in built artifacts, buildings were expected to face many more changes other than their physical deterioration. "The discrepancy between physical deterioration and functional obsolescence -i.e, between potential life span

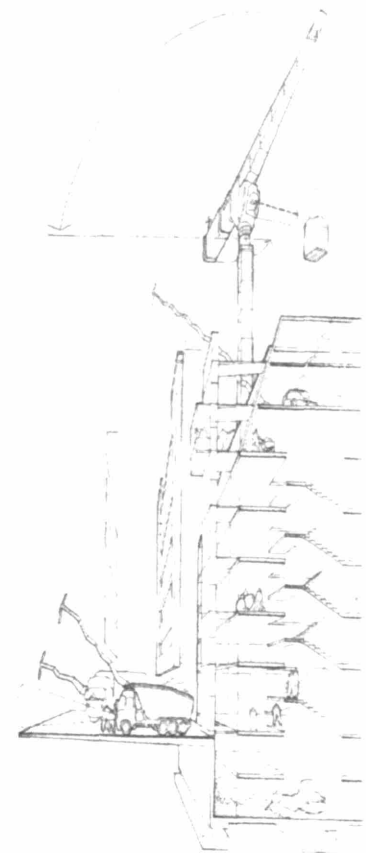
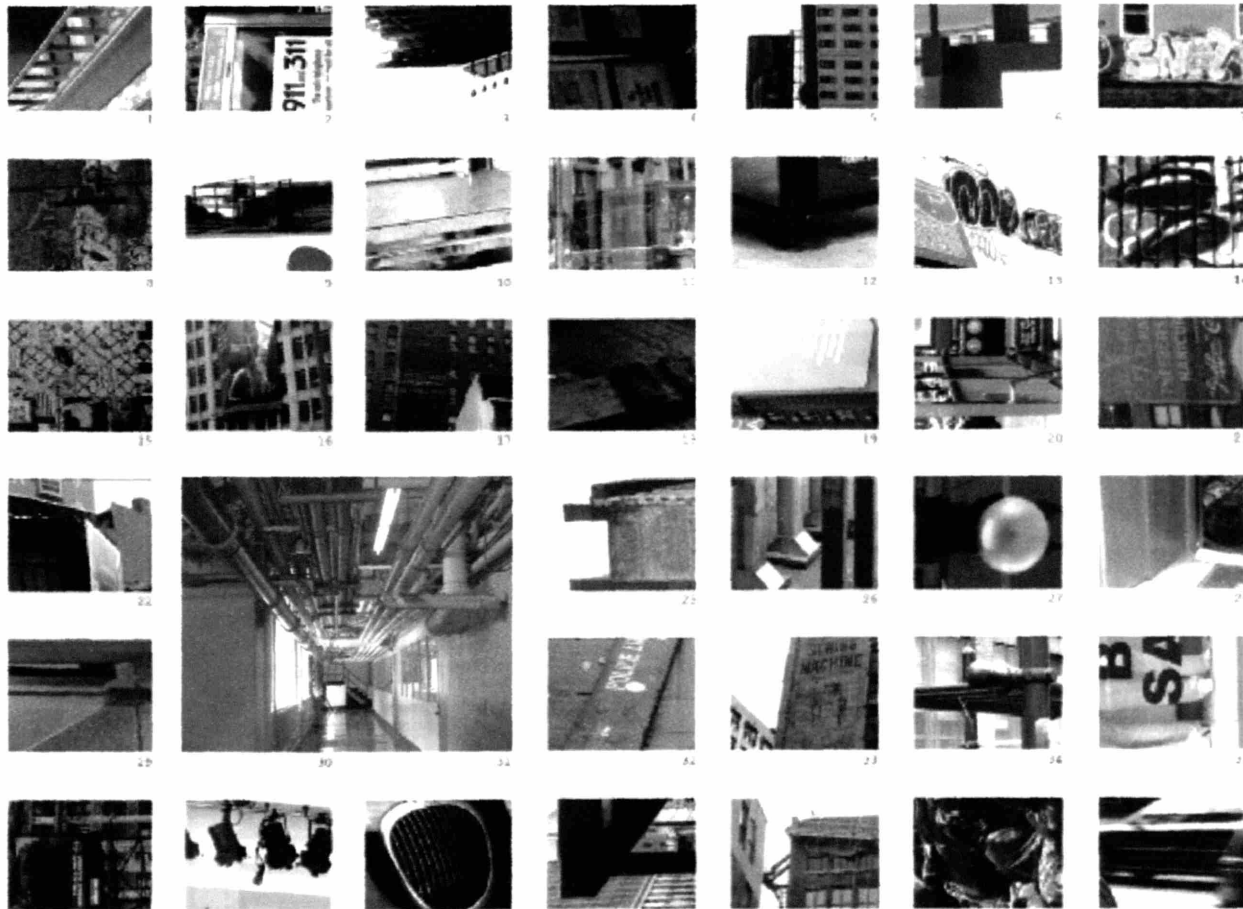
[45] Stewart Brand in his book, **How Buildings Learn: What happens after They' re Built**, (New York: Viking, Penguin Books, 1994), p.13.

Figure 6 >> The 'Six S's' diagram for shearing building layers by Stewart Brand





Overview / Analysis >> Discrepancy in lifespan of variable building parts

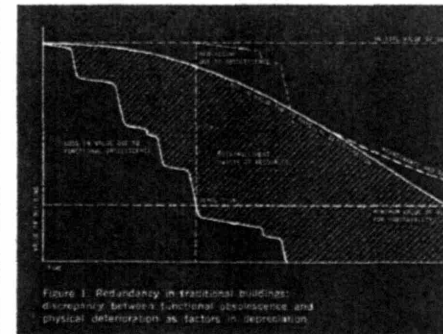


of structure and period of functional value- has caused excessively high dwelling costs over an ever shorter product life- costs which constitute over- investment... In previous centuries, obsolescence caused no problems for architects, since technological progress was slow and physical deterioration was almost the only case of depreciation in buildings. But today (referring to 1971) , functional obsolescence is the main factor in the decline of building value [46]". [Figure 7]

Currently, analysts are still preoccupied with the phenomenon of shearing building layers mostly due to the intricacies involved in the deconstruction of buildings and the consequent economic and material losses. Macozoma annotates an emerging interest in the 'layered approach' due to the potential of retrieving gradually building materials as a building reaches its obliteration. He mentions that "the theory of building layers is an old approach to building design that has found renewed interest in support of building disassembly to extend the functional lifetime lifespan of buildings and simplify the building modification process. In his description of the theory of layers, Crowther argues that a building is incorrectly referred to in singular i.e. "a building" because of a misconception resulting from the reading of a building in a limited timeframe. He goes on to say that no single building remains in its initial 'whole' state of construction for more than a few years or a couple of

[46] Helmut C. Schulitz, "Structure for Change and Growth", **Architectural Forum**, Vol. 134, No. 2, (New York: Whitney Publications, March 1971), p.61.

Figure 7 >> Diagram by Helmut C. Schulitz estimating the difference between physical deterioration and functional obsolescence.



decades. The building is continually changed by activities such as remodeling, repair, expansions and maintenance" [47].

The main reason that the theory of 'building layers' is of reoccurring interest to analysts of building technology is a financial criterion; it is a complicated mission to segregate a layer from the building shell and its paraphernalia, since all layers are densely compacted into an entirety. Yet, in short periods of time such separations are necessary. As Duffy remarks, services or infrastructure, "wears out or obsolesces every 7 to 15 years" [48]. If only this process of slippage would have been facilitated, not only the economic benefits would have been notable, but also material losses would diminish [Figure 8].

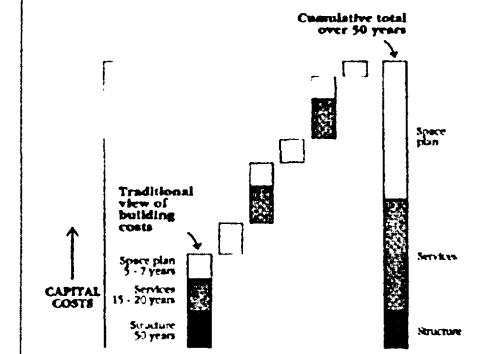
Nevertheless, throughout the prism of this technical discourse, the idea of the building as a core entity hosting variable layers and components remains an exclusive concern. The attempts to respond through design to these issues are focused primarily on rendering the building capable of adapting to erratic circumstances and disengaging easier its subsystems. The inquiry of what happens to the 'excrements' or what happens in occasions when adaptability is not an option is absent.

[47] Dennis S. Macozoma, "Understanding the Concept of Flexibility in Design for Deconstruction" in **Design for Deconstruction and Materials Reuse CIB Publication 272: Proceedings of the CIB Task Group 39 – Deconstruction Meeting**, Edited by Abdol R. Chini and Frank Schultmann, (Karlsruhe, Germany: April 2002), p.4. Macozoma also refers to Crowther P, "Developing an Inclusive Model for Design for Deconstruction", Queensland University of Technology, Australia, in **Proceedings of the CIB Task Group 39 Meeting** (Wellington, New Zealand: April 2001).

[48] Frank Duffy's "Four S's" scheme in Stewart Brand in his book, **How Buildings Learn: What happens after They' re Built**, (New York: Viking, Penguin Books, 1994), p.13.

Buildings are "vessels" of a constant flow in time and space, while everything else is on the move. Information space, materialized in objects such as billboards, labels, signs, booths etc. are also occasional attachments to buildings. Where do all these objects go after their short lives? What is the meaning of a machine that doesn't operate anymore? Could we possibly eliminate all of these objects and never bring this issue up again? And even if we did, would it be worth it, if we could use them in other ways to provide other new services for people that are traveling around the city constantly, just like these objects. They have similar itineraries of wandering endlessly in the urban fabric. Could we possibly explore an alternative architectural practice that recognizes the fluctuating, pulsing and ever changing nature of meaning, which cannot be resolutely engrafted in objects?

Figure 8 >> DEGW from Francis Dyff & Alex Henney, **The Changing City** (London: Bullstrode, 1989), p.61. On this diagram Bran explains that "over fifty years, the changes within a building cost three times more than the original building. Frank Duffy explains the diagram: "Add up what happens when capital is invested over a fifty-year period: the structure expenditure is overwhelmed by the cumulative financial consequences of three generations of services and ten generations of space plan changes... It proves that architecture is actually of very little significance".



Twentieth century architecture has attempted to respond the subject of the 'building vessel's' involution through the development of what one would call *open building approaches*. An *open building approach* can be briefly defined as the conceptualization of a built artifact that is *receptive* and can accommodate change in time. This idea has been examined in two main prisms in the design of buildings; either by designing a building in such a manner that it can itself change form to accommodate changing needs or design a building that embeds its own system of disengagement, meaning a capacity to handle its demise. I will call the first approach the 'plug-in' or 'tool-kit' approach, because most of the design projects that fall into this category are conceived as systems comprised of various interchanging parts that can be configured and reconfigured in various ways. For the second approach, I will use an existing term 'design for deconstruction', that is used to characterize approaches geared towards the effective disassembly of a building, in order to retain and reuse its materials.

The seeds for the former stream of thought can be located in the modern movement. At the inception of the twentieth century, issues of change in spatial terms became a cognitive social aim, as urban centers were growing rapidly, demographic changes intensely affected the built environment and new technologies of mass production and prefabrication were already available. Le Corbusier and Gropius advocated in the beginning of the 20th century, that standardization and technologies from other industries with fast assemblies should be transferred to architecture in order to address the housing problem. In 1958, Yona Friedman proposed in his articles for a 'mobile architecture', "a space capable of mutation" [49] according to society's changing needs. In parallel, the CIAM X International architectural conference in Dubrovnik (1957) raised issues of mobility, interconnections and communication, which were not previously discussed until that time. The GEAM -Groupe d'Etudes d' Architecture Mobile- has declared that "existing conditions and those still being put up today are too rigid and difficult to adapt to life as it is lived" [50], addressing the issue of a flexible - adaptable way of 'building', that has preoccupied intensely the architectural practice and the construction industry since then. The proposed design scheme of the GEAM group has outlined the following principles [51]:

[49] Yona Friedman, "*L'architecture Mobile*", Collection "M.O" :Mutations, Orientations (Edition CASTERMAN/ Poche, 1970). Ulrich Konrads (Ed.), Programs and Manifestoes on the 20th Century Architecture. (Cambridge, Massachusetts: MIT Press, 1964), p.167-168.

[50] Ulrich Konrads (Ed.), Programs and Manifestoes on the 20th Century Architecture, (Cambridge, Massachusetts: MIT Press, 1964), p.167-168.

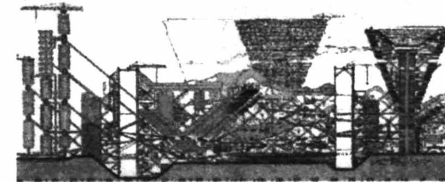
[51] Ibid.

- Development of variable and interchangeable elements of construction, as for example: (a) exterior walls (b) interior walls (c) movable floors and ceilings.
- Development of easily altered means of supplying buildings with power and water and the disposal of garbage.
- Development of larger towns-creating spatial units, such as: (a) interchangeable containers (traveling, flying, floating) (b) buildings on rafts (c) buildings bridging over spaces (d) air-conditioned open spaces.

Probably though the most astonishing precedent of the 20th century for this approach is the 'Plug-In City' by the group Archigram [figure 9]. The group's proposals were revolutionizing the architectural crowds of that time by launching the 'ephemeral' and the 'fleeting' as part of the building act. Archigram's proposals were intentionally humorous, provocative and 'hyper-technologized', emphasizing a neo-optimism in architecture and the merits of the emerging and complex power relationships in pop-culture. Peter Cook best describes the Plug-In City as "skeletal metal armatures ready to receive air-transported, crane-mounted living pods that could be relocated and reconfigured at the whim of their inhabitants." Definition: The Plug-in City is set up by applying a large-scale network-structure, containing access ways and essential services, to any terrain. Into this network are placed units, which

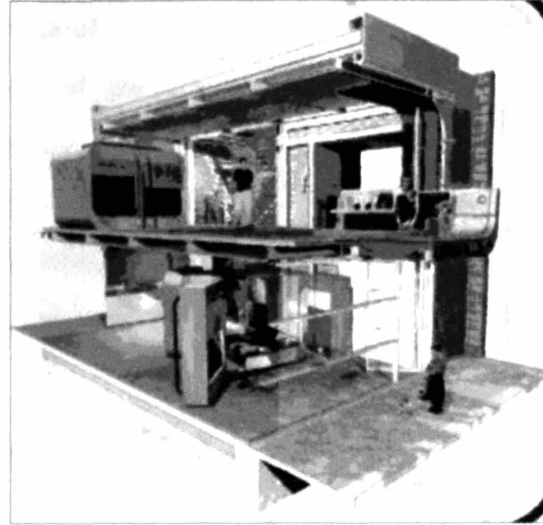
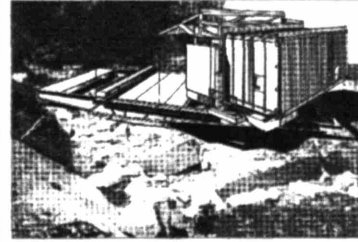
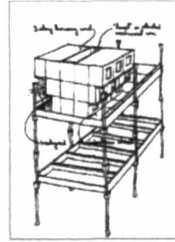
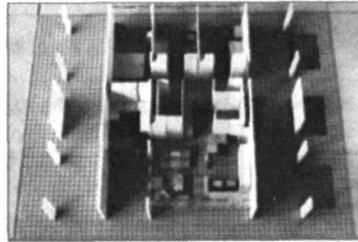
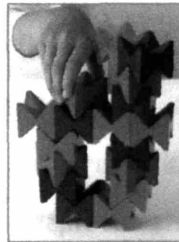
Figure 9 >>

Plug-in City, Peter Cook, 1964



[]

Open building approaches



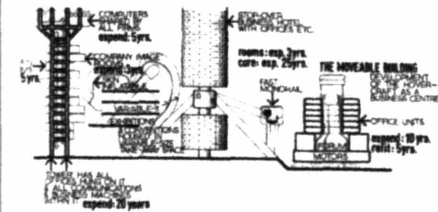
cater for all needs. These units are planned for obsolescence. The units are served and maneuvered by means of cranes operating from a railway at the apex of the structure. The interior contains several electronic and machine installations intended to replace present-day work operations" [52] [figure 10].

The following decade, the 'Metabolists' carried on the same tradition of plug-in systems, through a significantly different cultural understanding of adaptability. Many architects such as Cedric Price, and especially during the past decade through the notable enhancement of prefabrication systems and transportable structures, have adapted the idea of adaptable structures. Nonetheless, although such examples establish a new paradigm for adaptable structures and disclose a stream of thought for *open* time-based operations, the existence of a definitive matrix of possible combinations prescribes to a discernible degree the *possible futures* of the structure. In fact, although the initial intention was to create open-receptive-systems, the reality was closer to systems *closed within their own internal logic of change*, through a finite set of possible reconfigurations as in the logic of a tool-kit.

If the first approach has failed to exceed latent modernist ideologies, the second approach of 'design for deconstruction' celebrates optimization and functional efficiency to a greater extent. The definition implies design for remanufacturing and

[52] Peter Cook, "Plug-in City" in **VV.AA.**, Archigram, Birkhauser, Boston 1972.

Figure 10 >>
 Plug-in City detail, Peter Cook, 1964.



recycling with the aims of embodied energy maintenance and the minimization of energy that is needed to process used materials for further use; Design for deconstruction targets the preservation of embodied material energy and the reduction of input for new embodied energy. "Design for deconstruction is an emerging concept that borrows from the fields of design for disassembly, reuse, remanufacturing and recycling in the consumer products industries. Its overall goal is to reduce pollution impacts and increase resource and economic efficiency in the adaptation and eventual removal of buildings, and recovery of components and materials for reuse, re-manufacturing and recycling... The efficiency of the deconstruction affects the direct costs of labor and equipment and also affects the time costs of a project where building removals are integral to new construction on the same site" [53].

Beyond the rational arguments of cost efficiency and material recovery of the 'Design for Deconstruction' approach, the advocates of the movement are taken by a sermon pronouncing a new 'ethos' and the reduction of design into a set of instructions for the future. Characteristic of this point is the quote by Bradley and Shell: "These designers must understand how their decisions impact disassembly and reuse. The choices and specific uses of materials, the connections between individual

[53] Guy Bradley & Shell Scott
(2002). "Design for Deconstruction
and Materials Reuse" in
http://www.deconstructioninstitute.com/download.php?dow_ID=18, p.3.

[54] Ibid.

materials or components, the inter-relationships of building elements, the designs of spaces and whole-building structure, and even the ability to “read” the building are within the designer’s control [54]”.

Both approaches could be categorized under the largest umbrella of a modernist discourse, due to their offering of immediate responses to “the specific anxieties of real estate capital” [55] and “threats of profitability” [56]. Guided by the ideals of profit and responsibility, architects attempted to seek solutions for every possible emerging condition and embed in the architectural artifact as many mechanisms as necessary in order for it to respond more efficiently. Nevertheless, “despite architects’ efforts of proselytizing open systems in the 60s, the *open ideal* remained a pipe dream; the pragmatic emphasis in reality was on heavy prefabricated closed systems used mainly for the routine building tower blocks, which reinforced the fixed segmented house plans” [57].

At the same time, one needs to question critically the base logic of the *open operation* in architecture. Elaborating on this argument, the *plug-in* approach as well as the *design for deconstruction* approach can only develop a system up to a certain extent of ‘openness’; up to the point that everything goes precisely as

[55] Abramson, Daniel M.,
“*Obsolescence: Notes towards a History*”, Praxis: Journal of Writing + Building 2003, No.5
(Cambridge, MA: Praxis Publications, 2003), p.110.

[56] Ibid.

[57] Miles Glendinning & Stefan Muthesius, “*Continuity and Change. Social Housing Types in Postwar Reconstruction Era*”, Architectural Design (A.D), Vol.70, No.4, 2000, p.32.

planned. Such operations are pure linear plans, but in real life things derail; incidences occur; systems erode. Then one can wonder, can the by-products of a system's erosion be prolific sites of exploration, either these are objects or spaces? As Dennis Gabor claimed, "the future cannot be predicted, but it can be invented" [58].

2.4

>> *The discourse of the residual techno-excrement*

"The picture presented here -of various forms of flows and reservoirs- seeks to show that the environment of buildings and building processes may be more complex than has sometimes been proposed, *where that complexity is built up from simple systems...* Many of the points raised here arise because of the totality of systems -and nesting, overlapping and conflicting systems- within buildings... The assumption of some absolute hierarchy of systems in buildings appears unsatisfactory, except as a pragmatic strategy, because of the loss of the perception of complexity" [59].

As mentioned in the citation, the complexity that occurs in a building entity is not a summation of complex parts but results from their interrelations. Even by segregating a building into functional layers, each of which is able to disengage and

[58] Dennis Gabor, Inventing the Future (New York: Alfred A. Knopf, 1963).

[59] Steven Groak, The Idea of Building. Thought and Action in the Design and Production of Buildings (London: E& FN Spon, 1992), p.33, 34.

relocate, involution still occurs. Residual misused parts and spaces are most likely to arise, despite the quality of a plan of actions. This simple fact puts forward the necessity of a discourse that acknowledges and the intrinsic fractures and occurring incidents of planning and embraces the generative potential of *excrements* and *residual space*. Such a discourse stands on a fundamentally different ideological grounding than the aforementioned open building approaches, since it recognizes a world of inherent incompleteness, a "fractured world" [60]. Along these lines of thought, Robert Smithson creates his art works "made of asphalt, glue, cement, melted tar –poured out on the earth in a quest to transform one state into another" [61]. According to Smithson, "the mind and the earth are in a constant state of erosion. Matter itself is already an entropic landscape... Smithson demands 'de-archituration'" [62].

In light of Reinhold Martin's article on the notion of organicism [63] –as a coherent system of unified interconnected parts--, the practice of reusing building excrements and residual spaces presumably works with what he considers as the counterpart. It is based on the premise that *residues of a system's internal erosion* can be prolific sites of exploration. These remaining building parts, are not anymore

[60] Robert Smithson, Le Paysage Entropique 1960-1973 (Paris, RMN; Brussels, Palais des Beaux – Arts; Marseilles, Musees de Marseille, 1944), p.192

[61] Marie-Ange Brayer, "On the Surface of the Earth" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003), p.17.

[62] Ibid, p.16,17.

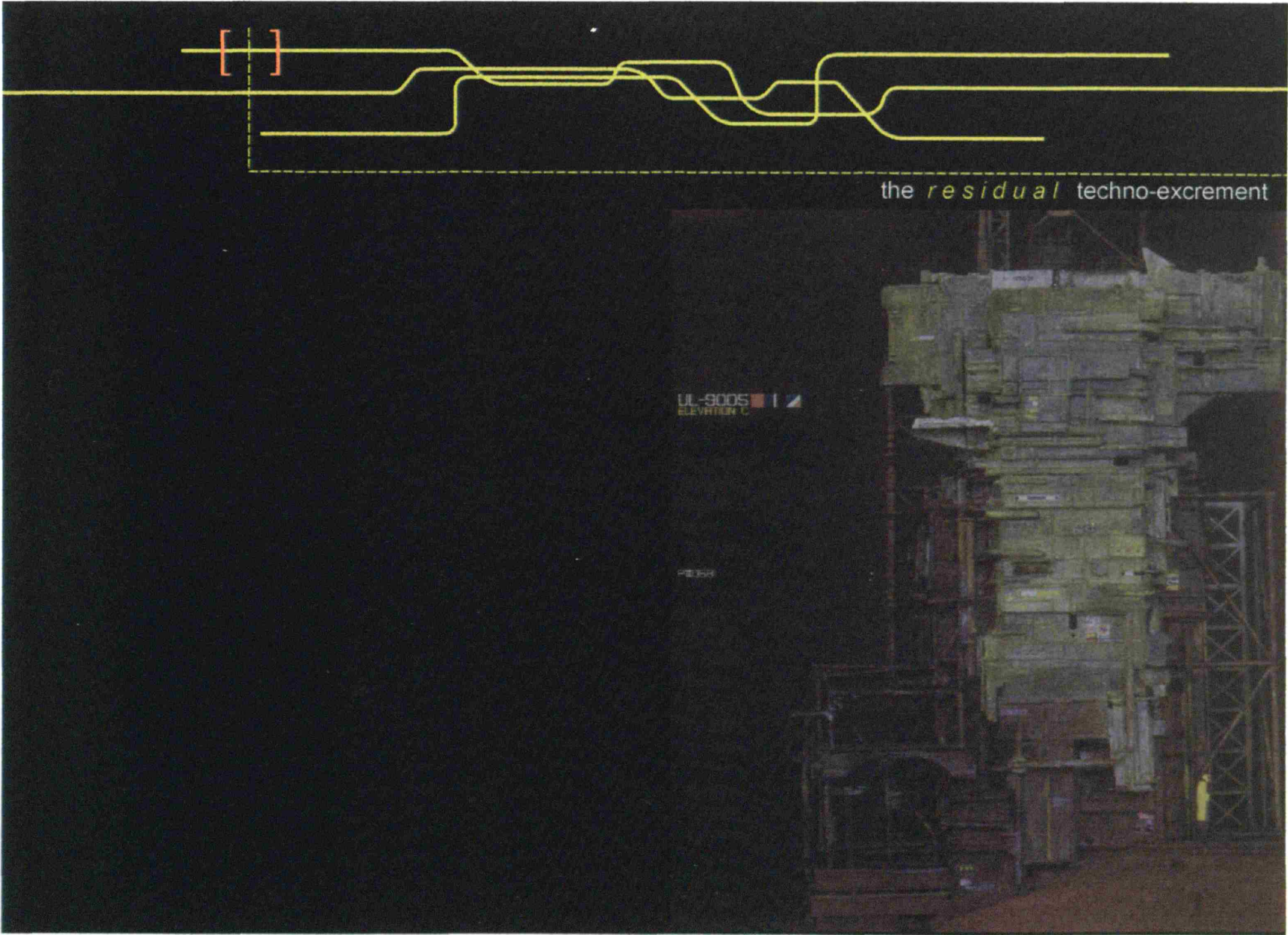
[63] Reinhold Martin, "Organicism's Other" in Grey Room 04, (Cambridge, MA: MIT Press, Summer 2001), p.40.

[]

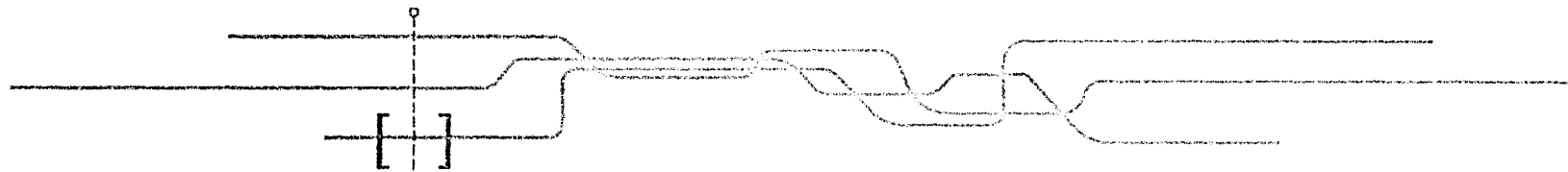
the *residual* techno-excrement

UL-9005 ELEVATION C

PRO-300



integrated in the building system's organism, but have been displaced from its context, eroding it from the "inside". This disclosure sheds emphasis on the inherent incoherence and open nature of creative activity. A post-*praxis*, which seeks meaning in the apocalypse of latent potential, in objects that have lost their previous identity, deals with a reality of fragments, a reality that has been "un-organicized".



CHAPTER 03 >> OVERVIEW / ANALYSIS

EXISTING REUSE STRATEGIES AND THE 'FUZZ OF GREEN TACTICS'

3.1 >> Documentation of Reuse Strategies

If one is to develop strategies of engaging with *obsolete matter* as a prolific site for design explorations, it would be useful to go through a process of documentation of existing methodologies of reuse that are currently available.

The established agenda for this discipline is circumscribed by what the environmentalists' motto -the 3Rs, referring to the words, *reduce, reuse, and recycle*. The first term -reduce- entails strategies targeted towards the minimization of harmful materials, such as toxic materials and non-recyclable ones. This stage of the '3Rs' procedural methodology is based on *a reduction logic*, meaning the diminishment of material volumes that would need to be reused or

recycled; by decreasing the amounts of materials that would have to pass necessarily in the second stage, the overall procedure would be facilitated. The second term –reuse– engages with a process of imbuing a new function to an object that has reached the end of its useful life. This stage does not entail *manipulation* or *processing* of the material that has been rendered obsolete, besides minor operations such as cleansing and polishing. Other than that, the necessary actions remain merely in the realm of signification and labeling of new identities. Finally, the third term –recycle– employs a great deal of material processing. It involves primarily the segregation of materials in material classes, such as polymers, wood, metal etc., and then in their elemental constituents. Subsequently, each material is pulverized and melted down into amorphous raw matter in order to produce new material of the same kind.

In summation, the three stages constitute a coherent cycle, meaning an integral chain of reactions that work sequentially. Each step comprises grounding for the next operation to operate successfully. This metabolic loop aiming at the diminishment of waste is usually referred to as a methodology for 'eco-efficiency'.

The catch of the '3Rs' loop or a factor that complicates largely the entire recycling process is the meticulous separation of materials into classes and categories, which precedes the recycling. This precise procedure is the main factor for 'recycling' to be frequently mentioned as 'downcycling'. 'Downcycling' [64] implies the diminishment of a material's value, because of it being mixed with other materials and therefore being rendered *impure*. McDonough & Braungart in their book 'From Cradle to Cradle' refer to 'downcycling' as a major negative trait that renders the entire circle of of the '3Rs' process ineffective: "Most recycling is actually downcycling; It reduces the quality of a material over time... Metals are often downcycled. (For example the high-quality steel used in automobiles -high-carbon, high-tensile steel- is recycled by melting it down with other car parts, including copper from the cables in the car and the paint and plastic coatings. These materials lower the recycled steel's quality. More high-quality steel may be added to make the hybrid strong enough for its next use, but it will not have the material properties to make new cars again)... Since *downcycled materials of all kinds are materially less rigorous than their predecessors*, more chemicals are often added to make the materials useful again. For example, when some plastics are melted down and combined, the polymers in the plastic- the chains that make it soft and flexible- shorten. Since the material properties of this recycled plastic are altered (its elasticity, clarity and tensile

[64] 'Downcycling' is the practice of recycling a material in such a way that much of its inherent value is lost (for example, recycling plastic into park benches). In http://www.mbdc.com/c2c_gkc.htm.

strength are diminished), chemical or mineral additives may be added to attain the desired performance quality" [65].

There are some questions though, which we might have to leave open in relevance to these claims about the downfalls of 'downcycling'. Our criteria are crudely based on the numeric performance of material properties and more precisely to the recycled material's 'performative properties' in comparison to its previous ones. The contingent mixture of a material with other substances changes its properties and has as a result the lessening of its numeric performance. However, if we cease to restrict the idea of recycling *as a precise replication of an original material*, new potential could be disclosed. If one were to examine the material status of an obsolete object and imagine possible applications that derail from its original usage, such as embedding it as reinforcement in another material to enhance its strength, would this be downcycling? What if one were to examine the formal attributes of a defunct plastic component and interrogate modes for its exploitation, instead of negating any formal characteristic of the obsolete component and bring everything to a condition of amorphous liquid matter? The hybridism and the impurity of obsolete matter could potentially yield alterative modes of post-production and re-generation of diverse matter.

[65] William McDonough & Michael Braungart, Cradle to Cradle. Remaking the Way We Make Things, (New York: North Point Press, 2002), p.56-58.

Partially in response to some of these inquiries, a new perspective of ecology is supported by the stream of **Industrial Ecology**. The additional trait here is the comprehension of recycling as a closed loop instead of a linear process, meaning that products that have reached a demise of usage can be considered as nutrients for other industries, ensuring in this manner a continuous flow of products and the obliteration of the concept of waste. Accordingly, the key axioms of industrial ecology are "waste equals food" [66] and "from cradle to cradle" [67]. The former saying connotes "a principle of natural systems and eliminates the concept of waste. In this design strategy, all materials are viewed as continuously valuable, circulating in closed loops of production, use, and recycling. In the next industrial revolution, the emerging movement of production and commerce eliminates the concept of waste, uses energy from renewable sources, and celebrates cultural and biological diversity" [68]. The latter saying predicates a "design paradigm that... models industry on nature's processes, in which materials are viewed as nutrients circulating in healthy, safe metabolisms. Industry must protect and enrich ecosystems—nature's *biological metabolism*—while also maintaining safe, productive *technical metabolism* for the high-quality use and circulation of mineral, synthetic, and other materials" [69]. Within the context of Industrial ecology the concept of 'eco-efficiency' is replaced by the similar but enhanced version of 'eco-effectiveness', which sermons

[66] William McDonough & Michael Braungart, **Cradle to Cradle. Remaking the Way We Make Things**, (New York: North Point Press, 2002), p.56-58.

[67] Ibid.

[68] MBDC Cradle to Cradle Design in <http://www.mbdc.com/>.

[69] Ibid.

the obliteration of the concept of waste and the imitation of natural systems. The methodology to achieve this mission, is a superior strategy of material separation, similarly to the method used in the '3Rs' system, this time in two main flows –the technological nutrients and the biological nutrients. The flow of biological nutrients would have as its final destinations the *soil* as materials would naturally decompose and become its nutrients. The flow of technical nutrients would serve as a pool out of which equivalent industries can retract materials for various purposes.

Despite the sincere intentions of Industrial Ecology to seek solutions to undeniable problems, the irreversible reverence and imitation of natural systems opens a huge discussion and becomes suspicious from the moment of the movement's inception. However, before dismissing this framework in its entirety, one has to acknowledge the indisputable value of the conceptual shift from an object in its physical, finite dimension, to a material flow. The feeding mechanism of materials that industrial ecology proposes launches a novel understanding of materiality, where meaning is not engrafted in objects but can be regenerated through the perpetual transformation of material.

[66] William McDonough & Michael Braungart, **Cradle to Cradle. Remaking the Way We Make Things**, (New York: North Point Press, 2002), p.56-58.

[67] Ibid.

[68] MBDC Cradle to Cradle Design in <http://www.mbdc.com/>.

[69] Ibid.

[70] The term 'verdolatry' was used by Frederic Migayrou in his essay "*Extensions of the Oikos*" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003), p.26.

On the basis of the previous analysis of the '3Rs' methodology and the stream of Industrial Ecology, one could claim that the vast majority of available reuse strategies are ruled by the underlying belief that nature can become a role model for design. At the same time, the promotion of a discussion allied to the laws of nature is neither remarkably innocent nor geared towards to world's salvation. Through the alliance of design and ecological mimesis, any idea –'good or bad'– gains immediate power and is labeled 'positive' by belonging under the umbrella of what we know of as 'green'. " 'Green' building theory can roughly be surmised as an ideology that professes the maintenance of local recourses and cultural building traditions *through a form of ecological and cultural mimesis*" [71].

In time, 'greenness' has become an unquestionable value, a label that guarantees in most cases 'goodness', responsibility and 'ethos'. Mark Jarzombek describes 'greenness' as a "heroic model" [72], one that can potentially "become the Esperanto of government agencies and religious systems" [73]. Along the same lines of thought, Frederic Migayrou has constructed a crafty word to describe this concept –

[71] David Gissen, "Bigness Vs. 'Green-ness'" in **Thresholds No.26: Denatured** (Cambridge, MA: Department of Architecture, Massachusetts Institute of Technology, 2003), p. 43.

[72] Mark Jarzombek, "Sustainability, Architecture and Nature; Between Fuzzy Systems and Wicked Problems" in **Thresholds No.26: Denatured** (Cambridge, MA: Department of Architecture, Massachusetts Institute of Technology, 2003), p.54.

[73] Ibid.

'Verdolatry' [74]. This is a composite word from the French word 'verde' meaning 'green' and the Greek word 'latreia' meaning 'absolute and unconditional worship'. Therefore, the word 'Verdolatry' implies an irreversible worship for *green ethics* and its accompanying worldview paraphernalia, without ever critically interrogating either the actual positive effects of such a vision or if this same vision can be applicable to all circumstances.

The effects of 'green vision' are not ecstatically promising. In many cases, 'green' is interpreted as a set of technical instructions to be applied, consequently ending up in a "technocratic utopia that either over-radicalizes the situation by reducing everything to an ethical-functional criterion or under radicalizes it by ignoring everything pertaining to the more complex aspects of social & urban life" [75]. In other cases, 'green' is interpreted as a sacred responsibility to simulate biological systems. Quoting again Jarzombek, he criticizes the view of McDonough & Braungart (the main advocates of the Industrial Ecology movement) who support that industry should learn from the metabolism of the cherry tree: "Although the metaphor of the cherry tree, while somewhat arbitrary, is not unproductive, it simplifies and romanticizes Darwinian notions of evolution by taking out of the equation the principle of the competition of species. This strategy harkens back to the

[74] Frederic Migayrou,

"*Extensions of the Oikos*" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003), p.26.

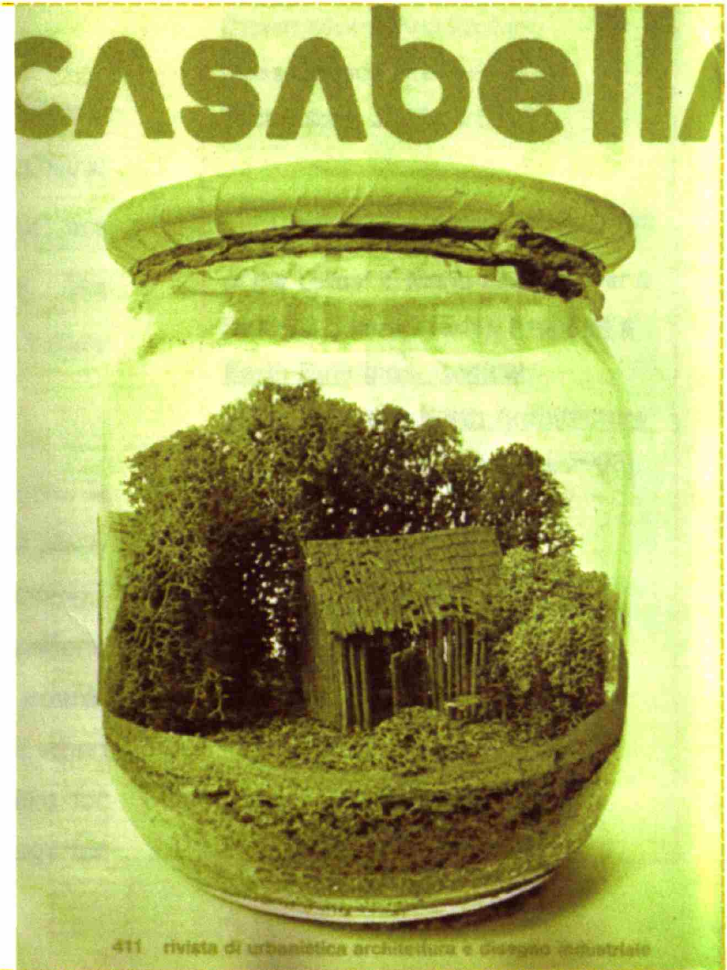
[75] Mark Jarzombek refers to Lisa H. Newton and her book **Ethics and Sustainability** (2002) in his essay "*Sustainability, Architecture and Nature; Between Fuzzy Systems and Wicked Problems*" in **Thresholds No.26; Denatured** (Cambridge: Department of Architecture, Massachusetts Institute of Technology, 2003), p.54.

[]

Overview / Analysis >> 'verdolatry'

Casabella, Milan, No. 411, March 1976

in Migayrou Frederic, "Extensions of the Oikos" in
Marie-Ange Brayer & Beatrice Simonot (Eds),
Archilab's Earth Buildings: Radical Experiments in
Earth Architecture (London: Thames & Hudson, 2003)



evolutionary theory of Ernst Haeckel, known to many as the father of the term ecology. McDonough and Braungart seem to have translated his particularly bizarre (and certainly controversial idea) that politics is a form of applied biology... Saving the world is important and architecture has a role to play but the map according to which that can be achieved is far from clear" [76].

The promotion of a reverent, naturalistic tone seems unlikely to unveil an original contribution to the field of reuse, because it does not encompass the cultural conditions of an era where the boundaries of the 'natural' and the 'artificial' are intertwining and their blending seems to exude extraordinary promise. The amalgamation of natural and artificial materials seems an inevitable battle for future endeavors in the design and production of new materials.

" The myth of 'green architecture, or 'verdolatry', is no longer an alternative; nor is the return of economic popularity seeking, 'low-tech' architecture. One cannot place any faith in this 'ecotecture' whose foundations would be a biomass economy... Accepting artificiality in the manner advocated by a number of current publications cannot provide us with an ultimate recourse, a form of energy that will enable architecture to put into practice hybridization, grafting, complexity. At a time when the human genetic code has been cracked, when man himself is the stake for which the law and the economy will be playing, we must devise a strategy for

[76] Mark Jarzombek,
"Sustainability, Architecture and Nature; Between Fuzzy Systems and Wicked Problems" in **Thresholds No.26; Denatured** (Cambridge: Department of Architecture, Massachusetts Institute of Technology, 2003), p.55, 56.

[77] Frederic Migayrou, "Extensions of the Oikos" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003), p.26.

deregulation, away from the norm, from identicalness, from the standard and we must root out the residual *oikos* that remains in the heart of the biological, along with the idea of the right and the proper, which has already been squashed by the industries of the world. We must place ourselves at the heart of mutation and, within the ebb and the flow of all the processes" [77].

3.3 >> Object - Room - Building Reuse Strategies

Reuse strategies applied to the three different scales of reference in this thesis - object, room, and building- differ significantly. This is mostly due to issues of shear size, which in the small scales facilitates processes of material manipulation.

If we begin from the large scale of a **building**, including building parts or areas, there are essentially two primary tactics and various degrees of their combinations; these are preservation and renovation. One would have to note here that neither demolition nor abandonment is considered as an operation of reuse. These occurrences could better be characterized by a lack of strategy. In fact, industrial derelict areas of large built complexes constitute a major theme of concern in a national scale. "Often called 'brownfields,' [figure 11, 12] in contrast to

Figure 11 >> Watervliet Paper Mill

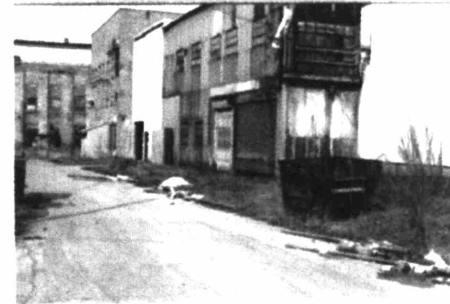
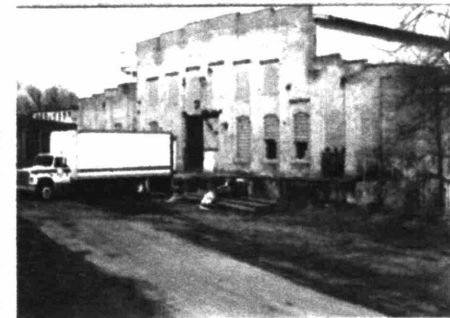


Figure 12 >> Watervliet Paper Mill



'greenfields' at the urban edge, industrial wastelands comprise 5-10% of the metropolitan land area. It is estimated that there are at least 400,000 'brownfield' sites in the US, especially in the Midwest and Northeast. California alone has more than 38,000 'brownfield' sites. These are often situated within declining districts that have aging streets and other infrastructure. Their locations may be perceived as marginal, and they may be contaminated by decades of industrial use. Rather than sell them or turn them over to new users, owners of 'brownfield' sites often prefer to shut down the properties completely and fence them off in order to avoid problems" [78]. "As Kenneth Frampton points out, these abandoned landscapes remain "meaningless ruins of regional dimensions"" [79] [figure 13].

Interventions in existing buildings are considered by most architects as a technical assignment, mainly due to the understanding of preservation and renovation as a crudely practical procedure of collecting information on the building's original or pure condition and aiming its *morphological restoration to the original*. Restoration requires the reconstruction of missing parts and the cleansing of the remaining ones with the ultimate goal of meticulously binding the two in an entity resembling precisely the original condition of a built structure. Donna Haraway describes the "restoration of the origin as a task of *genetic hygiene*" [80] and makes a

[78] Southworth Michael,
"Wastelands in the Evolving
Metropolis" (April 1, 2001). Institute
of Urban & Regional Development,
IURD Working Paper Series. Paper
WP-2001-01.
[http://repositories.cdlib.org/iurd/wps/
WP-2001-01](http://repositories.cdlib.org/iurd/wps/WP-2001-01).

[79] John E. Fernandez in his
essay "*Diversified Longevity:
Orchestrated Obsolescence for
Intelligent Change*" in Thresholds
No.24; Reproduction and
Production (Cambridge,
Massachusetts: M.I.T Department of
Architecture Publication, 2002), p.14
refers to Kenneth Frampton in
"*Intimations of Durability, Notes on
Architecture and the Theme of Time*"
in Harvard Design Magazine
(Fall 1997), p. 22-28.

connection between the practice of preservation and *taxidermy* [81]. She mentions that such a practice “is achieved in Carl Akeley’s African Hall by an art that began for him in the 1880s with the crude stuffing of P.T Barnum’s elephant, Jumbo, who had been run down by a railroad train, the emblem of the Industrial Revolution... From the dead body of the primate, Akeley crafted something finer than the living organism; he achieved its true end, a new genesis. Decadence –the threat of the city, civilization, machine- was stayed in the politics of eugenics and the art of taxidermy. And the museum fulfilled its scientific purpose of conservation, of preservation, of the production of permanence. Life was transfigured in the principal civic arena of Western political theory- the natural body of man” [82].

The irony portrayed in this passage is overt; however it only comments on the ideological prism of preservation and the manner in which the established historical significance of a building crudely leads to the intact restoration of its original state, no matter what has occurred in the meantime of its lifetime. One has to note that there are significant pragmatic factors to advocate the maintenance of buildings; and ever further than that to advocate drastic alterations onto their bodies, where the reuse of material becomes a generative force, instead of one that dates back to historic recordings.

Figure 13 >> Watervliet Paper Mill



[80] Haraway Donna, “Teddy Bear Patriarchy: Taxidermy in the Garden of Eden 1908-1936” in **The Haraway Reader** (New York : Routledge , 2004), p.50.

[81] taxidermy -- (the art of mounting the skins of animals so that they have lifelike appearance).

In many cases the effects on traffic and urban circulation because of a building's location constitute major parameters for retaining a building. The urban space that would have to be blocked out in order to remove it could cause major issues. Moreover, factors such as retaining material and the embodied energy in a building, as well as avoiding impending pollution, both in terms of physical waste material and airborne waves, comprise additional parameters.

Nevertheless, the practice of renovation, if viewed openly, can induce extraordinary potential for reasons that exceed the pragmatics of maintenance or the ethics of 'historicity'. Currently, renovation typically implies a practice where the 'old' is preserved in the condition of its original form and the 'new' is superimposed as a separate entity, in a delicate and gentle manner that avoids *contact*.

Potentially, missing information from the original body of the building can be complemented by new material parts and material can be extracted from the old body in order to act as a mold for new components. Then the existing structure could possibly become a receptive territory, upon and through which one can build; it could become a *material scaffold* or a mold.

[82] Haraway Donna, "Teddy Bear Patriarchy: Taxidermy in the Garden of Eden 1908-1936" in **The Haraway Reader** (New York : Routledge, 2004), p.50.

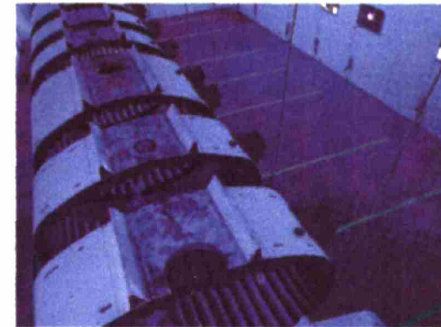
Figure 14 >> Plastic container

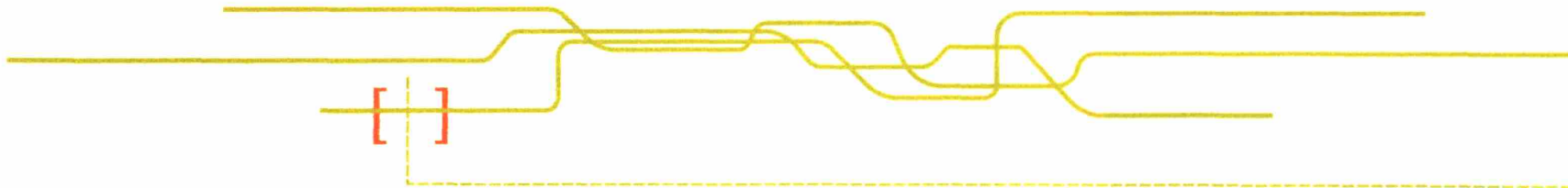


Moving from the elusive vision of the large scale to the intermediate scale of a **room**, one identifies quite promptly the absence of established operations of reuse. Let me clarify here that by the term -room- I refer to defunct building components, such as a water tank or a container that are potentially inhabitable [figure 14], by accommodating in some manner the body in space. This intermediate scale of building excrements, parts of transportation vehicles and large scale apparatuses is inconspicuous to a great extent; an object is small enough to be manipulated and reused and a building is large enough to bring to the foreground the requisite for its reuse, whereas a 'room component' remains in the background. Most of these building excrements are either put aside and become 'floating obsolete matter' in the urban fabric or are landfilled without any processing for material recovery. Recently there is a growing interest from artists and homeless people to *appropriate* these components and re-inhabit them by imbuing into them new functions [figure 15].

Finally passing into the scale of an **object**, the '3Rs' chain -reduce, reuse, recycle- comprises now a conventional typology for many manufacturers. Numerous industries make cognitive efforts to use biodegradable materials, reuse their utility objects and recycle them to produce new material. As mentioned in section [3.1] of this chapter, a prerequisite for the final stage of recycling to take place is the segregation of

Figure 15 >> TV Tank_ Petroleum trailer tank transformed into t.v lounge by Lo/Tek





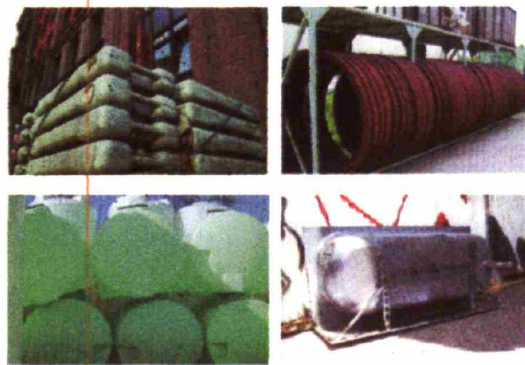
Overview / Analysis >> Existing Strategies of Reuse

Decomposition & segregation in constituent parts >> recycle
 _Lack of tactics: landfilled



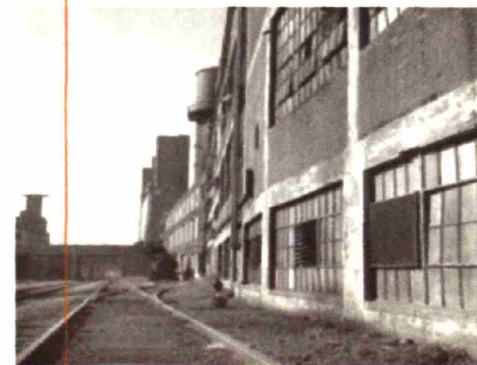
object toxic e-waste

appropriation for shelter or art
 _lack of tactics: deposition in landfills



room coating matter

historic preservation or renovation
 _lack of tactics: demolition or abandonment



building brownfields

materials in classes and categories of the same kind. According to the '3Rs' strategy, any possible mixtures of different materials retract from their purity and eventually end up in 'downcycling', meaning the remanufacturing of materials with deteriorated form or performance. Although these rules may apply to plastic bottles and containers, at the moment they become relevant to materially complex components, such as these recovered from the electronics industry, the task of meticulous segregation becomes particularly excruciating [figure 16], both in terms of labor and toxic emissions. As e-waste [figure 17] tends to develop into the largest waste stream in a global scale, one might have to consider other modes of reuse which do not entail such drastic procedures. Statistic surveys confirm that "the electronics industry is the world's largest and fastest growing manufacturing industry, and as a consequence of this growth, combined with rapid product obsolescence, discarded electronics or E-waste, is now the fastest growing waste stream in the industrialized world" [83]. Moreover and on the basis of evidence on the recycling of e-waste, the Basel Action Network (BAN) and the Silicon Valley Toxics Coalition point out that "electronics 'recycling' is a misleading characterization of many disparate practices – including de-manufacturing, dismantling, shredding, burning, exporting, etc. Most e-waste that is currently being 'recycled' is actually being exported, dismantled in prisons, or shredded in processes where there is some

Figure 16 >> Segregating materials in an obsolete computer



Figure 17 >> E-waste



material recovery followed by the discard of the remaining materials” [84]. Despite the fact that objects belong in the same category of scale, the fact of their material composition makes the case of a computer and of a plastic bottle significantly different. In the latter case, there seems to be a necessity to use defunct circuitboards for instance, as larger ready-made complexes or components for entirely new uses.

Such a practice is supported in the production of materials by *recombinant methods and assemblies*. Within this framework of thought, waste materials can be inserted within new materials, either as reinforcement or as ready-made components that yield particular local behaviors relative to the performance of the new materials. In light of this technique, the notion of ‘downcycling’ becomes relevant to the next use and ceases to depend on the ‘performative’ properties of the new material. *Recombinant assemblies stipulate material crossbreeding as a strategy for ‘upcycling’.*

Along the lines of this argument Sheila Kennedy remarks how “secondary and tertiary methods of post-industrial production produce *recombinant ... materials: materials within materials*. Sheet claddings made of chopped up or reconstituted bits of other materials, defy notions of homogeneity, use and value. The most

[83] Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, “*Exporting Harm. The High-Tech Trashing of Asia*”, Prepared by The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC), (February 25, 2002) in http://www.svtc.org/resource/pubs/pub_index.html , p.5.

[84] Ibid, p.6.

[85] Sheila Kennedy & Christoph Grunenberg, KVA: Material Misuse (London: AA Publications, 2001), p.15.



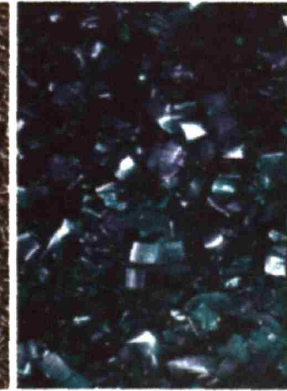
Overview / Analysis >> Existing Strategies of Reuse

Decomposition & segregation in parts

- [] [1] waste material >> raw material >> reproduce the same material deteriorated
DOWNCYCLE
- [] [2] waste material >> segregation >> embedded in another material, forming new bonds
RECOMBINANT ASSEMBLIES



Acoustic recycled paper fiberboard



ALKEMI, aluminous or other metal waste with silicon filler

object

inexpensive pressboards are made from the waste scraps of the rarest woods. These claddings products confound the representational hierarchies of front, back, exterior and interior, and are equally acceptable as substrates or finish materials.

This material cannibalism breeds an unstable grouping of restless material families. Crossovers, combinations and *new fusions* are created as families of materials once thought to be distinct (such as plastic or wood) now merge and become alike. At the same time, categories of materials dissolve and multiply into affiliated product lines –wood, for example, begets an endless family of paper products. Catalysts for this propagation are cyclic: methods of designing materials are created by interventions into existing fabrication processes, new methods of fabrication yield new kinds of waste, and remanufacture produces products from the waste of other products” [85]. Recycled ground cover [figure 18] and Alkemi constitute such examples of ‘recombinant assembly’ materials. The former is a “loose-fill groundcover derived from 100% recycled vulcanized rubber from whole passenger and/or truck tires..., held in place due to the interlocking properties of rubber” [86]. The latter is a “solid surface material made by blending salvaged aluminum chips or other non-ferrous metal waste with a silica fiber and pigments, bonded with a polyester resin” [87].

**Figure 18 >> Recycled
Groundcover material**



[86] **Material without Boundaries.**

Material ConneXion Catalogue,
(New York – Milano: Material
ConneXion Publication).

[87] Ibid



CHAPTER 04 >> OVERVIEW / ANALYSIS

'CHARTA' OF REUSE PRECEDENTS IN ART & ARCHITECTURE

4.1 >> Historic Synthesis

Material reuse is certainly not a new territory of exploration. Locally found materials in nature and materials recovered from deceased animals, such as whale and mammoth bones [88], were used directly for shelter and weaponry in prehistoric times [figure 19]. Up to the twentieth century, recycling was more of a technical exploitation of recourses or an incidence, rather than a cognitive strategy of material reuse. The falls of empires often succeeded recycling of the materials of buildings; this act was bonded to the disconnection of buildings from their cultural and monumental significance that were consequently used as 'quarries'. "After the fall of Rome, the ancient temples and monuments were recycled. First, they were

[88] Forrest Wilson, "Building with the Byproducts of Society", AIA Journal, Vol.68, No.8, July 1979, p.40.

Figure 19 >>
Reuse of mammoth bones

PRIMARY FUNCTION

MAMMOTH SKULL

SECONDARY USE

abandoned and fell prey to vandals and invaders. Then squatters settled in them, and the church quarried their marble to make new monuments. The Theater of Marcellus, originally a Roman amphitheater, became a family fortress in the twelfth century and then the palace of the Savelli family in the fourteenth century. Today, it's partially standing shell houses apartments" [89]. [figure 20]

Besides though such immediate exploitations of natural resources, there are historical precedents that insinuate alternate causes for secondary material, mainly in the construction of tombs in ancient Rome. In these cases, entire objects were reused, such as pots and carafes, in a repetitive manner to form shells or vaults. The fact that the objects were retained in their original form and placed in new configurations urges historians to contemplate that they possessed some kind of cultural value or ulterior meaning. Since construction was instigated by an assembly line of ready-made components, the reuse of materials in the case of these tombs was not likely to be linked to technical parameters of material extractions; otherwise the objects would be shred into smaller more efficient components for the construction of the vaults. These precedents however remain unresolved as to the reasons they were made; they are dealt by historians as bizarre case studies and their precise significance is yet to be discovered. On this theme, Forrest Wilson

[89] Southworth Michael,
"Wastelands in the Evolving
Metropolis" (April 1, 2001).
**Institute of Urban & Regional
Development, IURD Working
Paper Series.**

Paper WP-2001-01.

[http://repositories.cdlib.org/iurd/wps/
WP-2001-01](http://repositories.cdlib.org/iurd/wps/WP-2001-01), p.12.

**Figure 20 >> The Theater of
Marcellus, originally a Roman
amphitheater, became a fortress,
then a palace, and now houses
apartments.**



notes that "a fourth century Roman tomb on the Via Apia was dubbed 'pigna terra' in honor of its dome built of clay pots. We do not know whether these were formerly wine jugs, but they might have been. We are familiar with the dome of hollow jugs of the orthodox baptistry in Ravenna which was begun in 400 BC and finished 50 years later" [90].

The aforementioned examples of intentional material reuse on the assumption of expressing cultural values, were sporadic in history; essentially rare exceptions with unidentified causes. With a massive time gap, the issue of reuse has reemerged, monumentally appealing, as an offspring of rapidly advancing industrialized processes. Mechanical reproduction was critically questioned by artists and literary critics of the beginning of the twentieth century, such as Walter Benjamin and Fernard Leger. More specifically, "Leger's anticipations for the future were delineated in his writings. Among the many startling ideas which he considered was one that art should be comparable to the manufactured object... Leger's comments on the manufacture of art works were prophetic of the large variety of more or less useful and decorative objects designed by artists and manufactured in the 60s and called multiples. Multiple by definition is reproduced by manufacturing processes without limit and for which there is no original beyond the design of a matrix" [91].

[90] Forrest Wilson, "Building with the Byproducts of Society", AIA Journal, Vol.68, No.8, July 1979, p.40.

[91] Jasia Reichardt, "Multiples" in Architectural Design (AD), Vol. XLI, (London: The Standard Catalogue Co Ltd, 1971), p.71.

The questioning of identity and the critical display of the arbitrariness of its external imposition to an object was of pivotal importance at that time. Marcel Duchamp was of the first ones to initiate this debate by advocating that a urinal is a piece of art solely by its declaration as such [figure 21]. The ramifications of this syllogism are to liberate oneself from the bonds of the reminiscence that an object is carrying along with it and to view it as 'raw material', or as matter that can be useful for further spatial deployments. At the same time and as one of the main representative of the Dada movement, Kurt Schwitters gathered material from the street and collaged it to make artifices in the interior of his apartment, in order to create the compelling work of the Hanover 'Merzbau' in Germany [figure 22]. In German, 'merz' means nothing and 'bau' means to build. Essentially Schwitters' declaration was to build out of nothing, meaning out of displaced material that experiences a loss of identity. The importance though of Schwitters' artwork lies elsewhere; and that is on the technique of deploying the material he collected. He did not simply put it together using merely the method of collage. Schwitters did not operate under the premise that a new synthesis would emerge through the superimposition of unrelated parts; instead he created a second smooth membrane that sealed the realm of collage. Eventually, the compositions of the prosthetic art became latent building material, where points of local interest

Figure 21 >> Duchamp's Urinal

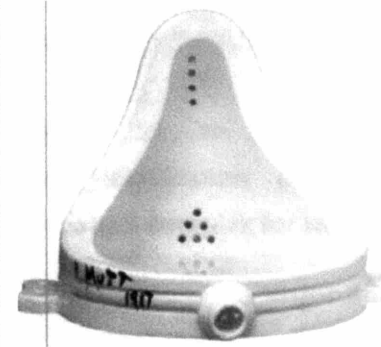
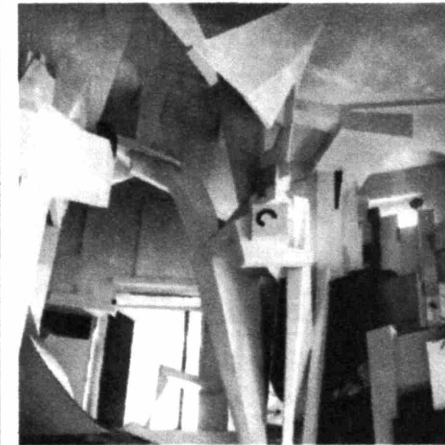


Figure 22 >> Schwitters Hanover 'Merzbau'



revealed through openings called 'grottos'. In this sense, the 'Merzbau' makes visible that there are alternative ways one can conceive of materiality and that superimpositions and juxtapositions are not unique solutions. For this along with myriad of other reasons, it can be thought of as years ahead of its time as an artwork.

"By the late sixties it started becoming obvious that continual economic growth had its down side. As the booming consumer society mindlessly guzzled fossil fuels and raw materials, a counterculture arose whose participants sought a way back to their natural roots. These drop-outs from conventional society hoped to swap self-centered consumerism for an autonomous, communal lifestyle. Not surprisingly, the back-to-nature movement drew its most ardent support in the Western USA. They established whole villages of astonishing self-built structures. Inspiration for the building types and techniques appropriate to a self-supporting society came from the (not all that distant) pioneering past and from nomadic architecture" [92] [figure 23].

[92] Piet Vollaard & Jacques Vink,
"Recycle, Recycle, Recycle" (1999),
<http://www.02.org/ideas/smartarch/smartarch995.html> .

Figure 23 >> IBA Emscher Park_Reutilization of a former industrial complex for recreation.

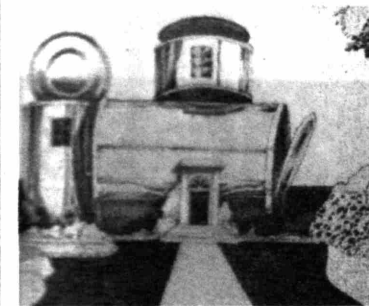


At that time, two parallel concerns arose. The former was related to increased urbanization rates and alarming demographic statistics, indicating massive population moves to urban centers which were already overpopulated and most of old structures were not fit for adequate living conditions. The latter concern was related to a consumer culture that was growing like a plague, leaving behind it more and more colossal amounts of physical waste and unused materials, given the fact that there were few if no strategies of reuse at that time. These two interests coalesced in a short-lived movement instigated by architects that attempted to seek solutions to the housing problem through the use of consumer waste materials.

Frederic Migayrou refers to this historic moment as a time of "simultaneous origin for urbanism and ecology" [93]. The merging of the housing predicaments with the potential derived by recycling consumer products was functioning in accordance to laws of nature and metabolism. As natural systems recycle their wastes, the hope of recycling by-products of urban environments became prominent bringing to the foreground a naturalistic perspective, diffusing hope and joy. Apparently frustrated with consumerism and housing issues, architects joined the two themes under an aborning umbrella of 'artificial ecology' and launched a new movement in the 70s of garbage reuse, often referred to as '*garbage architecture*' [figure 24]. Although, these architects through their subversive work were performing some form of social

[93] Frederic Migayrou, "*Extensions of the Oikos*" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003), p.23.

Figure 24 >> Garbage Housing Sketch by John Dickinson (1971) in his Master's Thesis entitled 'Why Leave London' at the Architectural Association, London.



critique, it should be noted that their ideas were in accordance with the conceptual main streams under the generic prism of "an organic model of life that came to the fore. As one can see from the theoretical works of the *Chicago School: The Town; A Natural Phenomenon; The Urban Phenomenon as a Way of Life; Expansion as Physical Growth*, the town became a physical entity, a constantly changing organism that should be studied *in vivo* with the same methodology as that which dealt with the ecosystems of nature" [94].

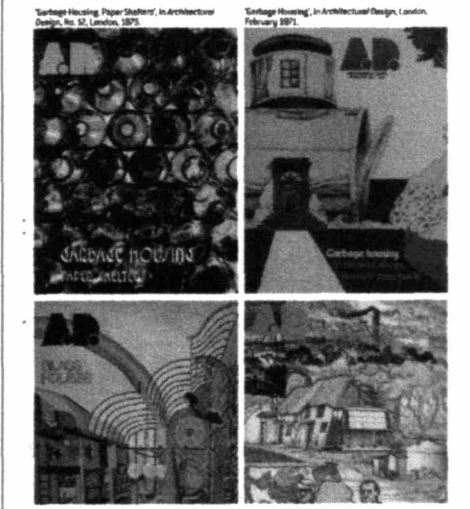
Guided by the belief that "one man's pollution can be another man's housing" [95], "garbage architects' began experimenting with various materials that had no essential value and were in a state of 'oblivience' as industrial by-products [figure 25]. More specifically, Witold Rybczynski in Canada experimented with sulphur and attempted to find a use for it as a building material. He recorded that "in Alberta, at the present time (1973), 9 million tons of sulphur were stockpiled ... Sulphur could be considered to have virtually no value and was, in effect, an industrial waste... Sulphur also occurred as sulphides and sulphates of metals and was a by-product of mining operations" [96]. At the same time, Martin Pawley headed a research program at Cornell University in collaboration with the municipality of Santiago in Chile. The research program concerned "the possible value of garbage housing in the context

[94] Ibid.

[95] Witold Rybczynski, "From Pollution to Housing" in Monica Pidgeon (Ed), **Architectural Design (AD)**, Vol. XLIII 12 (London: The Standard Catalogue Co Ltd, 1973), p.786.

[96] Ibid.

Figure 25 >> Architectural Design (AD) Covers in 1971 & 1973.



of the explosive urbanization of the Santiago region. This research was carried out at Cornell University in the Spring of 1973" [97]. Their goal was to produce housing solutions with the use of extant obsolete material in the regions of Santiago, especially consumer by-products. They were thoroughly examining ways in which to create links between packaging-container industries and building industries in order to achieve what Martin Pawley has called a "parasitic housing policy" [98]. Finally, "the two Cornell prototypes were experimental structures built using cans, bottles and corrugated cardboard... The second house, a scale model of Le Corbusier's Maison de Weekend was designed by David Montanari and Warren Lee. It featured walls of hand-corrugated sandwich panels devised by David Ross, and vaulted roof sections using large numbers of soft drink and beer cans as voussoirs" [99].

At the end of the decade in May 1979, "the first International Conference of Garbage Architects was held at Florida A&M University and examined 'junk' as a problem and a solution" [100]. However, hints of frustration had already risen from the movement's main advocates. Their sincere attempts to seek pragmatic solutions for the growing housing problems faced immense impediments by the building industry, which was functioning in a closed-loop of linear productivity and could not act as a

[97] Martin Pawley, "Chile and the Cornell Programme" in Architectural Design (A.D), Vol XLIII 12 (London: The Standard Catalogue Co Ltd, 1973), p.777.

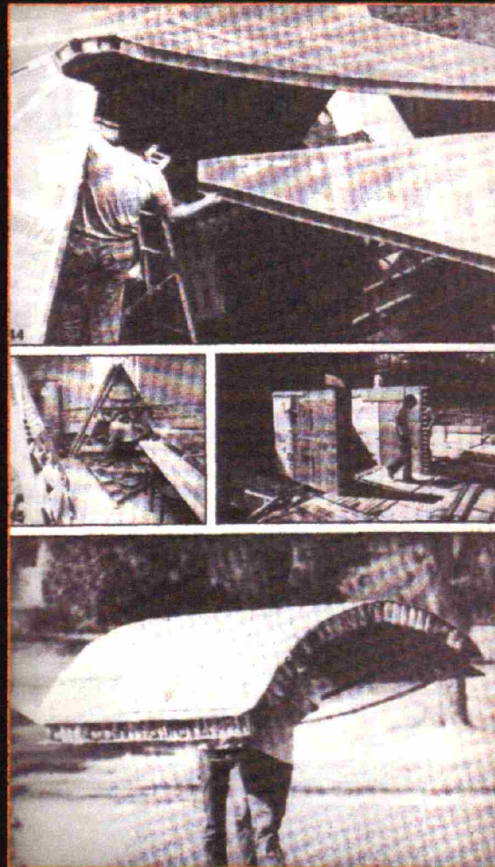
[98] Ibid.

[99] Ibid, p.783.

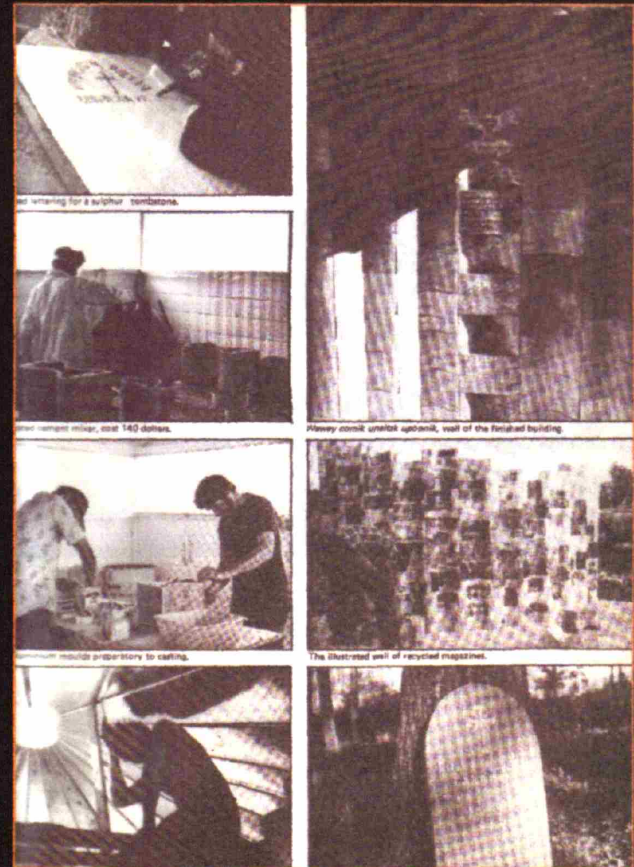
[100] Forrest Wilson, "Building with the Byproducts of Society", AIA Journal, Vol.68, No.8, July 1979, p.40.

[]

Overview / Analysis >> garbage housing 1970s



Chile & the Cornell Programme [1973]



Sulphur Reuse_ Witold Rybczynski [1973]

receptor for by-products of other industries. On top of this impediment, with the technology available at the time, it was excruciatingly difficult to use by-products in such a manner in order to produce quality housing, fulfilling technical standards of insulation. In 1973, Martin Pawley confessed that "to serve redesigned packaging into this machine (referring to the building industry) as a low cost building material *is to submit to a process of alchemy in reverse*; the outcome will be costly, scarce and irrelevant... any attempt to introduce a revolutionary new strategy... must not only develop outside the present structure of the building industry, but inside the mainstream of mass consumption itself" [101]. Seeing through the overt parameters that have instigated garbage housing to flourish under the cultural conditions of the 70s, one has to note that the 'fuzzy logic' of this subversive idea was accompanied by a lack of charm or appeal that would be a prerequisite to sustain the utopic discourse. 'Garbage architects' were guided solely by their ethos and sense of grandiose responsibility of saving the world. However, not even they themselves were intrigued by their designs; they were quite frank about it as well. So along all the practical hindrances that lead to the fall of 'garbage housing', the lack of appeal was also a significant side factor.

[101] Martin Pawley, "Garbage Housing" in Architectural Design (AD), Vol. XLIII 12 (London: The Standard Catalogue Co.LTD, 1973), p.775.

Concurrently, at the beginning of the 70s, parallel interests in the creative use of diverse used materials found a more creative expression in art, channeled through the movement of '*Arte Povera*' in Italy. Although artists of this movement and 'garbage architects' shared analogous tactics of material deployment in their work, their foundational logic and core concerns were extensively dissimilar. 'Garbage architects' were geared by an environmental sensibility in response to distressing technical issues; on the other hand, '*Arte Povera*' artists were seeking manners to use 'primordial matter' as a means of artistic expression, attempting to release themselves from the bonds of conventional representation techniques in painting, that was the dominant, if not exclusive, tradition in Italian art. As art critics note, the development of '*Arte Povera*' in Italy, "paralleled a broader international tendency (in the United States, the trajectory was through Pop Art, to Minimalism and Conceptual Art) in which the supremacy of painting was challenged from both the theoretical side and the practical side as artists found in sculpture an extraordinarily rich field of exploration" [102].

The movement was launched by the personal initiative of Germano Celant, who identified the eminent cultural shift towards materiality in artistic production. "The phrase *arte povera* first appeared in a text authored by a twenty-seven year old art critic named Germano Celant to accompany his exhibition Arte Povera e IM Spazio

[102] Richard Flood & Frances Morris (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., 2001), p.15.

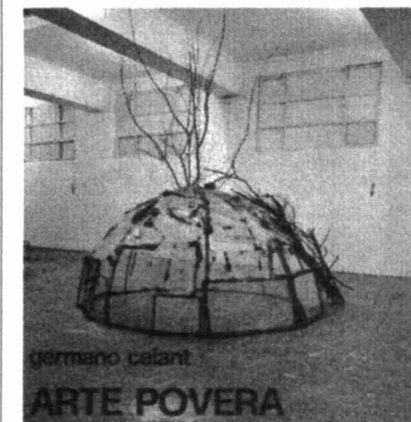
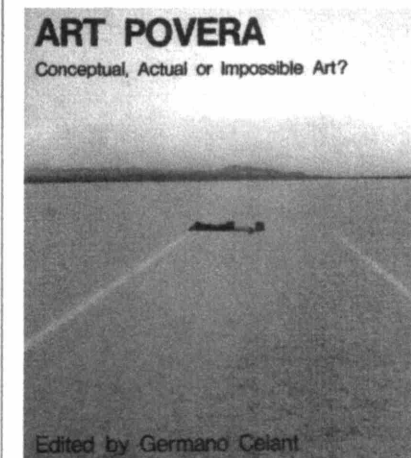
at Genoa's Galleria La Bertesca in September 1967... All artists had a diversity of exhibited work behind them, but at that moment, in the autumn of 1967, all shared a crystalline understanding of the marriage and concept of materials" [103].

[figure 26]

The term 'Arte Povera' [Arme Kunst] is immediately translated as 'poor art'. However, the emphasis does not reside exclusively in the use of worthless unused materials; it resides in the belief that "*art could be made from anything*: living things, products of the earth, and industrially produced materials, as well as immaterial substances such as moisture, sound and energy. Art could be made in any way. It could be painted, handcrafted, industrially produced, gestured, spoken, written, acted, dreamed" [104] [figure 27]. In this sense, the inherent entropy in matter is viewed as a generative force for the artists. They were urged to reveal the elemental nature of materials and release their properties through an open-ended experimentation, producing art. Art was not pre-conceptualized and consequently executed by the application of materials to already established concepts and ideas. On the contrary, these two parameters of the creative praxis were parallel investigations; "an interaction of work and material" [105]. Moreover, "the shift was no longer from the object to the material in the pictorial sense, as

Figure 26 >>

Posters of 'Arte Povera' exhibitions by Germano Celant (1969)

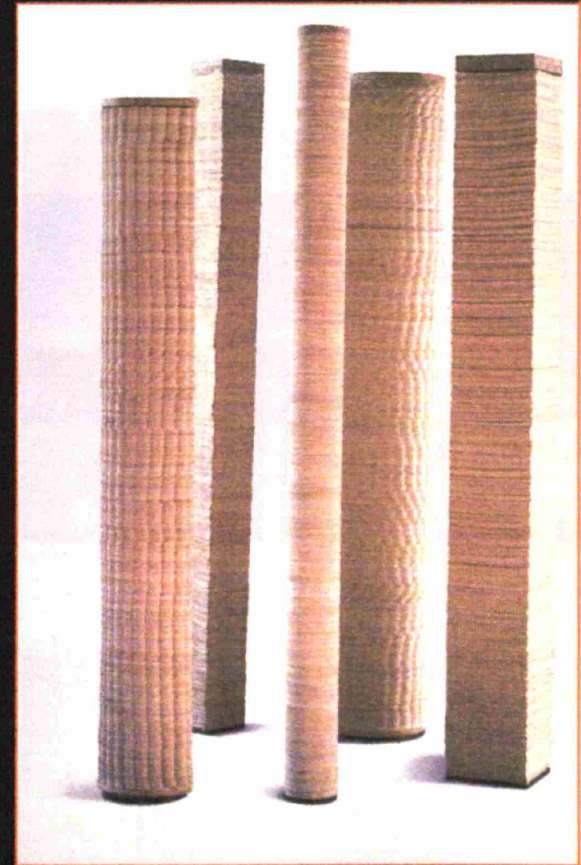


[]

Overview / Analysis >> Arte Povera



Marisa Merz Untitled (Living Sculpture) [1966]



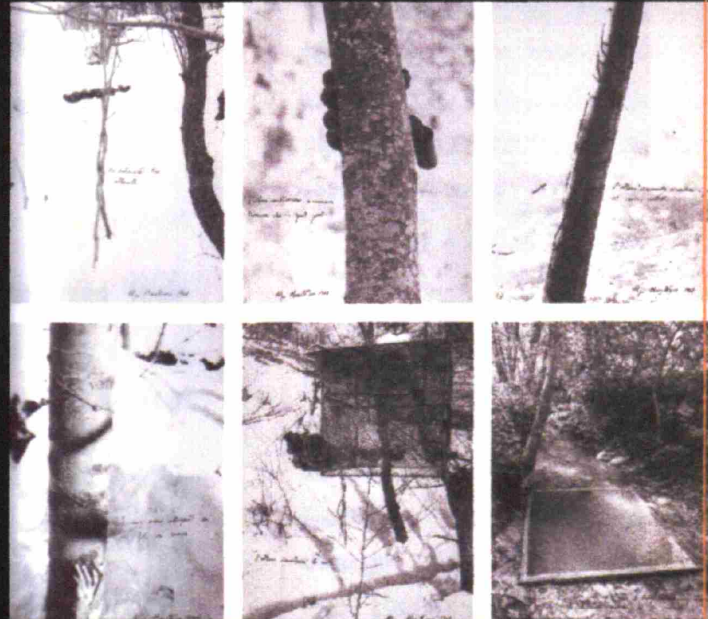
Alighiero Boetti (Columns) [1968]

[]

Overview / Analysis >> Arte Povera



Luciano Fabro _ The mirror of Italy [1971]



Giuseppe Penone _ Maritime Alps [1968]

with the Informale artists, but to a 'brutally elementary material', a physico-chemical presence that evokes the primordial... but the most striking aspect was the experimental juxtaposition of materials to create a strange encounter between the normal and the mythical, everyday life and art... Other critics went further by interpreting the work as a rearticulation of archetypes and myths of a 'Mediterranean civilization' to be counterposed to the technological, rationalistic and materialistic civilization associated with the United States. Materials, in this framework, were made to carry a heavy baggage of political and ideological connotations" [106].

"In May 1972 Celant pulled the plug: When the Munich Kunstraum organized their exhibition [Arte Povera: 13 italienische Künstler], he requested that the title of the show should not be 'Arte Povera', but the names of the individual artists" [107].

Celant was primarily responsible for the fact that the group of the thirteen Italian artists gained a collective identity. He launched 'Arte Povera' as a coherent cultural stasis in the production of art. His objection in 1972 to maintain this identity was also in opposition to the artists' will, who attempted for more than a decade to grasp from the communal potency of the movement. Gradually though, the effect faded and the artists pursued individual itineraries. Whatever the case, one has to

[103] Ibid, p.9.

[104] Ibid, p.15.

[105] Robert Limley, "Spaces of *Arte Povera*" in Richard Flood & Frances Morris (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., 2001), p.41.

[106] Ibid, p.41, 49.

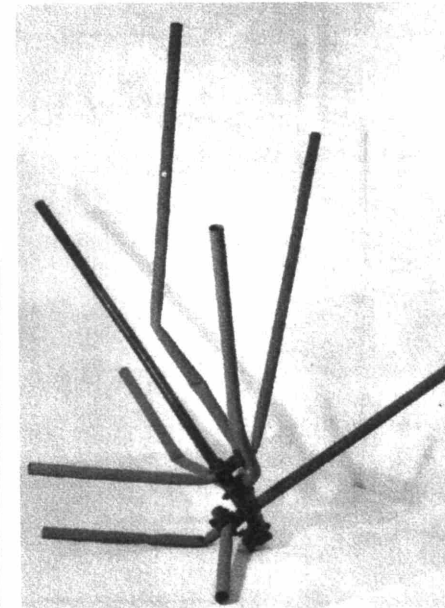
[107] Richard Flood & Frances Morris (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001), p.9.

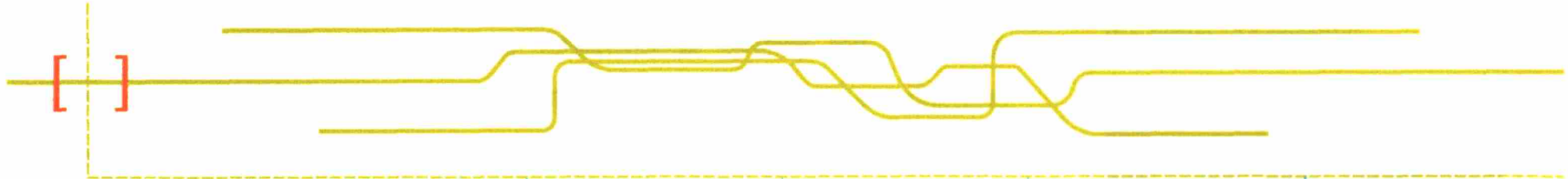
note that the movement of 'Arte Povera' has played a pivotal role in the production of art; a dense and compact instant in history of cultural resistance to form and generative potential of materiality.

Approximately twenty years later and in an entirely different arena of expertise, the group 'Asymptote' has created a series of indefinite digital images "I_Scapes, B_Scapes & M_Scapes" that have emerged from the digital manipulation of commercial objects designed in the computer [figure 28]. Prodding into a novel realm of 'digital reuse', their series did not encompass the direct application of obsolete materials, but instead involved the production and the reuse of virtual images that could then be manufactured. Common everyday objects such as shoes, car parts, wheels and others were introduced in the computer and manipulated through the use of digital media. The intrinsic logic of three-dimensional software tools became in this case a medium of open-ended exploration; a medium that has yielded unexpected results in comparison to direct material manipulations. Such an exploration discloses an alternate perception of matter that emerges from the use of a newly available tool.

Figure 27 >>

Gilberto Zorio [Torch] 1967.





	Overview / Analysis	>> digital reuse'	Asymptote	I_Scapes	
I_Scapes					 2.2
		 2.3		 2.5	 3.1
	 3.2	 3.4		 4.1	
					 H_SCAPES

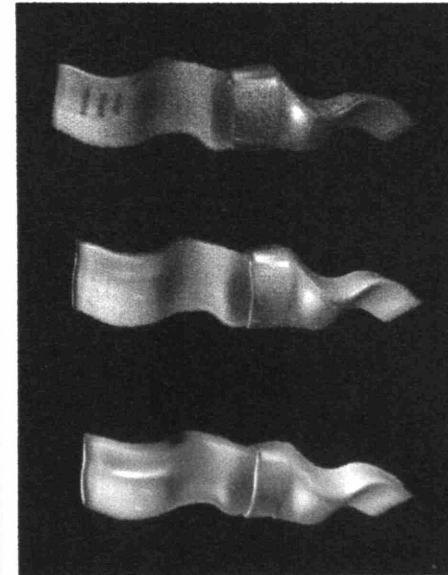
"The I. Scapes derived from the Asymptote's reading of the effect of the computer on culture, with particular focus on new formations of meaning and a revised understanding of what now constitutes spatiality. Asymptote's I. Scapes are discrete architectures provoked by and extrapolated from the proliferation of digital manipulated imagery from mass culture, the media and advertising... The I.Scapes are neither appliance nor building. They are instead continuous and fluid traces of uncanny resemblances. They fetishize mutation, distortion and delirium, forming spaces fused with image. The choreographed assemblies meander through channels of possibility and familiarity, arriving by chance at unforeseen orders " [108].

4.2

>> Collage & Moulding Operations

The ground logic for a post-praxis of reuse seems to revolve around two fundamentally different principles that constitute in parallel both bipolar and necessary drives for any creative praxis. These principles are *collage* and *moulding*; where the first denotes an additive logic of juxtapositions and superimpositions and the latter denotes a procedural, evolving logic of transfusion.

Figure 28 >> I_Scape Multiple by the group 'Asymptote'



[108] Hani Rashid & Lise Anne Couture, **Flux. Asymptote** (New York: Phaidon Press Limited, 2002), p.183, 185.

In many cases of reuse, disparate obsolete parts were added either to different contexts or to other obsolete components. This syllogism of bringing fragments together and interrogating their newly formed relationships in new assemblages constitutes a prime artistic revolution for the twentieth century. Collage embeds the notion of reuse in an elemental sense. As a line of thought, it is founded on the acknowledgment that meaning fluctuates and cannot be resolutely engrafted into the physicality of objects at a specific moment in time. In this sense, collage is a practice that "violates 'property' in every sense- intellectual property protected by copyright, and the properties of a given concept" [109]. It is a kind of *theft* [110]. Group Mu' s exegesis of collage is characteristic of the embedded logic of reuse and appropriation in the practice of collage. According to them, collage is "to lift a certain number of elements from works, objects preexisting messages, and to integrate them in a new creation in order to produce an original totality, manifesting ruptures of diverse sorts... Collage leads necessarily to a double reading: that of the fragment perceived in relation to its text of origin; that of the same fragment as incorporated into a new whole, a different totality. The trick of collage consists also of never entirely suppressing the alterity of these elements reunited in a temporary composition" [111].

[109] Gregory L. Ulmer, "The Object of Post - Criticism" in Hal Foster (Ed.), The Anti-Aesthetic. Essays on Postmodern Culture (New York: The New Press, 1998), p.102.

[110] Ibid.

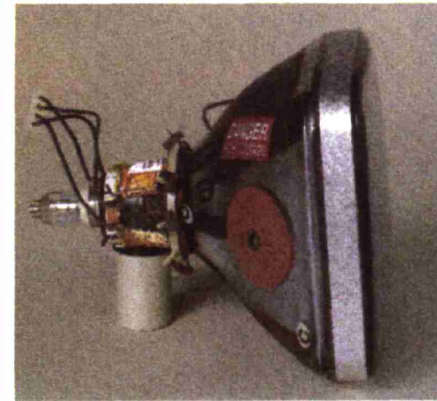
[111] Group *Mu* (Eds), Collages (Paris: Union Generale, 1978), p.13,14, 34, 35.

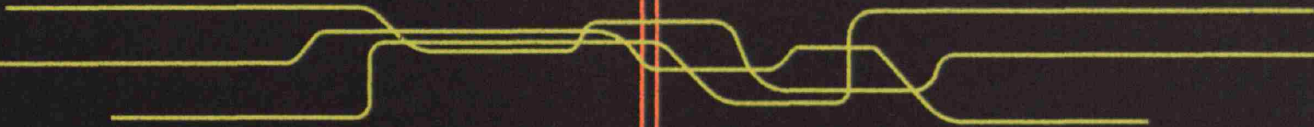
Although molding also involves the appropriation of existing objects and contexts, its case is vitally different. The obsolete matter is interrogated for its textural and formal potential and successively used either as a matrix or as material that can be plastically manipulated. Then the matrix is subjected to a process of many stages; a process that essentially feeds itself as molds and casts change roles in and out without a definitive ending. As Beatriz Colomina points out, molding "is a space to reveal its secrets, to show the unseen. This is no way a polite affair... Casting is an interrogation of space: violently pulling evidence out of it, torturing it, forcing a confession. If anything, casting approaches the supposedly benign but actually brutal techniques of medical inquiry and diagnosis, and the no less violent excavations and demolitions involved in psychoanalysis" [112].

By putting the two principles of collage and moulding, in opposition, one can draw the following assumptions: If collage signifies the *change of context*, then molding signifies a *material transfer*; if collage's scope is a *syntax change*, then molding's scope is a *substance change*; if the intrinsic principle of collage is *prosthesis of parts*, then the intrinsic principle in molding is *fusion of parts*; if collage is about *transformation*, molding is about *transmutation* [figure 29, 30].

[112] Beatriz Colomina, "I Dreamt I Was a Wall" in **Rachel Whiteread: Transient Spaces** (New York: The Solomon R. Guggenheim, 2001), p.71.

Figure 29 >> Detail of a Cathode Ray Tube_ Collage Method





Overview / Analysis >> Collage ~ Moulding Precedents



m e c h a n i c a l paradigm Collage

Moulding g e n e t i c paradigm

>> change of context

>> syntax change

>> prosthesis of parts

>> difference through
superimposition & juxtaposition

>> formal antithesis

>> transformation



>> material transfer

>> substance change

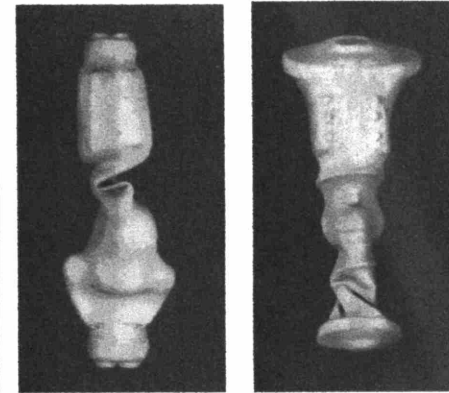
>> fusion of parts

>> assimilation

>> transmutation

For decades now, collage, as an analytical tool and a method of irony has been dominating the conduits of imagination in the creative praxis. Recent developments though in biology and informatics depict urges for a cultural shift towards new paradigms of thought. The wonders of genetic engineering, artificial skins, reflexive membranes and biosciences portray a shift from the mechanical paradigm. Genetic processes are structurally different from their machinic counterparts. They are not only distinguished because of their soft form, but also because of their origin, their production processes and their eventual integration to the body. This groundbreaking shift from the mechanical limb to the artificial organ or skin, due to our capacity to manipulate and eventually duplicate in different terms DNA, has conceptually infused diverse domains of thought and expression, including art, informatics, computation and architecture.

Figure 30 >> Chimera No.5 & No.8,
by Anthony Aziz & Samuel Cucher
_Moulding Method. Art work of
metallic screws & components
wrapped by human skin.



4.3 >> Collage Case Studies

Collage as an operation lies in the interval of individual desire and preconceived ideas of order. It has been referred to as possessing a 'quasi-nature', as an impure action between authentic creativity and use of fragments disconnected from their previous context. Quoting Rowe & Koetter, "societies and persons assemble themselves according to their own interpretations of absolute reference and traditional value; and, up to a point, *collage accommodates both hybrid display and the requirements of self-determination*" [113].

The case studies analyzed in this chapter, are diverse in terms of the use of techniques, selection of defunct components to be reused and context; however they are all governed by the *principle of addition*. Addition may either entail the prosthesis of an inoperative component as it is, in a new context, or the assembling of diverse parts and pieces after the dismantlement of a component, in order to achieve a new set of relationships.

[113] Colin Rowe & Fred Koetter, **Collage City** (Cambridge, Massachusetts: MIT Press, 1978), p.144.

Therefore, 'collage' case studies refer to artistic and architectural endeavors where:

i] there is direct transgression of the nature of an object, a transposition of meaning; in this method a new function is imbued in a defunct component, which is then adhered as a component to a new context.

ii] there are operation of shredding into parts, disassembling and assembling in order to produce a new object.

i]

[Lo/Tek - New York]

As the architects state, Lo/Tek is "an ongoing investigation into artificial nature, or the unmappable outgrowth of familiar, unexplored, man-made and technological elements woven into urban and suburban reality" [114].

Their work focuses on transforming objects displaced from their context, by attaching new technological input, onto them. By using methods of reuse and by viewing objects as 'receptors', Lo/Tek creates a new realm for the architectural practice, where new technological devices 'attack' obsolete technology, weaving the two in a novel context of meaning. In figures [figure 31 & 32], we see two examples of their work in New York, the Miller/Jones Studio and the Morton Duplex

[114] Tolla Ada, Lignano Giuseppe & Nobel Philip, **LOT/EK: Urban Scan**, (New York: Princeton Architectural Press, 2002), p.135.

[115] M.A Brayer & B. Simonot (Editors), **Archilab's Futurehouse: Radical Experiments in Living Space**, (New York: Thames & Hudson, 2002), p.90.

Figure 31>> Miller/Jones Studio_Lo/Tek, New York 1996.



Residence. The former example illustrates how an old kitchen is integrated and 'musealized' in a highly technological new construction -interface. In the latter, we can see the insertion of an *alien unit* -oil tank- into a residence, as well as the transmutation of this element in a viable part of the house. It now functions as a children's hiding place, a room with beds, suspended above the living room.

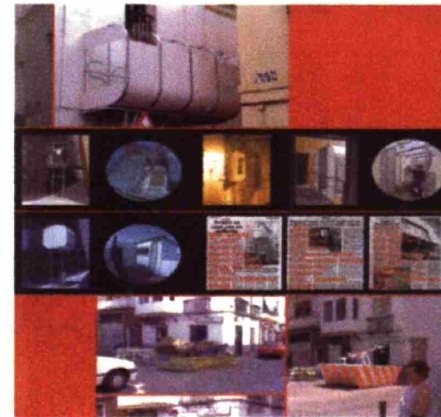
[[Santiago Cirugeda Parejo](#) - Seville]

Santiago Cirugeda Parejo entitles his project "The mutant and Silent Architecture" [115], in order to shed light to an architecture of 'absolute illegality', that is expressed through his projects of inhabitable prosthesis. Essentially by using the method of reuse and attachment to new context, he uses big, discarded inoperative components in the urban fabric, in order to cover the inhabitants' spatial needs, thus ascertaining "civil disobedience" as a legitimized approach [figure 33].

Figure 32>> Morton Duplex Residence_Lo/Tek, New York 1998.



Figure 33 >> Mutant & Silent Architecture_ Santiago Cirugeda Parejo, 2000.



[]

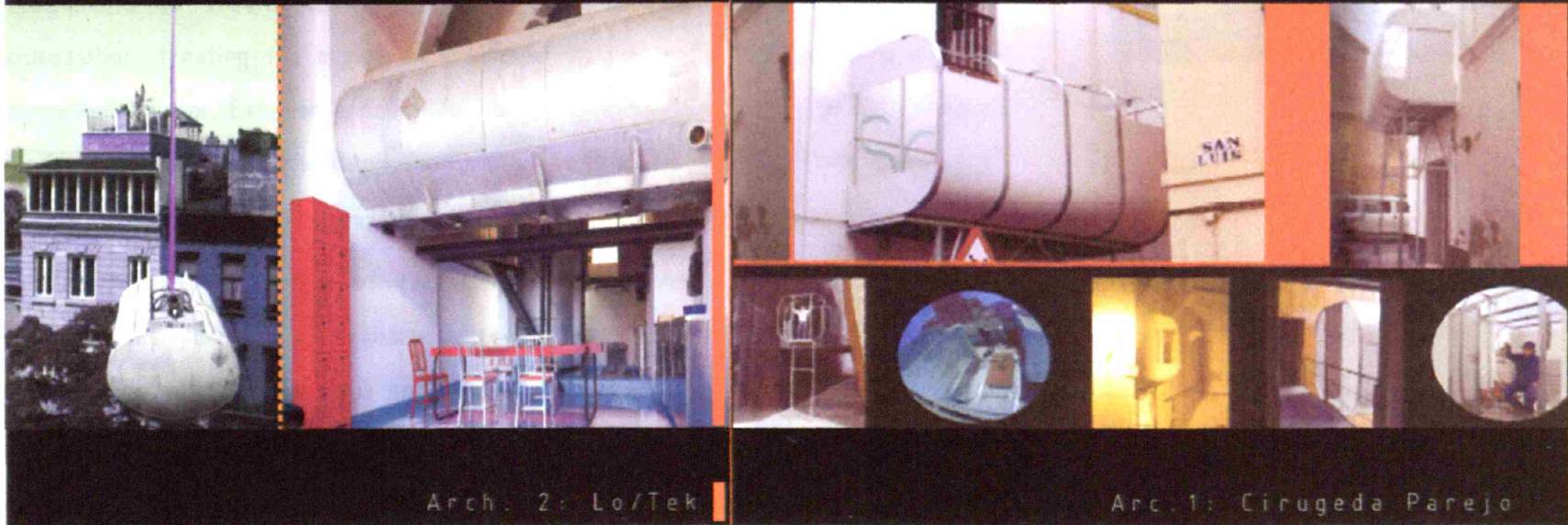
Overview / Analysis >>

Collage Precedents

[01] Semantic Reuse

re-use, imbuing new function to an inoperative component // change of context

[02] Assemblage + Decollage



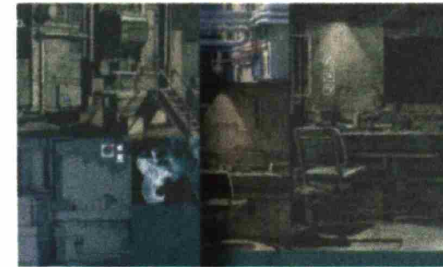
[Mas Yendo - Japan & New York]

The case of Mas Yendo, while also dealing with 'the defunct apparatus' differs significantly from the norm. Yendo's approach towards technology is polemic and ironic. By assembling disparate elements of obsolete machinery, he attempts to depict the vanity and the tragedy of a technological device's demise, thus revealing the paradox of the defunct apparatus. "Yendo pursues a strategy of appropriation and 'detournement' in many of his constructions. Assembled from other models – usually plastic models of cars, weapons and tanks—they are readymade elements to which Yendo ascribes new purpose and meaning... As Yendo reassembles model components to create his own objects, he often moves towards a sectional composition, treating the model as a kind of opaque body that protects a dense concealed interior. Exterior articulation, the very presence of the object, is subdued in favor of a highly articulated cavity that evokes and harbors inner experience" [116] [figure 34]. To conclude with, Yendo's approach is not an innocent one, headed towards an attack of technology and a reverence for nature. On the contrary, his work could be characterized 'cyborgian', in the sense that he uses technology's deterioration as a means of attacking social standards and norms. For

[116] Henry Urbach, "Trojan Horses, Smart Missiles: The Renegade Architecture of Mas Yendo" in RIEA Europa (Ed), **Mas Yendo. Ironic Diversion**, (Wien, Austria: Springer-Verlag, 2001), p.8.

Figure 34 >>

Living Unit by Mas Yendo



Yendo machinery is already culturally outmoded since the shift to miniaturized electronic technologies is an extant reality; therefore a discourse of appropriating and putting together obsolete machinery is already a speech of *diversion*, broaching at the same time modes of manipulating displaced matter.

[[Rural Studio \[Samuel Mockbee\]](#) - Alabama]

Samuel Mockbee's case and the Rural Studio originates from a fundamentally dissimilar perspective. A highly developed social consciousness and a respect to the local tradition of Alabama act as the incentive of this practice. The primary method of use in the work of the Rural Studio is 'collaging' and putting together on-site materials, scraps and pieces of garbage, in order to produce shelter for deprived people in this area [figure 35]. As we can see in the images, diverse techniques are used, such as the façade of automobile windshields and the wall made out of car tags.

Figure 35 >> Housing in Alabama
by Rural Studio



[]

Overview / Analysis >>

Collage Precedents

[01] Semantic Reuse

[02] Assemblage + Decollage

assembling diverse material
and reconstructing it into
new entities. Assembly &
disassembly. Action between
desire and preconceived ideas of order

The words 'mold', 'plasma' and 'plastic' are etymologically related to the Greek word 'πλάθω-πλάσμα', which refers to a condition of material malleability and the manipulation of substance until a shape is given. Consequently, moulding differs significantly from collage as an operation, since it speaks of material transfusion and the search of perpetual transformation of matter. Using moulding in a broader sense here, it is used to describe not only 'molds' used to produce inverse volumes in the conventional sculptural sense, but also to encompass a '*plastic*' use of material.

Therefore, 'moulding' case studies refer to artistic and architectural endeavors where:

- i] obsolete matter is used as a *matrix* or a '*reproductive machine*' for numerous by-products of an inoperative component.
- ii] an inoperative component or part is *wrapped* and *encased* by layers of different materials, leaving its imprint only as an internal volume.



[Matias and Mateo Pinto – Caracas]

Matias and Mateo Pinto, two young practicing architects in Caracas Venezuela, were assigned to build the La Vega Community Center in one of the poorest neighborhood in Caracas, in the course of “an ambitious plan to improve and formalize the squatter settlements –locally known as barrios– that occupy the city’s hillsides” [117]. Pinto’s perspective in the upgrading of the area was one of strategic alliance of the new building and its surrounding environment; an integrative approach to both the structure and the materiality of the barrios in the city’s hillsides. Their building was designed in such a manner as to open itself to existing pathways and void spaces in various levels, both through its volumetric expression and through its accessibility. A significant concomitant concern though, was to use existing used materials as parts of the exterior envelope’s structure [figure 36]; “the building materials and techniques reflected the improvisational and opportunistic character of many barrios constructions... In a last minute decision by the architects, the in-situ casting utilized a textured plastic formwork from air-conditioning filters” [118]. Although referred to as an unpunctual decision, the reuse of junk material that is

[117] Verona Irina, “Urban Upgrading: A new Community Center in the Barrios of Caracas. Matias and Mateo Pinto” in **Praxis: Journal of Writing + Building 2003**, No.5 (Cambridge, MA: Praxis Publications, 2003), p.73.

[118] Ibid, p.76.

Figure 36 >> Prefabricated ‘concacero’ system of steel and concrete structure_ La Vega Community Center by Matias and Mateo Pinto in Caracas Venezuela.



floating around the hills is deeply associated with the culture of construction in the hills, where most building units are not necessarily composed of one unified material, but instead of various diverse components that are readily available and are attached to different surfaces. In this case, floating waste material becomes a mould for the production of new material and reflects the mercurial building conditions in the 'barrios'.

[Specht Harpman - New York]

"Specht Harpman has developed a strategy for the mass appropriation into architecture of familiar, small-scale objects -from ice-cube trays to mineral water bottles- repetitively assembling them to create delirious, highly textured, colorful and ornamental surfaces. Specht Harpman uses the term '*hypertexture*' to describe the visual complexity generated by panels of these objects" [119].

Spechtman is interested in drilling a social critique on mass production culture and unveil a new approach to ornamental expression through the appropriation of packaging systems that apparently yield complexity when used as molds for repetitive tiles. In his designs, he does not seek to generate complexity through intricate thought patterns, but to *find* complexity in the formal presence of obsolete

[119] Specht Harpman,
"Hypertexture", Praxis: journal of writing + building 2003, No.5,
(Cambridge, MA: Praxis Publications, 2003), p.33.

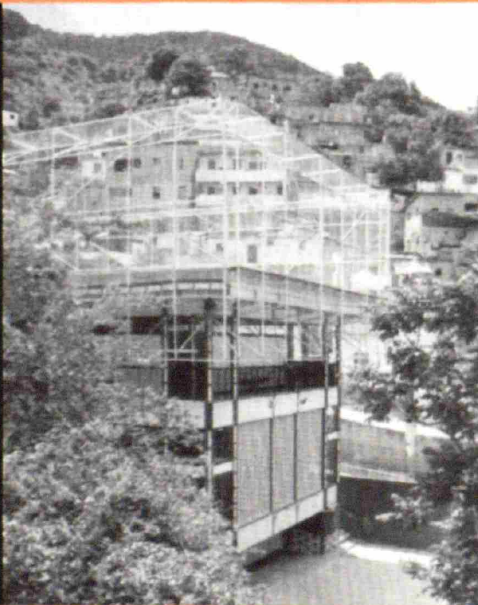
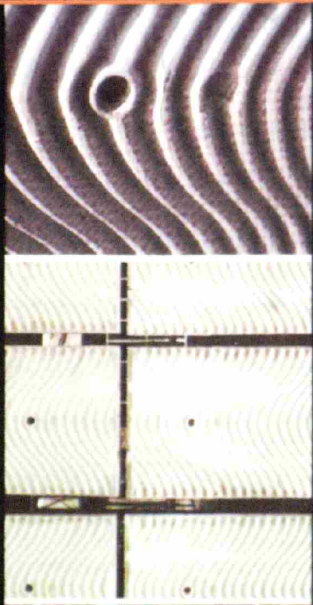
[]

Overview / Analysis >> **Moulding** Precedents

[01] Inverse Reproduction

using found objects as mediums (molds)
for reproduction of new objects

[02] Encasing



matter and expose it to the public. "This formal complexity of the individual containers is rationalized and subsumed through repetition into a visual field, a texture; but when viewed closely, it displays the geometric expressiveness of ornament -in this sense, created by repetitive absence, the negative impression of familiar consumer goods" [120].

[Lo/Tek -New York]

In the case of the Lite-Gate project, Lo/Tek has used a plastic shipping pallet as a mold in order to create door panels. The interest in this project lies in the composition of the cast material, which fuses the liquid material of resin with electronic devices, micro-sensors and neon tubes. The idea was the registration of entrance through the detection of movement by the sensors and the consequent illumination of the panels. In parallel, the sensors transmitted information to cameras, which recorded the people entering the apartment and projected the information in screens located in the interior of the apartment. Lo/Tek describe this project as "an illumination and surveillance device that marks the narrow corridor connecting two previously separate apartments. It recreates the experience of

[120] Ibid.

[121] Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002), p.68.

passing through a metal detector and acts as a luminous buffer between the outside world and the privacy of a home" [121] [figure 37].

The reuse of the shipping pallet that is utilized as a reproductive matrix exceeds its conventional role in providing formal features for the panel by-product. Instead the electronics are embedded in the mold and the final panel product turns out to be a compact solid panel with *wired* cast substance. In this sense, new modes of conceiving casting are disclosed; approaches that are unrelated to 'tiling' and decoration, but focus on the material composition of the mold yielding an *enhanced performance*.

[[Rachel Whiteread](#) - London]

Whiteread' s case is a particular one, since she casts obsolete spaces; entire parts of buildings illuminating the internal structure of their interior [figure 38]. More specifically, she selects buildings that are meant to be demolished and are already abandoned and she casts their internal space as a trace, a memory. Whiteread' s work is one of revelation; by turning the void space into a solid block, she exposes that which is not seen, that which does not exist in our perception as a coherent

Figure 37>> Lite-Gate Project by Lo/tek_ Hochberg Apartment, New York, 2001.

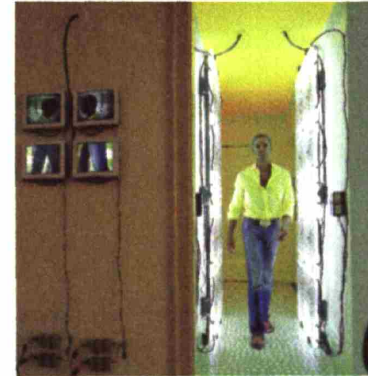
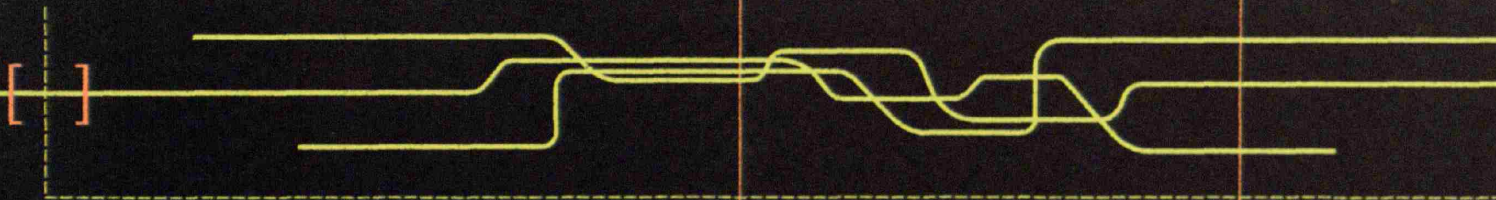


Figure 38 >> House by Rachel Whiteread_ Grove Road London, 1993.



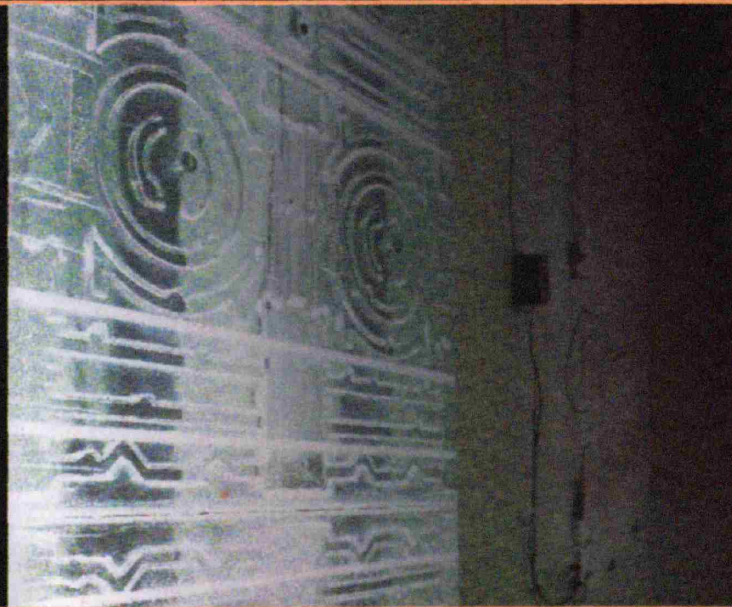


Overview / Analysis >> **Moulding** Precedents

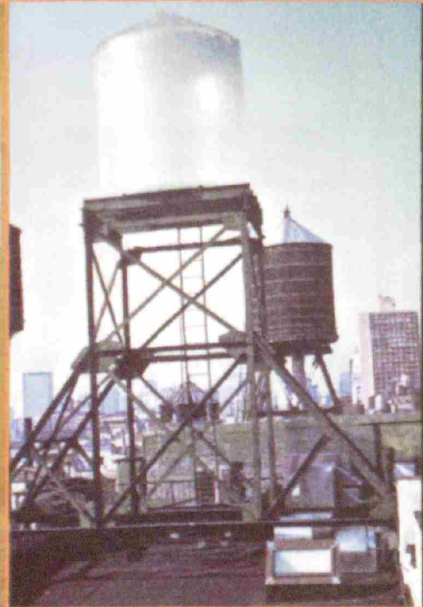
[01] Inverse Reproduction

using found objects as mediums (molds)
for reproduction of new objects

[02] Encasing



Lot/Ek



Rachel Whiteread

entity. "Her casts stays content with the negative, the inversion, the conundrum" [122]. Her materials have shifted significantly in time and in each given site, largely dependent on the texture that the mold has to bear as reminiscence of the obliterated space. By infusing different materials into large spaces in volume, her work moves ahead of the reproduction of a part used for tiling and stays aside from any interpretation relevant to decorative concerns. Instead her inverted cast spaces are giving volume and material to residual space, turning memory into a 'solid block'.

[Antony Gormley]

Antony Gormley has created an art series of diverse objects, each encased in a singular material, entitled 'Natural Selection'. The material Gormley selected was lead, which as a malleable metal would allow him to mold around his selected objects while retaining an approximation of their formal features in size and volume. Through this process of *wrapping*, the different objects were disconnected from their utilitarian identities and became part of a unified series, gaining new connections between them through their sheer size and volume [figure 39]. The series was one

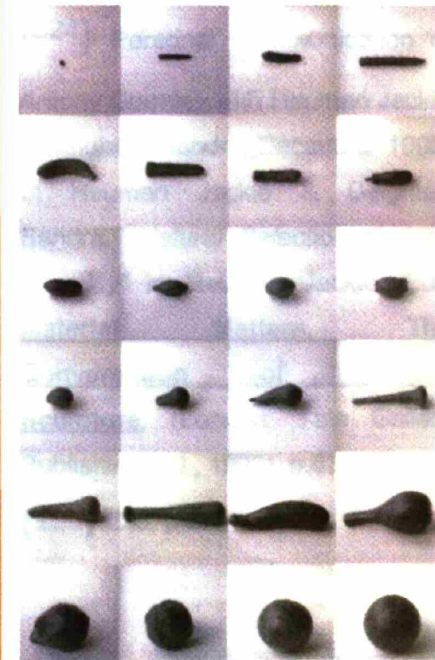
ii]

[122] Molly Nesbit, "Casting Out" in

Rachel Whiteread: Transient Spaces (New York: The Solomon R. Guggenheim, 2001), p.133.

Figure 39 >>

Antony Gormley_
Natural Selection 1981.



of evolution of form created by the most simple objects of everyday use; "pea, pencil, carrot, plumb bob, goose egg, grenade, lemon, light bulb, pear, paintbrush, parsnip, pestle, marrow, bottle, coconut, ball of string, melon and ball. It was important to the artist that each real object should be inside its lead casings" [123], as he mentioned that "the surface carries the memory of a moment in the history of the object" [124].

Some time after Gormley has submitted his art work for display, an interesting incidence occurred. "Soon after the sculpture was acquired, problems were noticed on the lead casings containing the banana, courgette, lemon, pea, parsnip and melon. The contents were decomposing and leaking, causing white disfiguring marks on the outside of the casings" [125]. Those casings containing natural elements were distinguished by the others because they were *contaminated from the inside* as the objects decayed. The museum that was hosting the art work at that time had to go through a process of cleansing the selection for reasons of hygiene, especially since they have already started to exude displeasing odors. When they opened the casings, they found to their surprise a new undefined material that has emerged from the interaction of the lead with the natural elements; an actual *dross* material.

[123] Heuman Jackie & Deighton Sandra, "Natural Selection. Antony Gormley" in Heuman Jackie (Ed), **Material Matters. The Conversation of Modern Sculpture**, (London: Tate Gallery Publishing Ltd., 1999), p.83.

[124] Personal Communication of Antony Gormley with Heuman Jackie & Deighton Sandra, December 1998. In Heuman Jackie & Deighton Sandra, "Natural Selection. Antony Gormley" in Heuman Jackie (Ed), **Material Matters. The Conversation of Modern Sculpture**, (London: Tate Gallery Publishing Ltd., 1999), p.83.

[125] Ibid, p.87.

On this issue, the curators note: "There was sufficient solder between the four pieces of lead that made up the casing sections to saw through with a small piercing saw without touching the lead either side. To our surprise, a very thick white and brown crusty layer filled the void between the coconut shell and the inside of the shell casing. It looked like plaster but was identified as *a lead corrosion product*. Lead is susceptible to change when in contact with mild acidic by-products from the decomposing coconut formed a basic lead carbonate. The flattened fibers on the coconut husk had encrusted particles of lead carbonate and in places there was black mould" [126].

[Kurt Schwitters - Hanover]

"Schwitters' Hanover Merzbau, begun as early as 1921 and continuing sporadically up to the point of his forced emigration from Nazi Germany in 1938, constituted a private, highly autobiographical extension of his literary and artistic productions. The work represented a *Carceri*-like *phantasmagoria* or dream *grotto* composed of the material detritus of late nineteenth and early twentieth century Hanover" [127].

Schwitters started developing the Merzbau by gathering diverse materials around the street and initially putting it together using techniques of *collage*. Although

[126] Ibid.

[127] Elizabeth Burns Gamard, "We Play until Death Shuts the Door" in Slow Space, Michael Bell & Sze Tsung Leong (Eds) (New York: The Monacelli Press, 1998), p.287.

collage was a method widely used and established during the 20s by the Cubists and the Dadaists, Schwitters' innovation lies elsewhere. His unremitting material additions, which involved in parallel subtraction of parts and constant reconfigurations of the overall composition, have turned the 'Merzbau' into a *developmental material organism* that was growing unexpectedly and integrating parts of its environment in time. Schwitters did not plan this extensive installation from the inception of the Merzbau project, but he became gradually possessed, expanding the Merzbau into his living space, sleeping space, *psychic* space. Each material addition required a rethinking of his processes and techniques and so although collage was primarily used, he conceived of alternative operations to manipulate materials such as molding, encasing and covering objects with surfaces that approximated the interior formation.

In this way, the Merzbau gained a significant *material depth* in time, the resultants of which are the *grottos* and *columns*, as the *interior spaces of the material itself*. Although these spaces are widely discussed by art critics, as spaces of 'paradox' linked to the spiritual and *psychic* dimension of this art oeuvre, they do not cease to utterly signify an *open* alternative perception of imaginative materiality; a materiality that is solidified as a developmental open matrix receptive to the introduction of diverse matter.

Elizabeth Burns Gamard makes a connection between this approach of material receptivity and the concurrent evolution to 'non-representational' art, meaning art produced without the mediation of representational systems, which can potentially derail the concept. She refers to representation as 'friction' in the art work and consequently binds such connotations with the German early 20th century concept of '*Aufbau*' that reflects primal origins in material use [128].

[128] Elizabeth Burns Gamard,
Kurt Schwitters Merzbau: The Cathedral of Erotic Misery (New York: Princeton Architectural Press, 2000), p.116.

[]

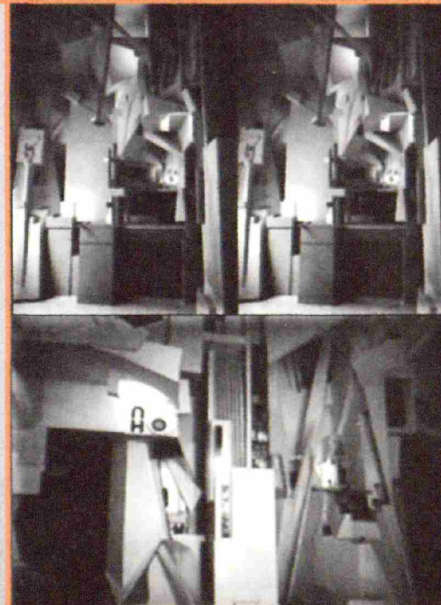
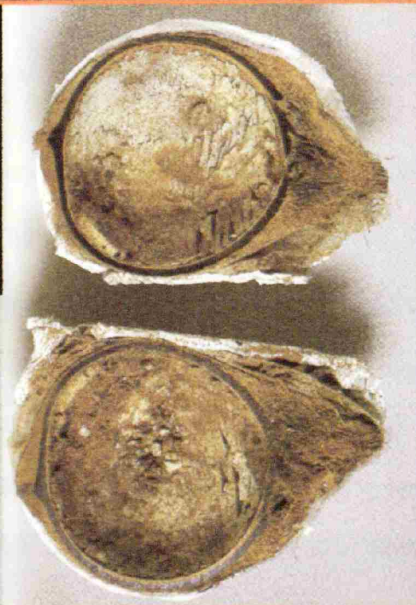
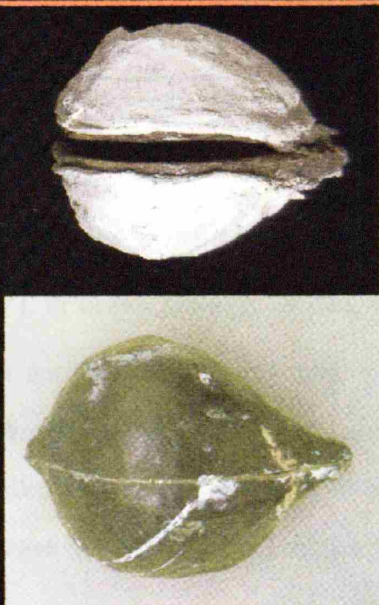
Overview / Analysis >>

Moulding Precedents

[01] Inverse Reproduction

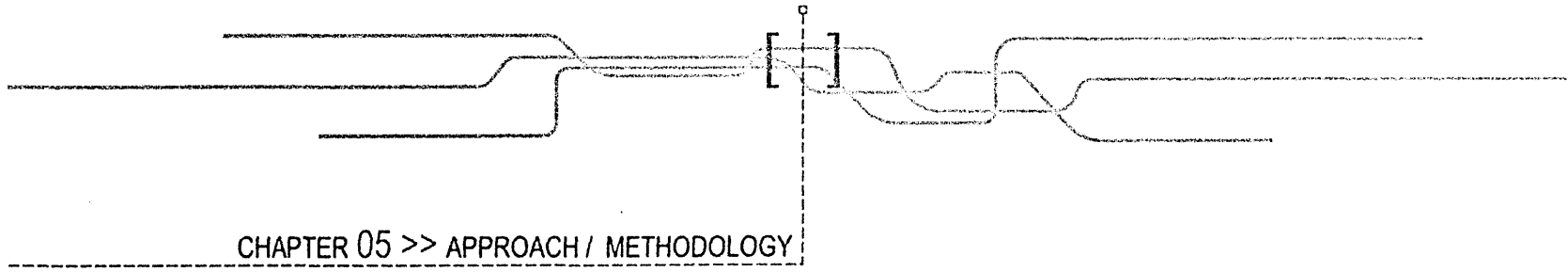
[02] Encasing

using various material layers to cover
and encase found objects and spaces



Antony Gormley

Merzbau



CHAPTER 05 >> APPROACH / METHODOLOGY

POST - PRAXIS

5.1 >> Parameters for a Design Post - Praxis

The Greek word 'parthenogenesis' [129] means virgin birth -genesis- or "reproduction without concourse of opposite sexes and union of sexual elements" [130]. In Greek however, it has an alternate understanding, originating etymologically from ancient Greek philosophy; it implies *a mental state of excess*, where the mind momentarily generates *pure and virgin ideas*, ideas that are unprecedented and unmixed with anything extant in the physical world. This was a concept deeply rooted in Greek myths. Athena [figure 40], daughter of Zeus and goddess of wisdom, has

[129] In Oxford English Dictionary Online,
<http://dictionary.oed.com/entrance.dtl>

[130] Ibid.

Approach / Methodology >> re-gensis ~ parthenogenesis

Parthenogenesis_

Etymology: [f. Gr. - virgin + origin, birth, nativity, GENESIS.]

Reproduction without concourse of opposite sexes or union of sexual elements.

Now usually restricted to reproduction by the development of a single sexual cell (as an ovum or ovule) without fertilization by union with one of the opposite sex (which occurs, normally or occasionally, in certain insects and other invertebrates, and in rare instances in plants); formerly used more widely to include asexual reproduction, as by fission or budding (cf. AGAMOGENESIS).

1849 OWEN (*title*) On Parthenogenesis, or the Successive Productions of Procreating Individuals from the Single Ovum. 1859 DARWIN *Orig. Spec.* xiv. (1878) 387 The term parthenogenesis implying that the mature females..are capable of producing fertile eggs without the concourse of the male. 1875 BENNETT & DYER *Sachs' Bot.* 805 *note*, *Parthenogenesis*..is a phenomenon of very rare occurrence in the vegetable kingdom. 1879 tr. *Haeckel's Evol. Man* I. ii. 28 The so-called parthenogenesis, or virginal generation, of Bees has been proved..by the meritorious zoologist, Siebold, of Munich, who also showed that male Bees develop from unimpregnated, and female bees only from impregnated eggs. 1886 VINES *Physiol. of Plants* xxiii. 674 When..these gametes, having failed to conjugate, germinate independently, it must be assumed that both male and female parthenogenesis takes place. 1889 GEDDES & THOMSON *Evol. of Sex* xiii. §1 In 1701, Albrecht observed that a female silkmoth, which had been isolated in a glass case, laid fertile eggs... The occasional parthenogenesis of this insect has been repeatedly confirmed by competent observers. 1902 D. H. CAMPBELL *Univ. Text-bk. Bot.* v. 122 In one species of Chara, *C. crinita*, the oöspores are developed without fertilizationone of the few well-authenticated cases of parthenogenesis. 1936 [see EUTELEGENESIS]. 1950 *Adv. Genetics* III. 195 In vertebrata normal parthenogenesis is unknown (with the possible exception of certain fish hybrids). 1965 BELL & COOMBE tr. *Strasburger's Textbk. Bot.* 203 There are exceptions in which a sexual cell will germinate and undergo development without fertilization. This phenomenon is referred to as parthenogenesis. Habitual parthenogenesis is that occurring when egg cells germinate regularly without fertilization.

emerged from the head of Zeus. "Her birth was most unusual. Zeus swallowed his first wife Thetis when she became pregnant, fearing a son would steal his throne. He developed a severe headache and his fellow god Hephaestus was good enough to split his head open with an ax. Athena emerged full grown, wearing a suit of armor, from the head of Zeus" [131]. In this sense, the concept of 'newness' that overwhelms us conceptually in our creative endeavors dates not only back to the industrial revolution and the paraphernalia of 'progress', but also all the way back to classical philosophy.

On the basis of the exegesis of *parthenogenesis* as the phenomenon of virgin birth, a *post-praxis* dwells conceptually on its counterpart. A post-praxis emerges as a germinal creative drive, through the desire for transformation of existing information, concepts and physical entities; it engrafts a *copiousness* of thought or "a transformative vision" [132], defying pure, virginal creations. In fact, a post - praxis resists utopia by acknowledging that meaning is not resolutely implanted in the physicality of objects or the conceptual vigor of singular concepts; instead it is a fluctuating, pulsing and ever changing condition, which can shift from object to object and from concept to concept. If we assume that nothing emerges 'out of

Figure 40 >>

Athena bearing the aegis



[131] Sean Henahan, "Asexual Stem Cell Production", in <http://www.accessexcellence.org/WN/SU/SU102001/parthenogenesis.htm>

zero', a post-praxis aims to retain the energy induced in creative systems and exploit the accumulative effect of knowledge and materiality.

In other fields, this developmental model of conceptual and cultural reuse has yielded extraordinary results. Open-Source software and the provision of freely accessible operating systems, such as Linux, exemplifies the potential exuded from accumulated and manipulated knowledge. Raymond markedly points out how Linux was developed as a collective creative endeavor that emerged from the process of addition and manipulation of source code, by millions of users dispersed around the world. He notes: "Good programmers know what to write. Great ones know what to rewrite and reuse. Linus, for example, didn't actually try to write Linux from scratch. Instead, he started by reusing code and ideas from Minix, a tiny Unix-like OS for 386 machines. Eventually all the Minix code went away or was completely rewritten -- but while it was there, it provided *scaffolding* for the infant that would eventually become Linux. In the same spirit, I went looking for an existing POP utility that was reasonably well coded, to use as a *development base*. The source-sharing tradition of the Unix world has always been friendly to code reuse (this is why the GNU project chose Unix as a base OS, in spite of serious reservations about the OS itself). The Linux world has taken this tradition nearly to its technological limit; it has terabytes of open sources generally available. So spending time looking

[132] Sheila Kennedy's remark about the creative process in Christoph Grunenberg, "The Appeal of the Real". Sheila Kennedy, Christoph Grunenberg, KVA: Material Misuse (London: AA Publications, 2001), p.63.

for some else's almost-good-enough is more likely to give you good results in the Linux world than anywhere else" [133].

Rosalind Krauss refers to the art of *copying* or the action of appropriation of the "other" as a primordial ingredient in the production of art. By referring to the use of live models from which artists draw inspiration throughout the entire history of art, she elaborately makes the argument that art inherently demands *copying*. This action though, is not a *mimetic* one, but an action of *interpretation and re-vision* of existing information, since the artist reuses the precedent through abstraction and uses his medium of representation as a generative implement to produce art.

Therefore, "the copyist is not the slave of imitation. He is also, at times, the master of invention. Needing to decide about ambiguous patches, he conjures a reading by imagining what would make sense. This new things is what he then delineates. The children's game 'telephone' is an example of a how a message passed from one person to another is transformed to a wholly new invention through the very rite of transmitted passage. Furthermore, one's feeling that ritual or other kinds of repeated forms have their own source of meaning in some long since forgotten referent from which the forms derived but which they no longer in any way resemble, only adds to the suggestive resonance of these forms. Their quality

[133] Eric S Raymond, "The Cathedral and the Bazaar. The Importance of Having Users". In http://www.redhat.com/knowledgebase/otherwhitepapers/whitepaper_cathedral-2.html .

as coded vehicles of repetition is what gives them their aesthetic authority. They have a purely formulaic rather than a mimetic relation to their referents. In this sense, the emblematic is a function of the world of the copy, rather than the world of nature. The process of copying is deeply embedded in the industry of art. It is what separates that industry from the romantic experience of art as either the continually fresh reflection of nature or the ever original product of the imagination. *Copying exists in a very different place from imagination or nature. For copying can either be situated at the mimetic pole- the imitation neither of nature- nor at the abstract pole- the pure projection of imagination or spirit*" [134].

Copying or reuse, as an essential component of the launching of imagination, becomes a major parameter for a design post-praxis. As a discourse, post-praxis stands aside from attempts to achieve 'newness from ground zero' and becomes feasible as a "text, produced only in the transformation of another text" [135]. "It is precisely a principle of contamination, a law of impurity, a parasitical economy" [136].

[134] Rosalind Krauss, **The Originality of the Avant - Garde and Other Modernist Myths** (Chicago: University of Chicago Press. 2003), p.126.

[135] Jacques Derrida, **Positions**, trans. Alan Bass (Chicago: University of Chicago, 1981), p.41, 42.

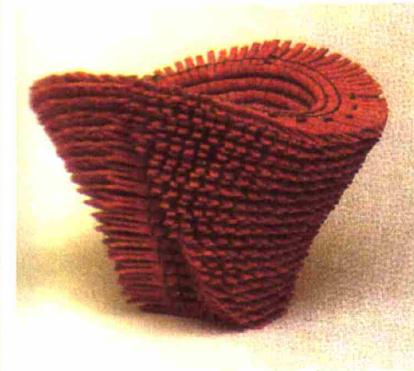
[136] Jacques Derrida, "The Law of Genre", **Glyph 7** (1980), p.206.

When related to the reuse of obsolete matter though, the act of copying is embedded in the appropriation of the material and the decision to manipulate it as 'raw matter'. In the course of this action, all other possible connotations, besides a component's current formal features and material composition, are disregarded. Given that the architectural process here does not begin from scratch, but from the reality of an existing inoperative component, *meaning* is inevitably shifted; it can no longer be located in the process of representing an abstract concept, but in the act of *appropriation and alteration* or the act of *molding* found material entities. Instead of a *genesis* of meaning, there is a *regeneration* of meaning and identity.

An interesting example that employs precisely this logic of *appropriation and alteration* in order to produce entirely new artifacts is the basket by Karyl Sisson entitled 'Just Ripe' [figure 41] and constructed out of "dyed miniature wooden clothes-pegs, twined with wire" [137]. Sisson has generated the vessel by following the lines and the material logic of her primal element, the clothe-peg. Sisson had not preconceived the final overall shape of the vessel and consequently deployed her elements to achieve a certain volume; instead the vessel was generated volumetrically through repetitive lines of clothe-pegs that were connected linearly with a wire and then twined in closed loop, one on top of each other. By closing

Figure 41 >>

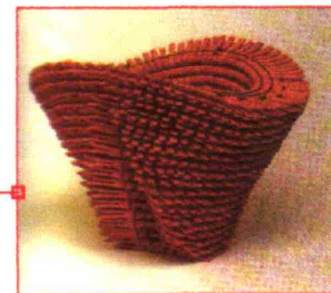
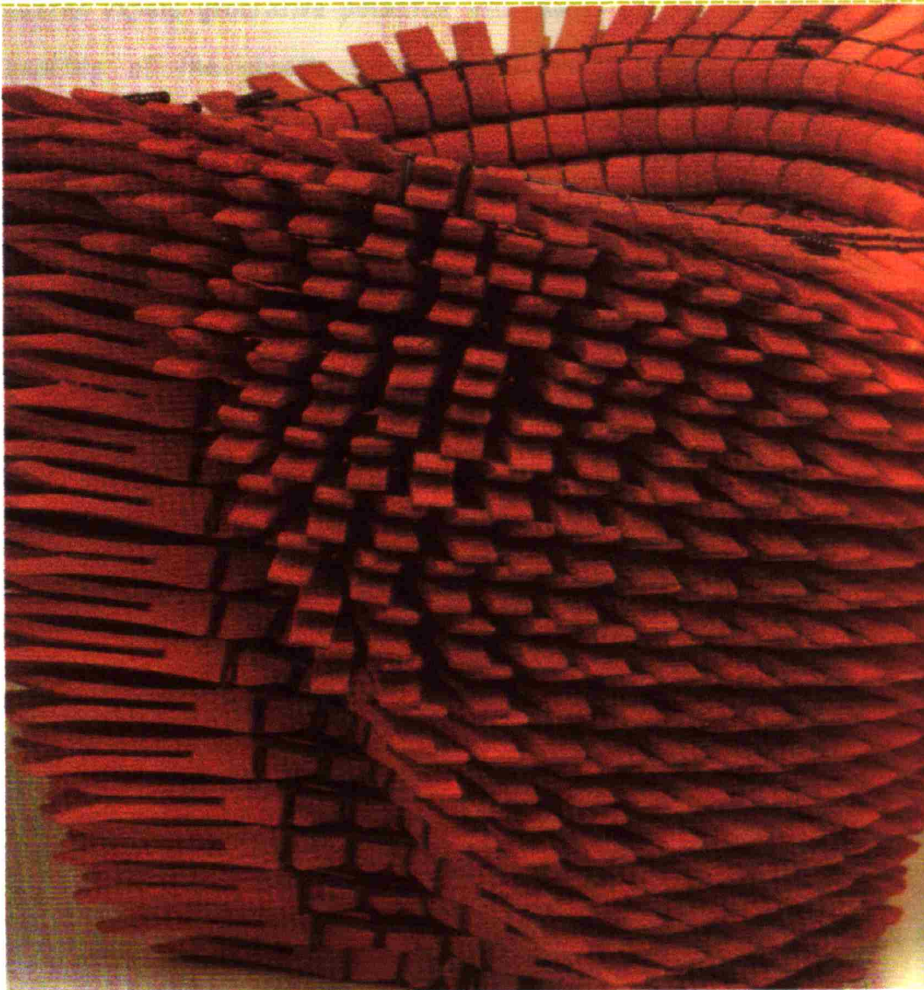
Basket by Karyl Sisson_
Entitled "Just Ripe"



[137] Martina Margetts (Ed),

International Crafts (London:
Thames & Hudson, 1991), p.137.

Approach / Methodology >> material in effect



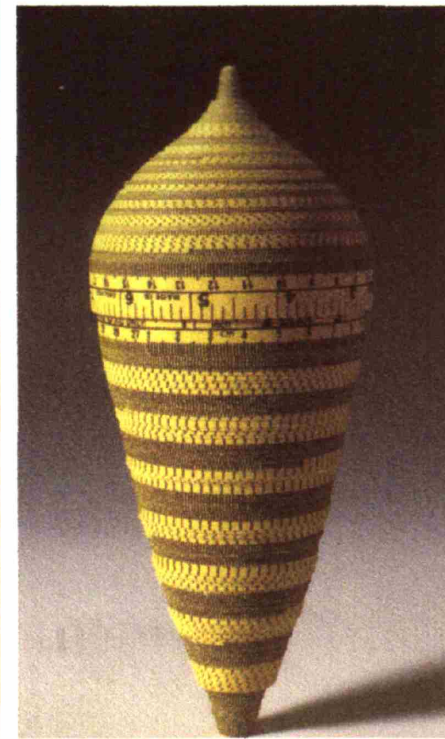
"Just Ripe" by Karyl Sisson

each loop and adding the next one on top, the overall shape was attained. In the course of this process, the form of the actual unit, its cavities and slopes as well as the way it reacted to the operations of twisting and twining have played a decisive role in the formation of the object. In this sense, the reuse of obsolete matter expels generative potential and ceases to propagandize solely the technical benefits of the generic reuse of materials. Another example by Karyl Sisson depicting a similar logic of formation is 'Faux Pot with Lid' [figure 42], where coiled tape-measures unfold vertically and in various diameters in order to produce another vessel. Again in this case, the figure is emergent from the selected material and its intrinsic properties.

Sisson's baskets depict a *resistance to representation* as a mode for spatial production. The final product was not firstly represented and accordingly executed. Instead the unit or the primal material used each time has yielded the final result. This mere fact of a practice that emerges from a given materiality and from the generative reuse of obsolete matter challenges conventional assumptions deeply rooted within our discipline. In fact, the primary assumption that it challenges is the momentous role that representation can play in the cohesion between a conceptual artifact and a material spatial entity. In most cases, representation plays a key role

Figure 42 >>

Basket by Karyl Sisson_
Entitled 'Faux Pot with Lid'



in the coalescence of concept and construct, not only as a medium of conveying and narrating a determined meaning, but also as code of creating new meaning, while the medium seeks to establish a relationship with itself. In this sense, mediums of representation, as external parameters to the design process, are not neutral tools of translating an idea, into its concrete form. They are neither authentic means of creativity, nor vapid carriers of an idea. In the case of Karyl Sisson, as well as in the construction of the Hanover 'Merzbau' by Kurt Schwitters, a fundamentally different paradigm is delivered; a post-praxis that begins from the reality of obsolete components and spaces and based on their materiality, departs to unknown destinations.

On her analysis of the 'Merzbau', Elizabeth Burns-Gamard depicts the nascence of a non-representational art, evolving from diverse matter and its deployment in space. Citing the principles of Schwitters' in the 'i-manifest', she remarks that within the frame of this new paradigm, art is an *open integrative material field* that evolves via the "introduction of diverse matter (*materia*) which, in turn, produces the additional energies necessary to sustain further development. The introduction of *materia*, usually in a form that creates tension (friction) for the host, effects changes of state (the source of energy) as it is incorporated into an ever-

developing field of associations and reactions. The introduction of friction in the form of diverse matter is a primary aspect of alchemical and hermetic experimentations as well...

According to the 'i-manifest', the forming of the work of art requires 'large ready-made complexes that count as the material, to shorten as much as possible the path leading from the intuition to the actualization [*sichtbarmachung*] of the artistic idea, so as to avoid heat loss through friction'. The 'ready-made complexes', what may here be regarded as the *prima materia* are the grottoes, caves, rooms, columns. Over time these constructions constituted an actualized expression of an idea that occurred through the process of gathering and assembling myriad bits of information" [138].

She consequently traces a connection of non-representational art to the concept of '*aufbau*' that arose in artistic explorations in late nineteenth and early twentieth century Germany. The word '*aufbau*' translates to English as 'building'; however it "alludes to the intuitive, mystical nature of the 'building art.' In English, *aufbau* roughly translates into three words, all of which are interrelated: construction, organization, and structure... As a fundamental principle in the development of the design arts... *aufbau* reflected the search for primal origins" [139].

[138] Elizabeth Burn-Gamard, Kurt

Schwitters's Merzbau: The Cathedral of Erotic Misery, (New York: Princeton Architectural Press, 2000), p.116.

[139] Ibid, p.119.

Copying as in appropriating material for further generative use and *resisting representation* were identified in the previous section, as parameters for a design post-praxis. By naming these actions as parameters, I mean that they are essentially inscribed in creative activities that do not begin from scratch and encompass the generative potential of extant conditions and materials, driven by the desire for their transformation. In this section, the focus will be on outlining my individual parameters for a design post-praxis, or in other words my principal methods for the design operations that will unfold in the following two chapters. There are two vital strategic decisions or methods that precede the actual engagement with obsolete matter in each different case; the first one will be cited as *composite graft* and the second as *plastic matter*.

The first principle for *composite grafting* denotes the combination of actual obsolete components -in the scales of an object, a room and a building- and their by-products. It should be noted here that the term 'by-product' in this case, does not connote obsolete objects of the utilitarian waste stream; instead the term

advertises new 'artificial' objects that can be formed by using an obsolete component as a reproductive matrix or a mold. By using found objects as molds and casting on them different materials than the ones they were made of, the occurring by-products will retain partially characteristics of the original object but will have different properties. If for instance an assembly line of identical obsolete objects is based almost exclusively on the form of the unit, by changing this unit's material properties in numerous cast variations, the nature of the assembly line would change radically and attain local behaviors and properties according to the material synthesis of the by-products. Composite materials make a useful analogy to the strategy of a composite graft. Composite materials are composed of elements that work together to produce material properties that are different to the properties of those elements on their own. "The result is a new substance whose properties are different and superior to those of the original elements, but where the mixed elements retain their individual characteristics" [140]. On the basis of this assumption that relates to the behavior of material synthesis in a micro-level, it is advocated that larger obsolete ready-made components combined with their *by-products* will yield similar results. *Grafting* the actual obsolete component that has been rendered displaced and needs to be reused, with its own by-products, one can actually begin to develop new material properties and spatial products that exceed

[140] Johan Bettum, "Skin Deep. Polymer Composite Materials in Architecture", Architectural Design (A.D), Vol.72 No.1, (London: Willey Academy, 2002), p.72.

the realm of *signification*. Moreover, one can probe into the process of casting and imagine ways of reproduction that transgress the equal repetition of by-products. Casting is a process of many stages and these stages can be planned in such a way in order to yield variations instead of the exclusive return of the original object. In the following chapter, alternative modes to conceive of casting and molding processes will be analyzed in depth. At this point it is important to see that by using an obsolete object, room or building as a mold in order to produce by-products, a pool of different components emerges; components that are not all alike, but at the same time they are not irrelevant or formally antithetical to each other. By binding these objects in elusive yet promising combinations, one can imagine an emergent materiality with local behaviors and variable performances.

This decision is crucial to my understanding of what material manipulation is really about. Overwhelmed with the amounts of waste streams in all possible scales of reference, we either use objects as they are and put them together in a repetitive manner or liquefy them so as not to deal with their materiality at all. The fact that we need to reuse the actual obsolete matter that is nondisposable is apparent and indisputable. However, perhaps it is essential to bind this matter in more mystical assemblies in order to reuse it also to a cultural effect. This reused matter

necessitates compulsively a new identity and a new relationship with its environment, other than the label 'reused matter' and the concomitant positivist assumptions. Along these lines, lies the discourse of *dross*; *dross* is neither concerned with the salvation of the planet, nor with environmental policies. It is rather yearning for the fluctuation of meaning and identity of displaced matter.

The method for a *composite graft* of obsolete objects and their by-products also touches on some of reuse's most deeply rooted conventions; such a convention is the dogma that reuse should be structured as a precise analogue of the way that natural systems deal with their waste. By considering the production of new components out of casting on found objects, artificiality becomes part of the equation for manipulating waste streams. On this argument, the French philosopher Francois Dagognet argues "that nature has not been natural, in the sense of pure and untouched by human works, for millennia. More provocatively, he asserts that nature's malleability demonstrates an invitation to the 'artificial'. Nature is a blind *bricoleur*, an elementary logic of combinations, yielding an infinity of potential differences. These differences are not prefigured by final causes, and there is no latent perfection-seeking homeostasis. If the word 'nature' is to retain a meaning, it must signify an uninhibited polyphenomenality of display. Once understood in this

way, the only natural for man to do would be to facilitate, encourage and accelerate its unfurling –thematic variation, not rigor mortis. Dagognet challenges is in a consummately modern fashion”; either one adopts a sort of veneration before the immensity of ‘that which is’ or one accepts the possibility of manipulation’. The term manipulation carries with it the appropriate ambiguities implying both an urge to dominate and discipline as well as an imperative to improve on the organic. Confronting this complexity constitutes the challenge of artificiality and enlightenment” [141].

The second principle-method for the design post –praxis outlined here is *plastic matter*. By this term, I refer to a condition of material indeterminacy, where material is malleable and deformed slightly from its original status, while maintaining some of its primary characteristics. In reality, this condition occurs in a wide variety of polymers when heat is applied to them and they reach a *mesophase* where they are neither liquids nor solids. *Heating* is a method that is considered distinct from any tools linked to the architectural design process, while other methods such as *assembling* are common practices within our discipline; However the effects of heating in materials such as thermoplastic polymers could be described as physical

[141] Paul Rabinow, “Artificiality and Enlightenment: From Sociobiology to Biosociality” in Jonathan Crary & Sanford Kwinter (Eds), Incorporations. Zone (Series);6 (New York, NY: Zone, MIT Press, 1992), p. 249.

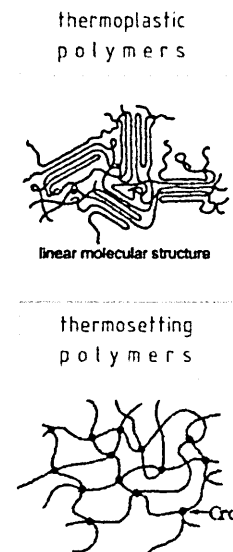
conditions that immediately relate to digital tools -currently available 'deformers' in 3d modeling environments, such as twist, taper, spherify, bend etc.

A wide variety of obsolete matter in the scale of objects and rooms are composed of different kinds of thermoplastic polymers, either entirely or partially. Oil and water containers, tubes and milk bottles are made up in a vast majority of cases from polyethylene (PE) and polystyrene (PS); Cases for computers, TVs, shower trays, vacuum cleaners, pipes, RV parts, boat shells, letter boxes, windsurf boards are made up from Acrylonitrile-butadiene-styrene (ABS); Automobile parts and plumbing parts are made up from Polyoxymethylene (POM), Acetal [142]. And these are some of very few cases of thermoplastic polymers that can "soften when heated and harden again to their original state when cooled" [143]. More specifically, thermoplastic materials -one of the main three basic types of polymers along with thermoset and elastomeric polymers- are linear polymers instead of network polymers, having the ability to be formed and reformed almost without any limitations [figure 43]. This is due to their chemical composition in a micro-level, since in a linear structure individual molecules have no chemical links between them. They are held in place by weak secondary bonds that are called intermolecular forces. With the application of heat and pressure, these intermolecular bonds in a solid thermoplastic polymer can be temporarily broken and the molecules can be

[142] This information was retrieved from Ashby Mike & Johnson Kara, Materials and Design (Oxford, UK: Butterworth-Heinemann, 2002), p.188, 191, 195.

[143] Ibid, p.177.

Figure 43 >> Molecular Structure of Thermoset & Thermoplastic Polymers

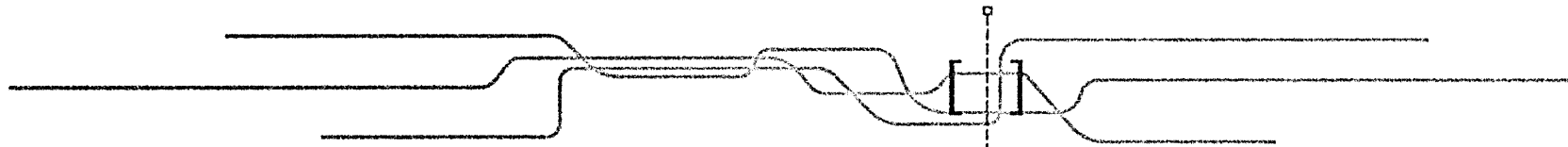


moved relative to each other to flow into new positions. Upon cooling, the molecules freeze into their new positions, restoring the secondary bonds between them and resulting in a new solid shape [144].

As a result "thermoplastic materials can be remelted and cooled time after time without undergoing any appreciable chemical change" [145]. These materials can change their form to some extent when heat is applied to them and then consolidate in their new reformed condition. The simple possibility of perpetual reformation, which is derivative of the material properties of many obsolete components, allows for their direct *molding manipulation* in order to achieve new material compositions; compositions that in some manner retain properties of the components' previous status and emerge partially from their generative material potential.

[144] Mel M. Schwartz, Composite Materials. Processing, Fabrication and Applications (Volume II) (US: Prentice Hall Inc., 1997), p.9.

[145] Ibid.



CHAPTER 06 >> EXPLORATION

DESIGN EXPLORATION OF MOULDING PROCESSES

6.1

>> Moulding Processes

"Casting is a process. A surface is encompassed, flooded, or smeared with a material that hardens over and against it. Eventually, the material can be pulled away. A mimetic transfer has been left on the material. It has acquired an imprint; a negative of the surface. At this point another set of steps can ensue, since the negative itself can be cast in turn, becoming then a mold for pouring a new object. If cast again, the surface returns; positively mimetic. Here, we say, pointing a finger high, is the true copy. But is this copy the caster's one true end? Casting being a process with steps, it can become a flight of steps, or it can stop on one end and stay" [146].

[146] Molly Nesbit, "Casting Out" in

Rachel Whiteread: Transient Spaces (New York: The Solomon R. Guggenheim, 2001), p.133.

As Molly Nesbit points out, molding is a procedural phenomenon that can only be accomplished in steps; but most importantly, molding is an interrelational phenomenon between two objects, the mold and the cast [figure 44]. Although one of the two objects belongs to a suspended realm of the 'unseen' and essentially comprises a phantom, the final product of the molding process is derivative from the interaction between the mold and the cast. It not a self defined entity.

Although in the history of sculpture of the past centuries, molding was mostly associated with a drive for precision and immaculate form definition, in ancient times molding was used for the production of objects that were carriers of mystery and wonder. On the basis of the earlier forms of casting in ancient Greece, Beatriz Colomina describes the process as "a ritualistic, rather than a scientific, function" [147]. The first wax models of bodies made were the death masks used in funerary rites in ancient Greece (ca. 300 B.C) and the was models of body parts, for which healing was hoped, offered to deities [148]. At the same time, masks were used in theatrical performances as mediators that would disconnect the personality of the actor from his role and 'void his body' in disguise.

Figure 44 >>

Lost Wax Molding Method_ South India and Bangladesh.

All of the stages of production for a larger south Indian lost wax piece It takes approximately 6 weeks to complete a 24 inch piece.



[147] Beatriz Colomina, "*I Dreamt I Was a Wall*" in **Rachel Whiteread: Transient Spaces** (New York: The Solomon R. Guggenheim, 2001), p.77.

The scope of this chapter is to use molding as a methodological tool or process applied to a variety of obsolete objects in different scales of reference –object, room, and building. By performing various molding operations to these obsolete components, one can at the same time put in effect the two methods outlined in the previous chapter, *composite graft* and *plastic matter*. Again, the former term implies the grafting of inoperative components with their eventual by-products, meaning the products that occur if the inoperative component is used as a reproductive matrix or as a mold. The latter term implies the attainment of a plastic condition of material indeterminacy that occurs in a wide range of materials when heat is applied to them.

Before though actually selecting objects and spaces for molding experimentations, it is necessary to analyze different ways of perceiving the process of molding that underlie the eventual products. Grounded on the procedural definition of molding, one can quite easily imagine that molding can potentially derail from producing identical copies of an object or from the scope of realizing a predetermined shape. By altering the mold, or the materials that participate in the process and their principles of interaction, molding can be perceived as a process of perpetual transformation; a transformation though that in each step of the process always bears the imprint of the other part.

[148] Beatriz Colomina in her essay “*I Dreamt I Was a Wall*” referring to Joseph C.T. Chen, “*The Development of Anatomic Art and Sciences: The Ceroplastica Anatomy Models of La Specola*” in Neurosurgery 45, No.4 (October 1999), p.884.

Therefore, I have identified five different molding paradigms escalating in complexity. This complexity does not refer to any technical specifications or requirements that entail molding as a manufacturing process within the framework of industrial production. The classification is derivative from the core structure of relationships between the cast and the mold as two elements that can form and reform each other, in the course of the molding process. Moreover, the examples analyzed for each category as follows, are restricted to the use of obsolete matter as a mold.

6.1.1 Mimetic molding >> Material Transfer

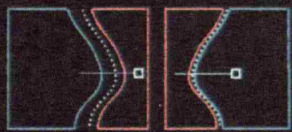
This is the conventional type of molding that is used for replication and repetition of numerous copies. In this case, the inoperative component is used as a matrix upon which material is cast and the new object returns the inverse shape of the component. Nonetheless, the new object is infused with a new materiality and texture according to the selected cast material. Since the final product imitates the mold *in reverse* this molding category is entitled as *mimetic molding*.

An example of this type of molding is the 'Monument' by Rachel Whiteread, set up in Trafalgar Square, London 2001. The monument is "a replica in clear resin of an empty plinth in Trafalgar Square" [149]. It is placed on top of a large pedestal, filling the missing part. Although the two parts are formally indistinguishable, their

[149] Beatriz Colomina, "*I Dreamt I Was a Wall*", p.86.

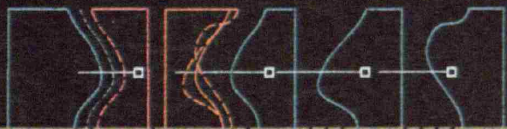
Design exploration >> Mold / Cast relationships

01



Mimetic molding >> Material transfer

02



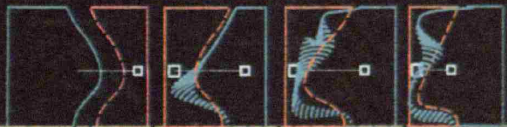
Flexible molding >> Orchestrated variability

03



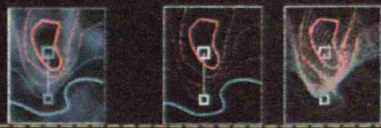
Precision loss molding >> Deteriorating mold

04

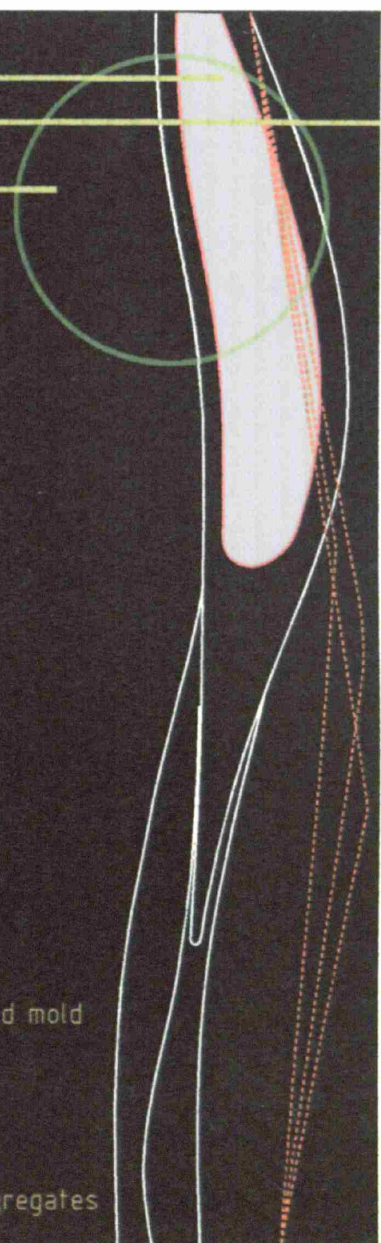


Material exchange molding >> Porous scaffold mold

05



Particle interaction molding >> molding of aggregates



significantly different material status -granite plinth and resin- portrays an interrelationship of interrogation that bonds them in a mystified assemblage.

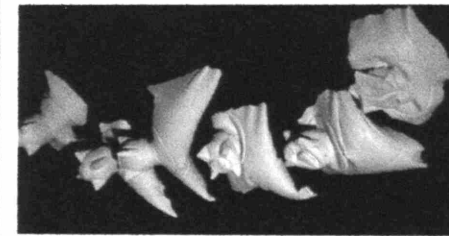
6.1.2 Flexible Molding >> Orchestrated variability

This is a type of molding that entails the formation of an elastic mold that can deform in different configurations and produce multiple variations. The flexible mold is derivative by using an inoperative component as a mold. In this process, there are three stages: in the first one, an inoperative component is appropriated and used as a reproductive mold; in the second stage, elastomeric material is poured on this component in order to produce the flexible new mold; in the third stage, the flexible mold is used as a new matrix that can be deformed in various ways and produce geometric variations. It should be noted here, that in order for the matrix to be actually flexible in the second stage, the selection of material poured in the initial component is crucial; elastomers in general, such as neoprene, silicone, bakelite, EPM etc., make excellent candidates for this purpose. This molding category is mentioned as *orchestrated variability*, due to the formation of a mold that instead of being used as a matrix for replicas, changes its shape in a controlled manner in order to produce multiple geometric variants.

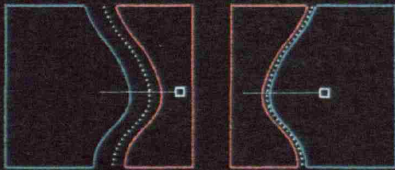
An example of this type of molding is the series of casts with latex and plaster by Pia Ednie-Brown, who has produced a latex mold of a shower cap and consequently poured plaster on it in a number of different positions. Regarding her experiments, she mentions: "Each one of these series is a product of deformation of the same mold... The act of making involved a kind of *puppeteering* act in which the elastic molds were suspended with string, positioned with wire and held down with tape under chairs, in boxes, off coat hangers—whatever was at hand. Pouring in the plaster was always a somewhat precarious operation and could never be completely controlled. The latex stretched and deformed with the weight of the fluid plaster, particularly as the makeshift supports fell away and shifted. The resulting casts arose out of the coalescing involutions of a myriad of variable relations all struck into accord: form extracted from dynamic interactions, fall in into one another in a collaborative agreement with a responsively overarching skin" ^[150] [figure 45]. In the case of Ednie-Brown, the term orchestrated that I used above is quite misleading; it was the initial assumption and the drive for her project, but as the process unfolded, she discovered that the actual outcome was founded on the interaction of the shower tap mold, the environment that it was positioned and the material properties of the liquid that she used. Nevertheless, the example is classified in this section on the basis of the initial incentives for this project. In

[150] Pia Ednie-Brown, "The Will to Animation" in **Architectural Design (A.D)**, Vol.71, No.2 (London: Willey - Academy, April 2001), p.65.

Figure 45 >> Molding Experiments with Latex and Plaster by Pia Ednie-Brown

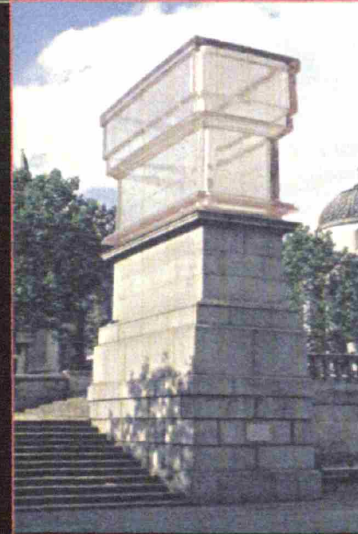


Design exploration >> Molding Processes



01

Mimetic *molding* >> Material transfer



01

02

Flexible *molding* >> Orchestrated variability



02

parallel, it depicts that in a process such as molding that implicates a number of time-consuming stages, things can derail and go offhand independently of what we initially assume.

The type of orchestrated variability that is feasible via the use of a rubber component as a flexible mold is not an entirely controlled process; the rubber can indeed deform to a number of positions, but cannot be precisely proscribed in order to be utilized in the manufacturing industry. In fact, the aviation and the naval industries are currently investigating on the topic, since reconfigurable molding devices would allow them for the production of parts via the use of a single mold that changes its shape for each casting. However, in searches linked to manufacturing, the necessity for precision is considerable and therefore variation is electronically controlled for precision purposes.

6.1.3 'Precision Loss' Molding >> Deteriorating mold

In this type of molding, the mold that is produced by casting onto an inoperative component is from either a biodegradable material, such as ice and biodegradable polymers, or from a material that deteriorates if being cast repetitively. The deteriorating mold is derivative by using an inoperative component as a mold.

Variation occurs in this category of molding as well as; the difference between this case and the previous one lies on the manner that variation is achieved. In the second case, variation is a willful action that is orchestrated by the geometric reconfiguration of the mold, whereas in the third case, it is the substance of the material that changes by deteriorating and losing the acuteness of its texture. In other words, the mold gradually loses information, which previously defined its sharp geometry. There are again three stages that describe the process; in the first one, an inoperative component is appropriated and used as a reproductive mold; in the second stage, biodegradable material is poured on this component in order to produce the 'deteriorating' new mold; in the third stage, the 'deteriorating' mold is used as a new matrix successively for variations until it becomes completely amorphous. It should be noted here, that in order for the matrix to be actually 'deteriorating' in the second stage, the selection of material poured in the initial component is crucial; biodegradable plastics in general, such as casein, gelatin, cellulose, polyesters etc., make excellent candidates for this purpose.

An example of this type of moulding is the attempt of David Sellers to produce housing entirely made of snow in 1973. Sellers' initiative was twofold; he was investigating manners to produce housing with a valueless material abundantly

Figure 46 >>

Snow Moulding

by David Sellers 1973



available in nature and at the same time mold the material in order to achieve desirable variations. These variations would occur either by actually sculpting the ice or by leaving it to degrade partially [figure 46]. The editor of the AD in 1973 mentions: "David Sellers has solved the rather tricky problem of creating cheap but variable moulding forms for free-form polyurethane shelters- by using snow. The snow is built up to the required shape and covered with Hessian. It is then sprayed with low temperature foam to create a shell of a thickness of between two and eight inches, depending on the structural requirements. In this way, Sellers was able to build a four room 1000sq ft house for less than \$8000" [151].

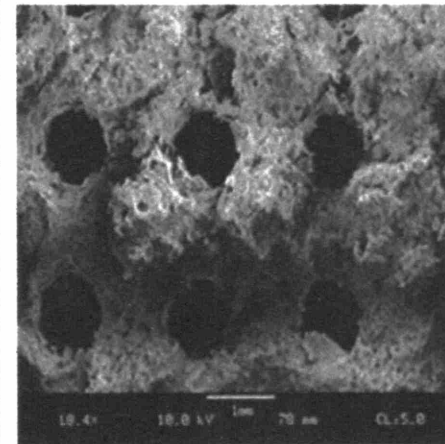
6.1.4 'Material Exchange' Molding >> Porous Scaffold Mold

This is a type of molding where the mold does not determine the shape of the cast. It defers formal explorations and fuses in the realm of material grafting and artificial skins. In this case, the mold that is produced by casting onto an inoperative component is from biodegradable polymers and essentially acts like a *porous material scaffold*, instead of a shape prescribing the cast form [figure 47].

Variation does not occur in this category; rather emphasis lies in the nurturing of cast from the mold, as the material that is bred into the mold is intruded in a micro-level. The cast evolves as the mold decomposes and in the end the remaining

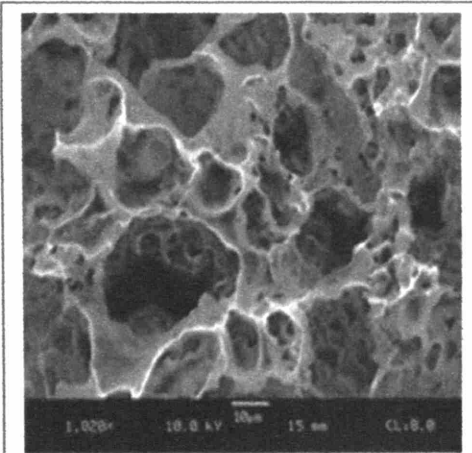
[151] Pidgeon Monica, "Snow Moulding" in **Architectural Design (AD)**, Vol XL III 12 (London: The Standard Catalogue Co Ltd, 1973), p.751.

Figure 47 >> Material Scaffolds for the production of artificial skin with local/global pore structures



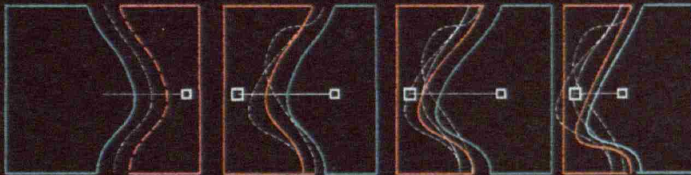
product has absorbed the material structure of the mold. There are again three stages that describe the process; in the first one, an inoperative component is appropriated and used as a reproductive mold; in the second stage, biodegradable material is poured on this component in order to produce the 'porous scaffold' mold; in the third stage, the 'porous scaffold' mold is used as a new matrix where cells are bred.

Artificial skins comprise a precise analogue for this case. In their essay 'Artificial Organs' Dr. Joseph Vacanti and Robert Langer explain how the growth of artificial organs will be a reality in the future. "The structure of each system –muscle, skin– would be duplicated in bio-degradable plastic. These 'scaffolds' would then be seeded with cells of relevant tissues. The cells divide and the plastic degrades, finally only coherent tissue remains. A mechanical pump would provide nutrients and remove wastes until the arm, which would take roughly six weeks to grow can be attached to the body" [152] [figure 48]. The essential difficulties scientists have to overcome in order to make this a reality do not involve so much the production process of the organ, which is one of cultivation, rather than fabrication. The critical issue is centered on the assimilation of the organ by the organism, its building a



[152] Neal Spiller, "Leaving Nadir"
in **Architectural Design Profile**
(A.D), No.123 (London: Academy
Group Ltd., 1996), p.93.

Design exploration >> Molding Processes



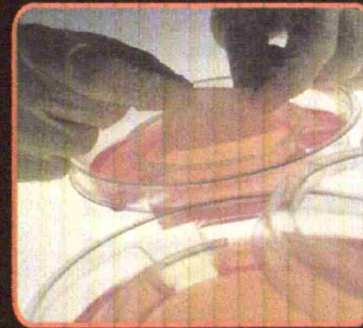
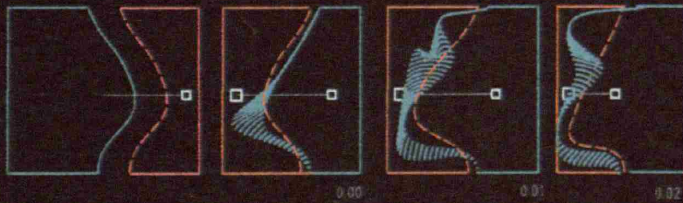
03

Precision loss *molding* >> Deteriorating mold



04

Material exchange *molding* >> Porous scaffold mold



degree of acceptance. Every cell has to be connected with another in order for the new organ to be systemically integrated.

In the early 90's developments in tissue engineering have played a crucial role towards the materialization of this possibility. After casts are prepared and bred with cells, tissue engineering deals with the construction of artificial support systems, "to direct and control the growth of tissue into a desired shape in order to replace or support the function of defective or injured parts" [153].

By stretching reality and projecting into the near future on the basis of these existing methods, we are dealing with a novel kind of molding that essentially redefines the act of molding itself. Artificial skin is a process of "augmenting the body with alien materials" [154] and creating an extra layer with enhanced properties, such as permeability, deformability, augmented elasticity, hypersensitivity and endurance. The process of molding here goes further than any geometric affairs. Reconstruction here is literal and refers to *material bits*, as each neuron and each cell has to connect to existing and be *assimilated* by it.

Figure 48 >> Growth of Artificial Skins in laboratories



[153] Ionat Zurr & Oron Catts, "Emergence of the Semi-Living" in **Thresholds No. 24; Reproduction and Production** (Cambridge, Massachusetts: Department of Architecture, Massachusetts Institute of Technology, 2002).

[154] Jennifer Tobias, "Artificial Skin; Ingrown and Outsourced" in Ellen Lupton (Ed.) **Skin. Surface. Substance + Design** (New York: Princeton Architectural Press, 2002), p.47.

6.1.5 Particle Interaction Molding >> Molding of Aggregates

This final category of molding processes is rather metaphoric, since the mold and the cast are not actual physical objects, but rather physical systems consisted of myriads of micro-particles, such as granular material. The mold and the cast in this case could be better described as material fields that interact as energies and have a constant effect to the formation of the other. Such is the case of the wind and the sand in the formation of sand dunes in the dessert.

Dunes form where loose sediment accumulates. The requirements for dune formation can be summed up as follows:

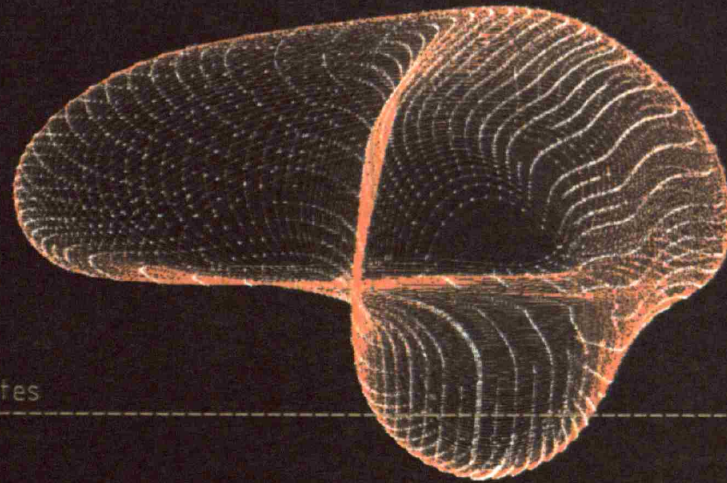
- energy to move sediment* -usually wind, but dunes can form underwater in rivers.
- some obstacle around which sand accumulates* -areas with sparse vegetation commonly form dunes; dunes also form around rocks.
- *dry climate* -moisture causes sand grains to stick together. Larger grains are more difficult to transport by wind. Moisture also facilitates plant growth, which stabilizes loose sediment and prevents it from moving. [155]

[155] **Explore the World of Earth**

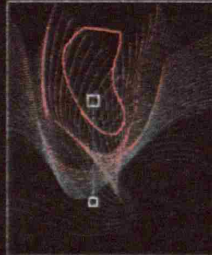
Science, Section of Investigations,
Chapter 16: Wind, Waves, and
Currents, In:

http://www.classzone.com/books/earth_science/terc/navigation/investigation.cfm .

Design exploration >> Molding Processes



05 Particle interaction *molding* >> molding of aggregates






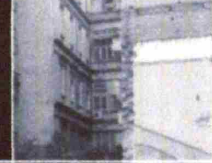












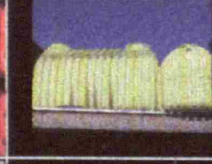











In order to test the aforementioned molding operations, I have created a *matrix* of objects escalating in scale that can serve as a pool for design exploration. The objects that constitute the matrix –circuitboard, helmet, plastic container, bikelid, watertank, partition wall and building part– were selected randomly up to a certain extent. In other words, the selection did not entail a scientific methodology, however a number of parameters were considered. Such parameters were the complexity in texture and form of the obsolete objects, notable hindrances in their disposability, frequency of finding the particular obsolete objects, material composition and other factors.

Once the selection has taken place, the methodology was to run each object through the molding processes outlined in the previous section. In this sense, the *matrix* has played the role of a *generating device* for new material, new images and new concepts. Each obsolete object has delivered innumerable and variable by-products that can either open the imagination through an apocalypse of the material plasticity in each case, or they can be directly used in new assemblages.

Design exploration >> *Selection* of obsolete objects, spaces & building parts

Matrix

01	02	03	04	05	06	07
Circuitboard	Helmet	Bike lid	Plastic container	Water tank	Party/Blind Wall	Part of building
						
						
						
						

object

room

building

This section is intentionally referred to as an exploration instead of a research, since the process had no ultimate goal or determined scope. It has rather been an open self-indulgent process, conducted for observation and motivation.

Before presenting the actual outcomes of the molding experiments in the case of each object, room and building that comprise the matrix, it is necessary to delineate how each molding process was translated through the use of digital media. The core principles of each molding process were converted into a specific set of digital operations that were performed sequentially for each object of the matrix.

To be more precise, these translations go as follows:

1. Mimetic Molding __Material Transfer

Core principle >> *material texture*

In this process, material texture signifies material only as a surface that is applied on an object, as if form and material are two independent and secluded operations.

This is a very simple operation of reproduction and change in texture bitmaps.

2. Flexible Molding __ Orchestrated Variability

Core principle >> *shift in geometry*

In this process, the objects are subject to a series of deformations via digital tools that are directly available in Rhinoceros 3d modeling software. Such common 'deformers' are 'flow', 'twist', 'bend', 'tapper' etc. The process of deformation involves purely the geometry of the object. The way in which the object deforms is derivative to a great extent from the way it was geometrically constructed in Rhinoceros. The deformation portrays in parallel its construction decisions, in terms of the geometric principles involved.

3. 'Precision Loss' Molding __ Deteriorating mold

Core principle >> *information loss*

This case involves purely information embedded in an object. By the term information, I mean here the number of points and lines that underlie the geometry of an object. Towards this objective, each object that is originally constructed from geometric components is contoured and sliced in parallel guidelines -ribs. Subsequently, these ribs constitute guidelines for the reconstruction of the object, which is accomplished by lofting between the guidelines to form the object again. Information loss is translated as the retrieval of points that define the curvature of each guideline. As

more and more points are extracted, the object gradually degrades and loses its acuteness and its texture until it becomes an amorphous mass unrelated to the original object.

4. 'Material Exchange' Molding __ Porous scaffold mold

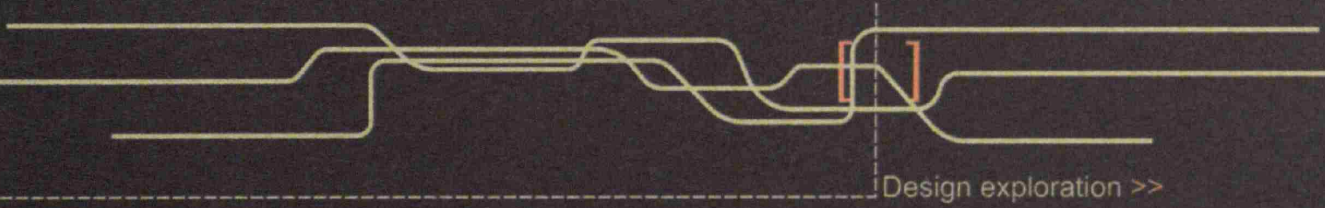
Core principle >> *material substance*

Substance refers to the geometry of the materiality of an object. It offers an alternate understanding to materiality in the digital medium that is currently translated almost exclusively via the pasting of maps and images. In this case, the object constructed out of geometric components is converted into a mesh. The mesh mode reconstructs the object in constellations of new components that do not respond directly to the geometric modeling of the object and can be accessed independently. Essentially, the object is segregated into myriads of new components that describe it in a different way. Out of this field of elements, some are randomly selected through the use of scripting; onwards the object is separated in two complementary sub-objects. The two remaining parts comprise constellations of material bits that are unrelated to the way in which the object was geometrically modeled.

5. 'Particle Interaction' Molding __ Molding of Aggregates

Core principle >> *point clouds*

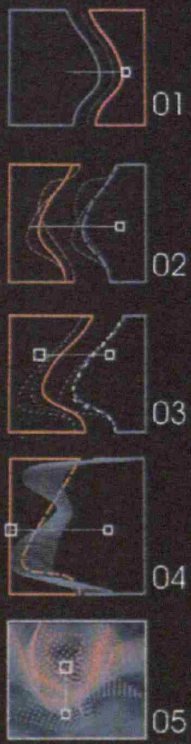
This process tends to dematerialize an object and convert it into a field of points that approximate it. The intention is to describe the object through points instead of lines. For this reason, the command 'point drape' is used, which has as a result the formation of a set of points that describe the geometry of the object through points. Subsequently, a geometric object -sphere- is placed in each one of these points through the use of scripting. The object is finally described as a material field, subject to a variety of deformations as an entity.

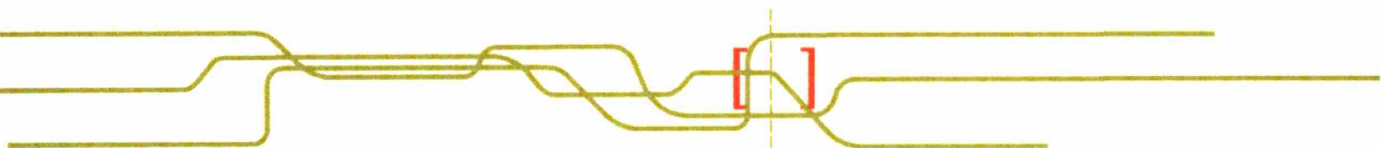


selection of objects

molding processes

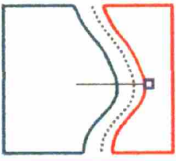
	01 Circuitboard	02 Helmet	03 Bike lid	04 Plastic container	05 Water tank	06 Party/Blind Wall	07 Part of building
01	○	○	○		○		
02	○	○	○		○		
03	○	○	○		○		
04	○	○	○		○		
05		○	○				

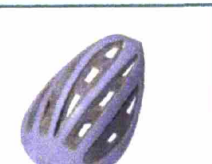
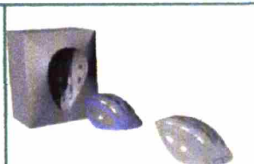



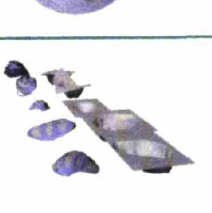
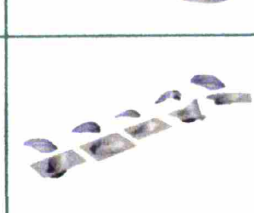
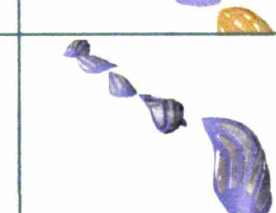

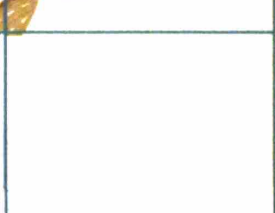
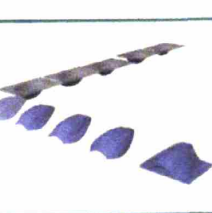
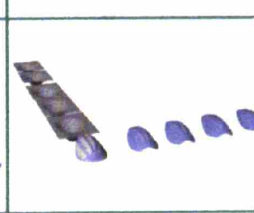
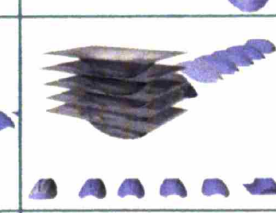
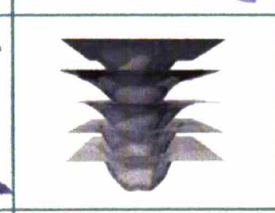
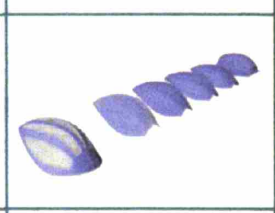

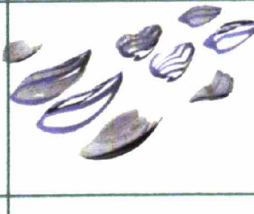

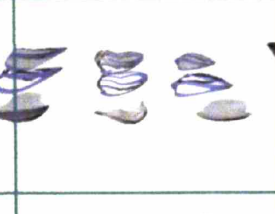
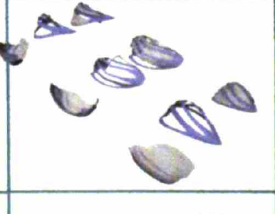
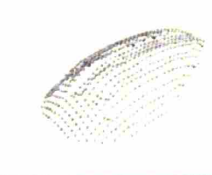
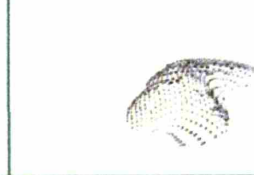
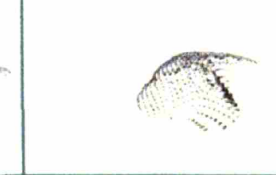

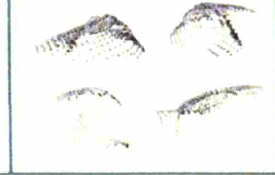




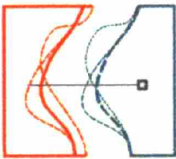
Design exploration >> [molding] *helmet*

01

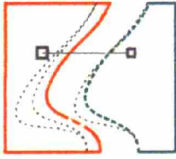


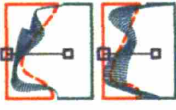
02



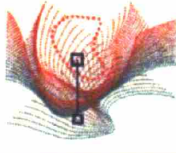
03



04



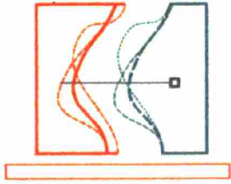
05





Design exploration >> [molding] *helmet*

02



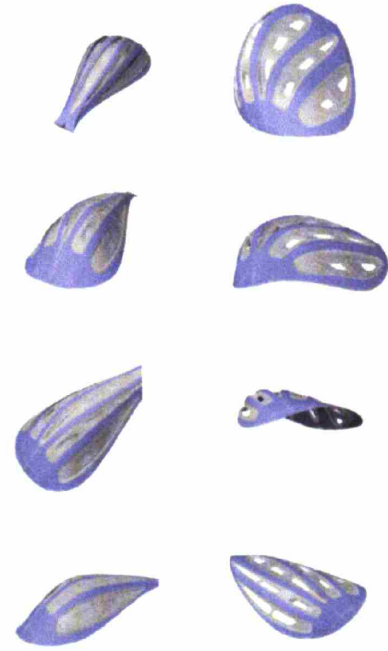
Generation by product -1



Generation by product -2



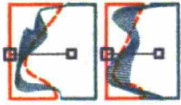
Generation by product -3



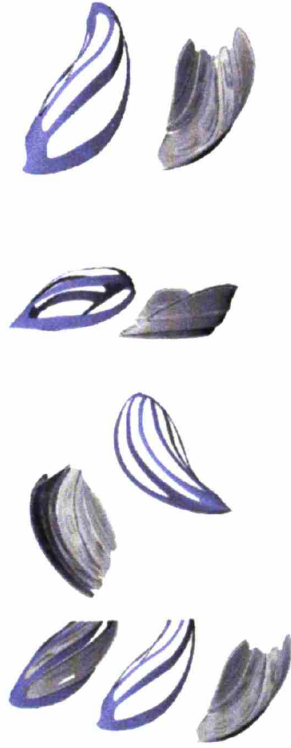


Design exploration >> [molding] *helmet*

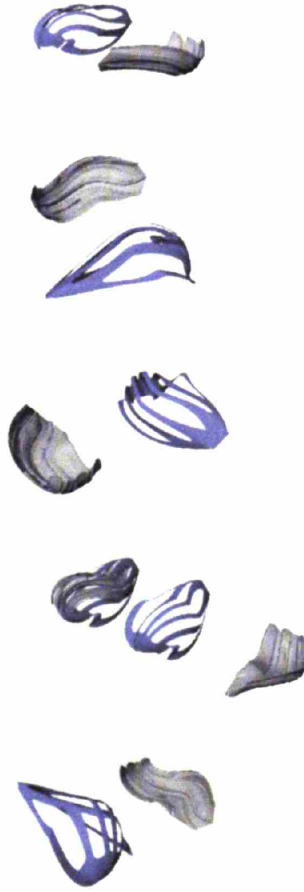
04



Generation by product -1



Generation by product -2

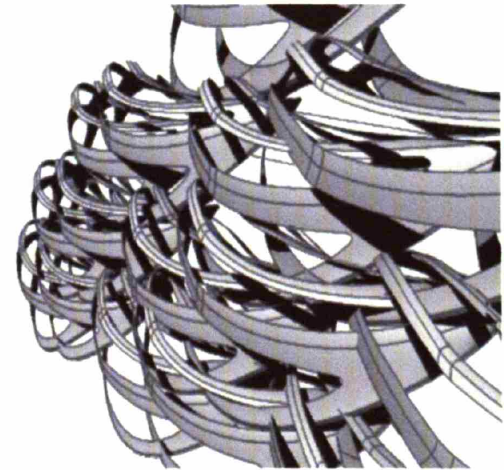
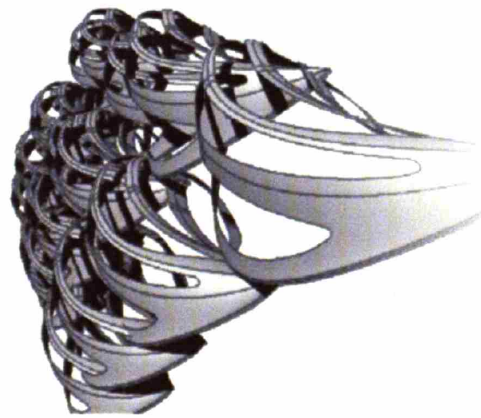
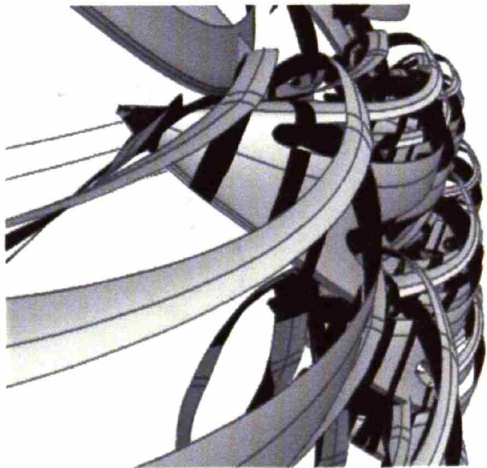


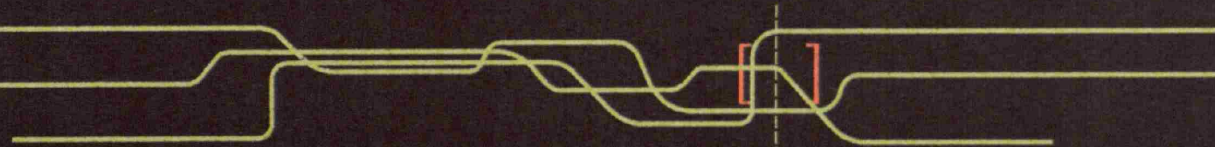
Generation by product -3





Design exploration >> [molding] *helmet*



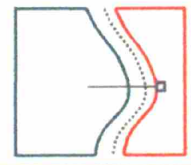
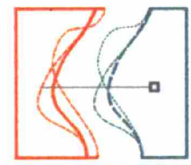
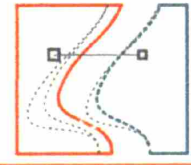
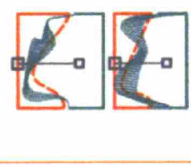
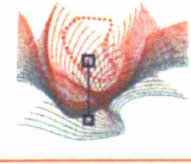



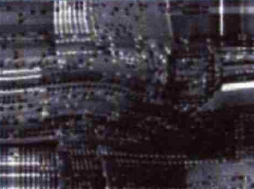




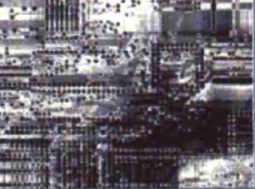

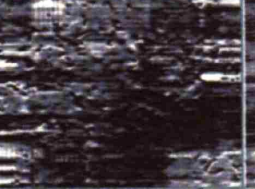

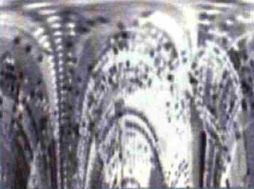
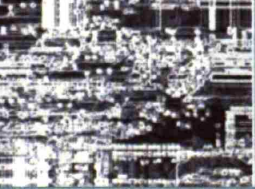
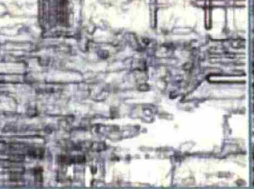
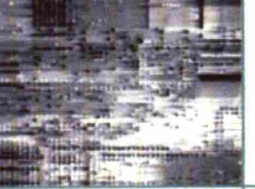

Design exploration >> [molding] *helmet*

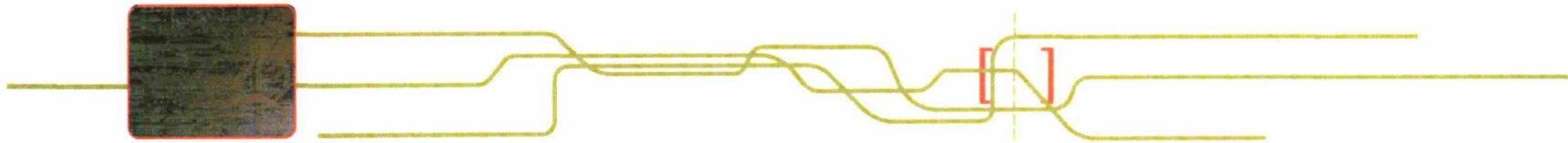




Design exploration >> [molding] *circuitboard*

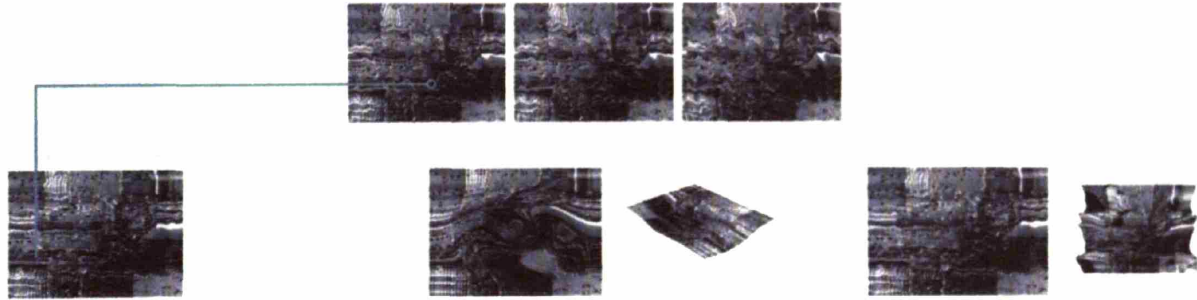
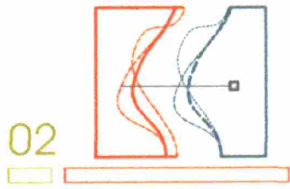
- 01 
- 02 
- 03 
- 04 
- 05 

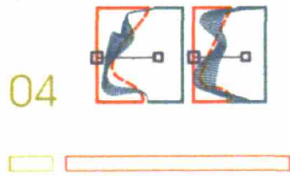


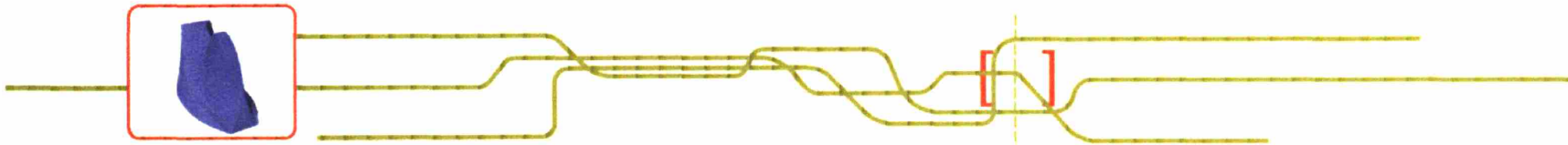
Design exploration >> [molding] *circuitboard*

02



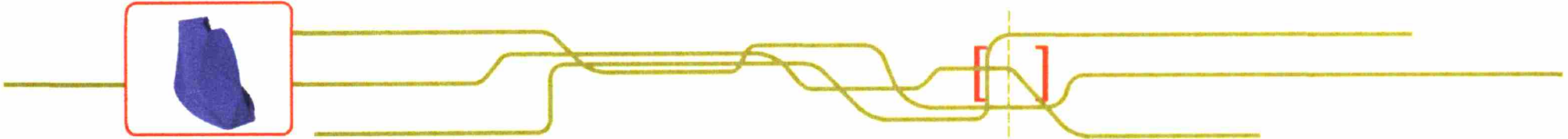
04





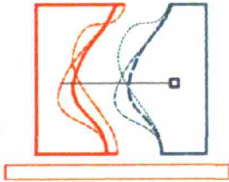
Design exploration >> [molding] *bikelid*

<p>01</p>					
<p>02</p>					
<p>03</p>					
<p>04</p>					
<p>05</p>					

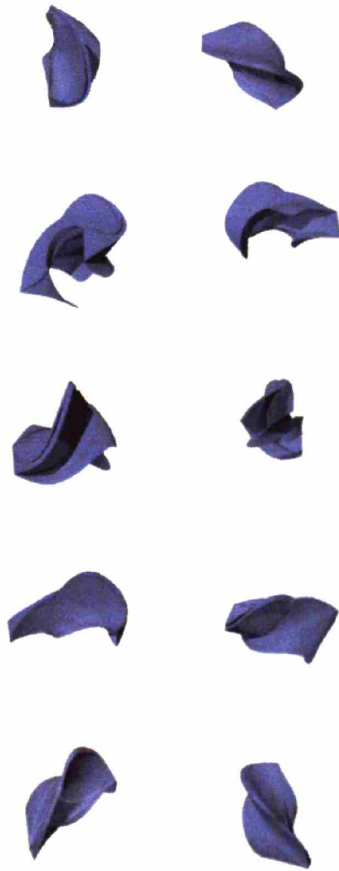


Design exploration >> [molding] *bikelid*

02



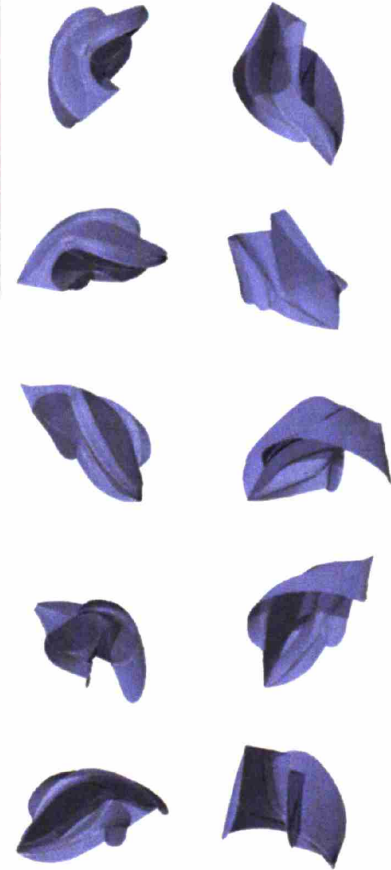
Generation by product -1



Generation by product -2



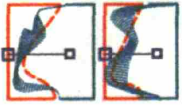
Generation by product -3





Design exploration >> [molding] *bikelid*

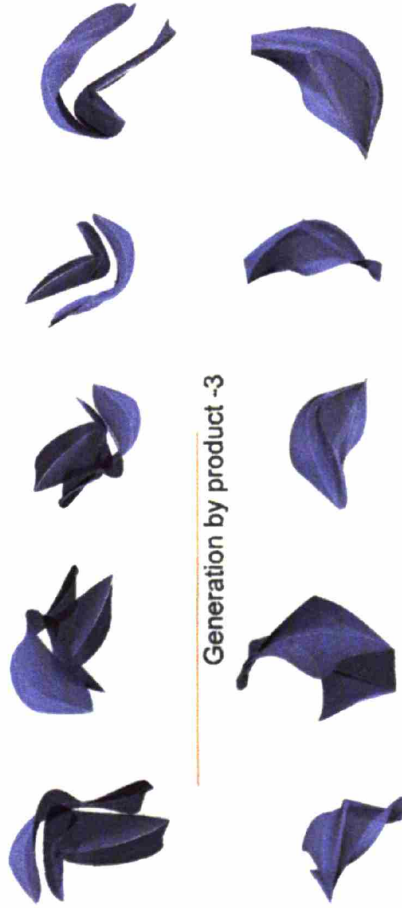
04



Generation by product -1



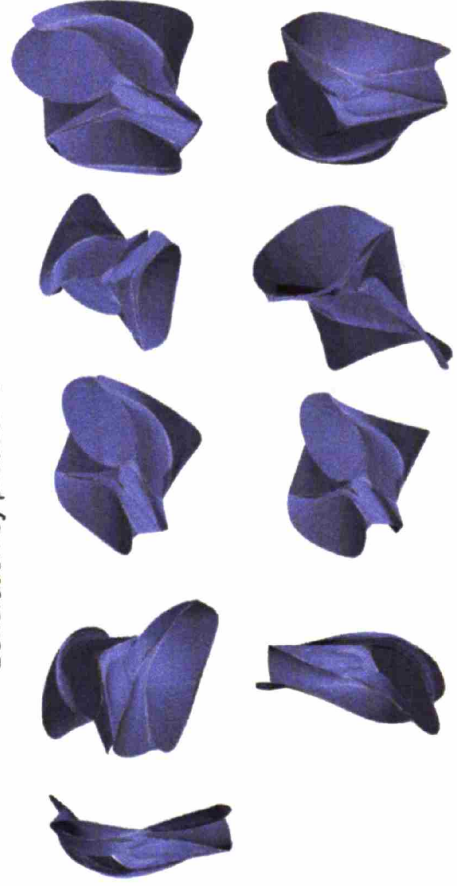
Generation by product -2



Generation by product -3

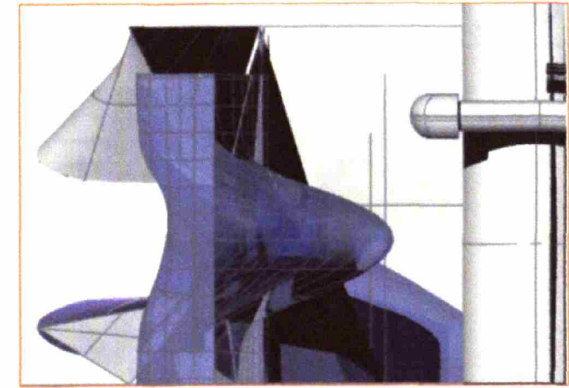
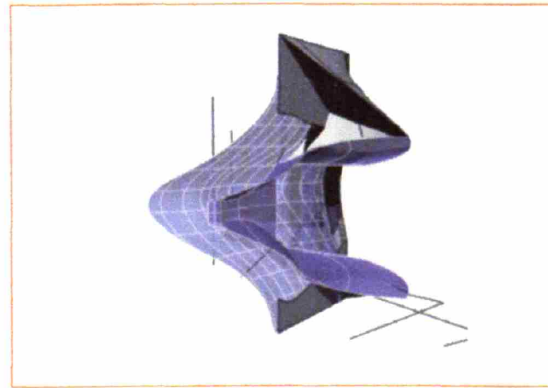
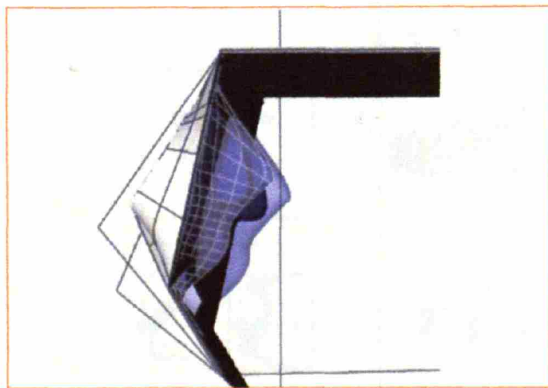
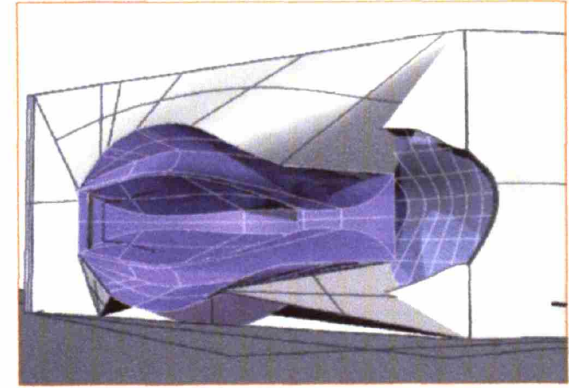
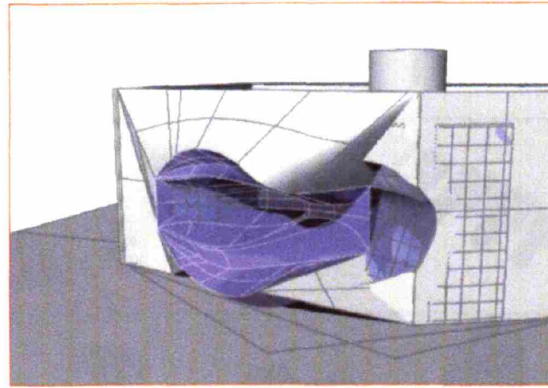
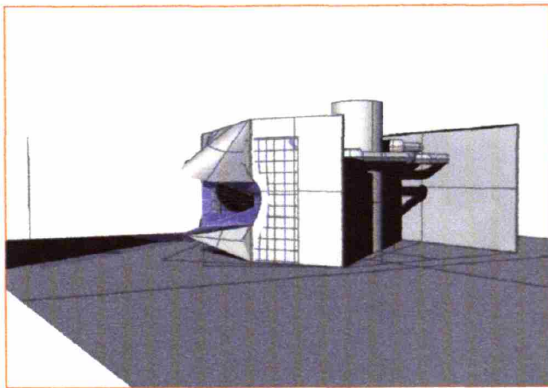


Generation by product -4





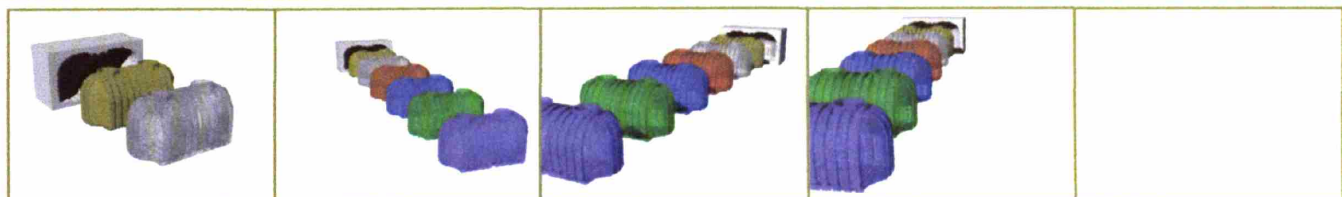
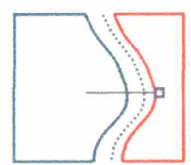
Design exploration >> [molding] *bikelid*



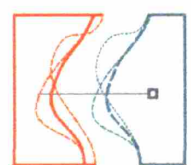


Design exploration >> [molding] *watertank*

01



02



Generation by product -1

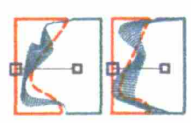
Generation by product -2

Generation by product -3

03



04





Design exploration >> [molding] watertank

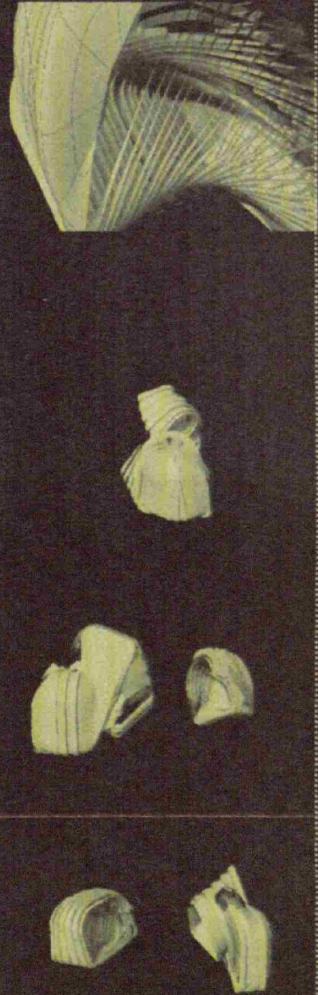
Generation by product -1



Generation by product -2

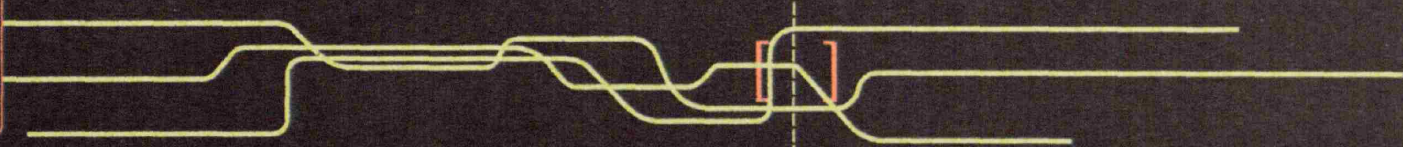


Generation by product -3

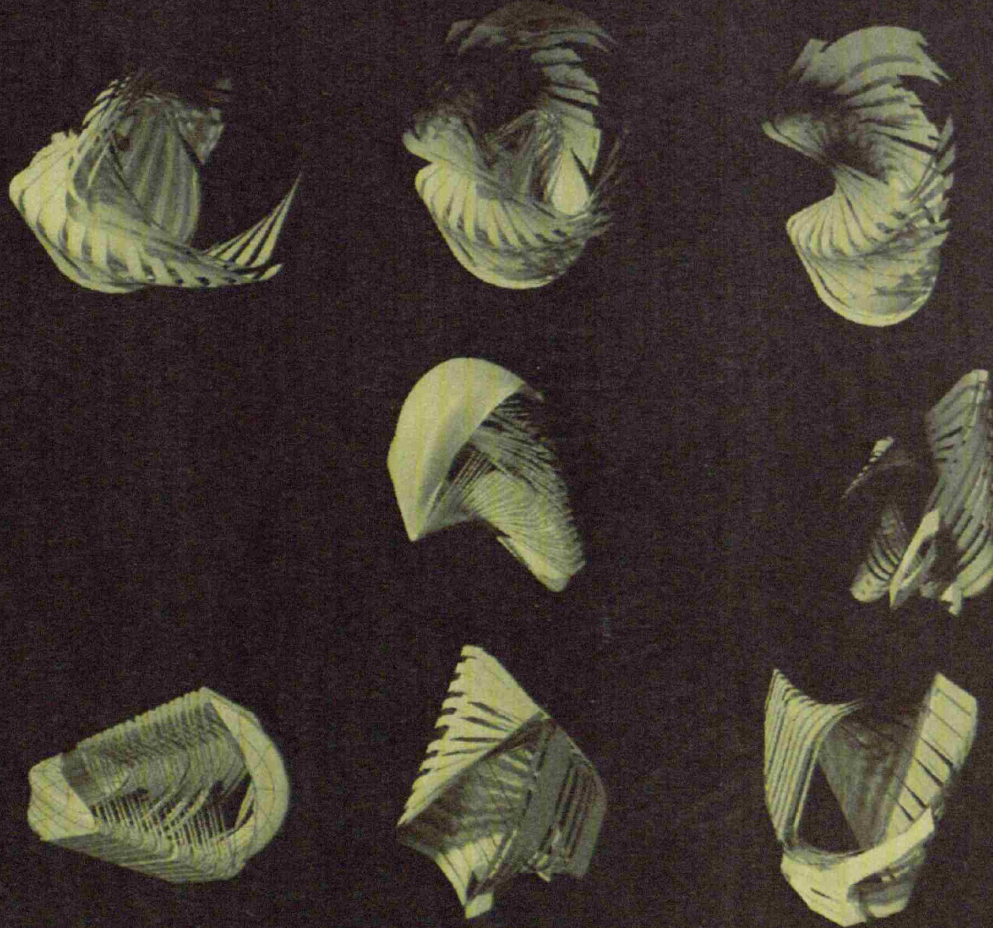


04



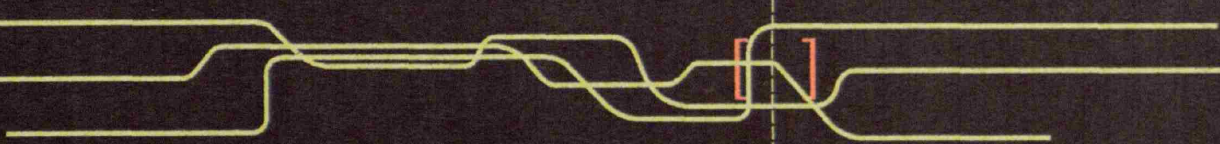


Design exploration >> [molding] *watertank*

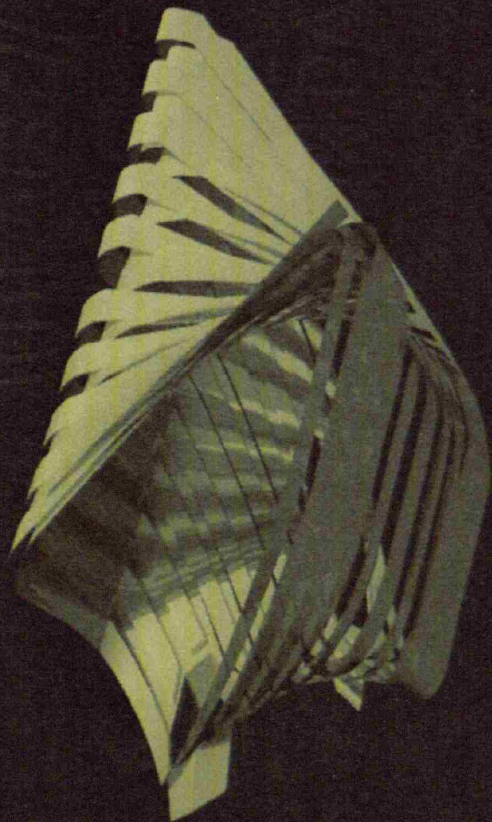


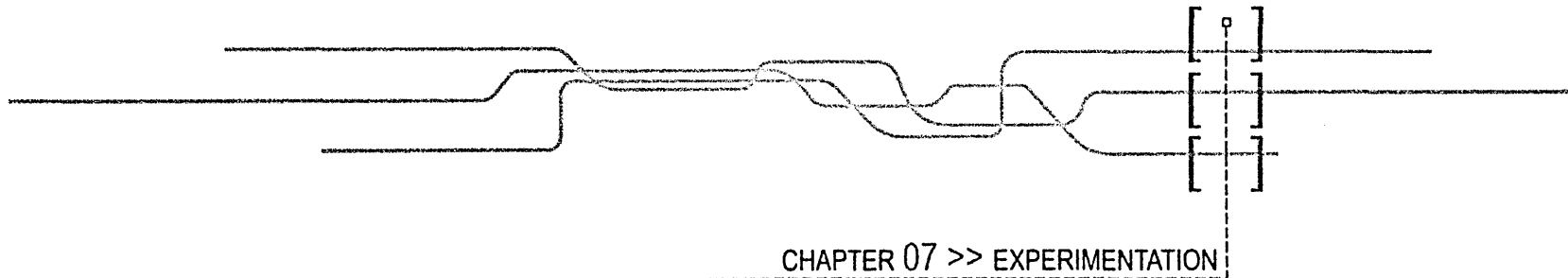
04





Design exploration >> [molding] *watertank*

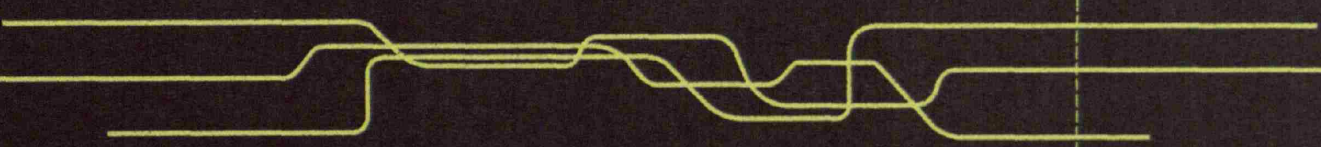




DESIGN EXPERIMENTATION

The matrix contrived in the previous chapter constitutes a pool of obsolete matter in various scales of reference. On the basis of the selection of the particular objects objects, rooms and buildings, I have used some as elements for implementation in design experiments and other as sites.

Dross conditions are identified and *dross strategies* are implemented throughout the design experiments.



Design experimentation >>

	01 Circuitboard	02 Helmet	03 Bike lid	04 Plastic container	05 Water tank	06 Party/Blind Wall	07 Part of building
01 Dross experiment	Object						Site
02 Dross experiment		Object				Site	
03 Dross experiment					Room		Site

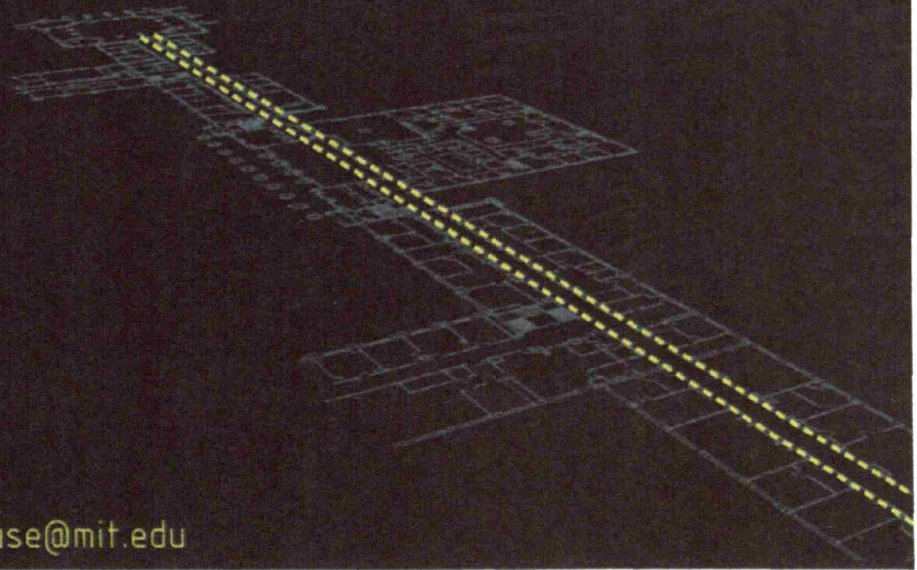
The first selected site for operation is part of the MIT main building; the MIT basement infinite corridor. The MIT infinite corridor on the ground floor of the building is an excessively linear space used almost exclusively as a quick passage to move through the building uninhibitedly. The case of the basement though is significantly different. Although it is mainly used for circulation of recourses and supplies throughout the building, in time it has acquired an additional incidental meaning and function. It has become a *pick-up point* for obsolete matter, such as outmoded computers, machinery, mainly electronics. MIT, as a prominent technological institution, has incredible amounts of electronic waste on a daily basis. According to the Facilities Department, we have approximately sixty obsolete computers for recycling everyday [156]. Most of these items are announced for recovery and free pick-up through the reuse@mit.edu list, which has just about 6,000 users all over the Boston area. The MIT basement infinite corridor comprises a major pick-up point, where computer and other kinds of machinery and electronics are hosted for a couple of days, until they are retrieved for second uses [157].

[156] This number is estimated by Kevin Healy, who is the Waste Management / Recycling Manager in the Facilities Department of MIT. Personal interview with Kevin Healy in March 2004.

[157] This information was disclosed to me again by Kevin Healy in a personal interview in March 2004.



Design experimentation >> *Dross* project 01



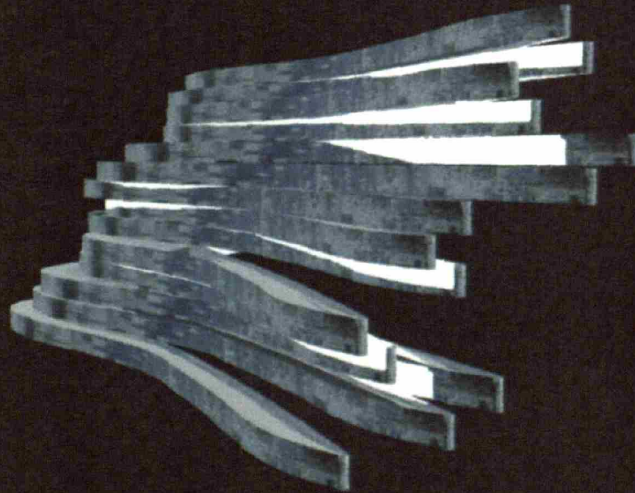
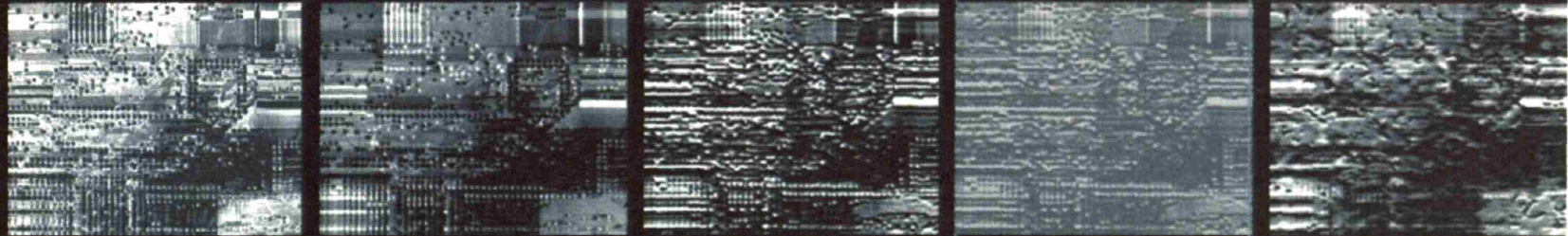
Site >> MIT Infinite Corridor__Basement __reuse@mit.edu

In this sense, the basement corridor is a *depositor* for obsolete matter. There are times that the space wallows with electronic junk and other times that this condition is entirely invisible and unnoticeable to our perception. In other words, the MIT basement infinite corridor has acquired a *dross* function.

My idea in this experiment was to use some of the discarded items, circuitboards in specific, to create a 'pocket device' that *accommodates within it the obsolete matter* and also *registers its flux* in and out of the corridor.

Towards this goal, various ways in which circuitboards could be reproduced and assembled were investigated. My first attempts considered the use of different molding processes outlined in the previous chapter and the occurring overall effects via diverse placement combinations. These introductory attempts were useful but unsatisfactory regarding the yielding of registration performance of obsolete matter. Instead of focusing on reproducing the element of the circuitboard and thus focusing on its texture, I examined ways in which to join both actual circuitboards and circuitboard by-products (inverse reproductions of circuitboards made from elastic material). Contrary to deploying new assembly components to bind the circuitboards in an array, I inquired the use of elastomeric cast materials with adhesive properties for the joining of elements. The flexibility of the joint also allows deformation. By

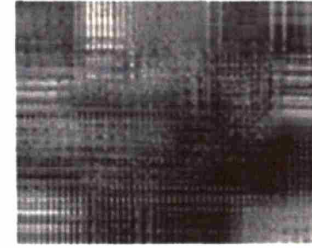
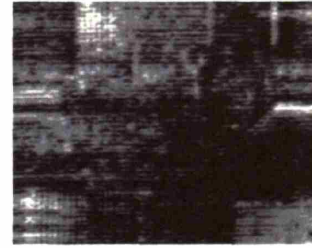
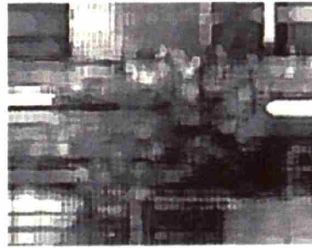
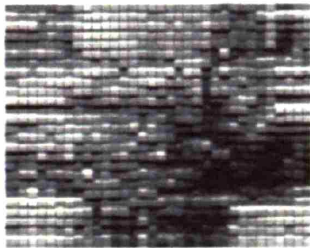
Design experimentation >> *Dross* project 01



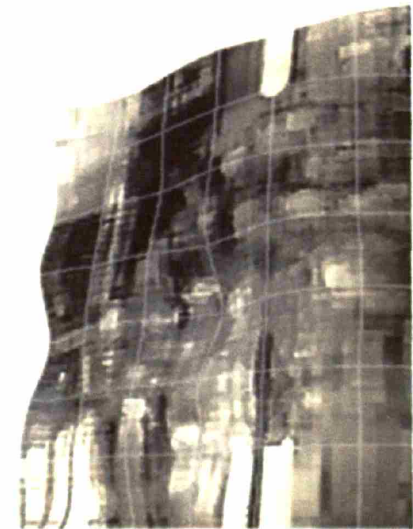
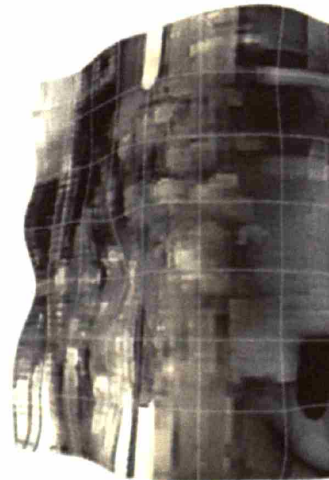
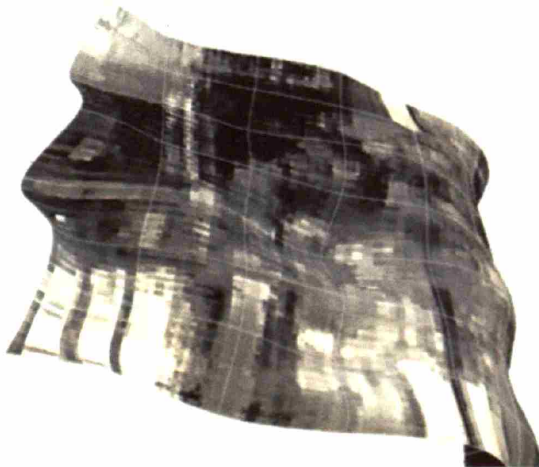
01>> hyper-texture
pocket space
use the components as
reproductive machines
[molds] // for building
material

[]

Design experimentation >> *Dross* project 01

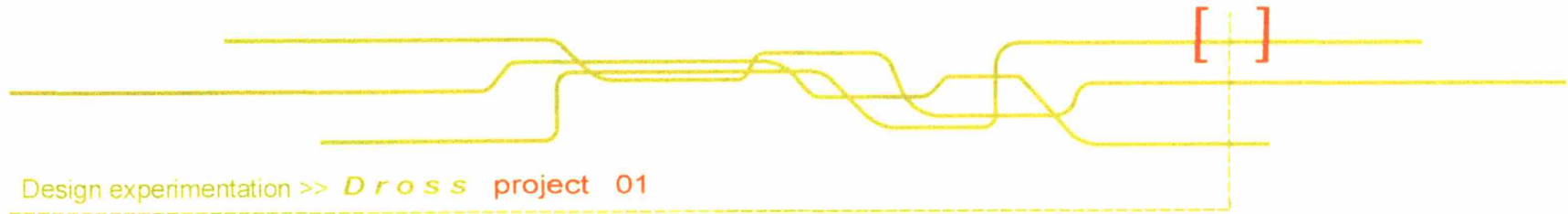


Different overall wall effects according to the placement of tiles

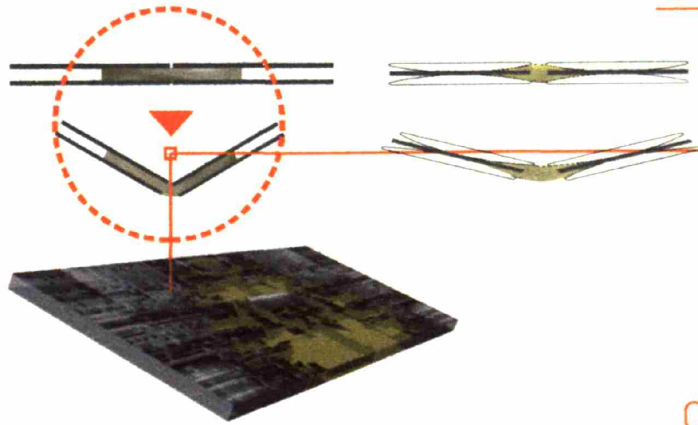


creating a band of circuitboards along with circuitboards by-products the band would acquire different local performances. Moreover, in order for the device to accommodate obsolete components within its skin, the stripe is designed as a double skin that can open up, in order for materials to be placed within it. For this reason, the actual circuitboards are designed to function as *hard points*- with laminated rubber in between and unable to open up and store materials- whereas the circuitboard by-products are designed to function as *elastic points* -with a double soft skin of elastic by-products that can open up allowing for material storage.

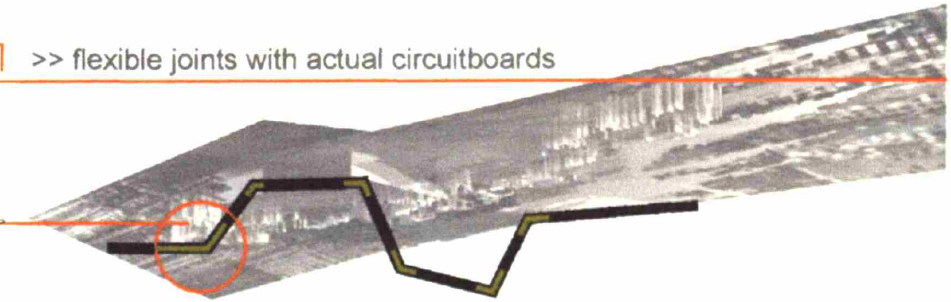
The application of these stripes was planned through the bolting of their lower edge to the walls of the basement infinite corridor. This *pocket device* becomes a second skin on the wall. At times of meager flux of obsolete matter along the corridor the skin would simply be a tapestry. At times though of intense flux, the *pockets* would 'swallow' and 'stuff' through the storing of computers and other machinery or electronics within its body. Therefore, the wall is essentially a registration device of the fluctuation of electronic waste, a by-product of MIT's main production. Moreover, besides storing waste, it depicts an invisible function and portrays its effect by changing the space of the corridor and the subsequent movements along its path.



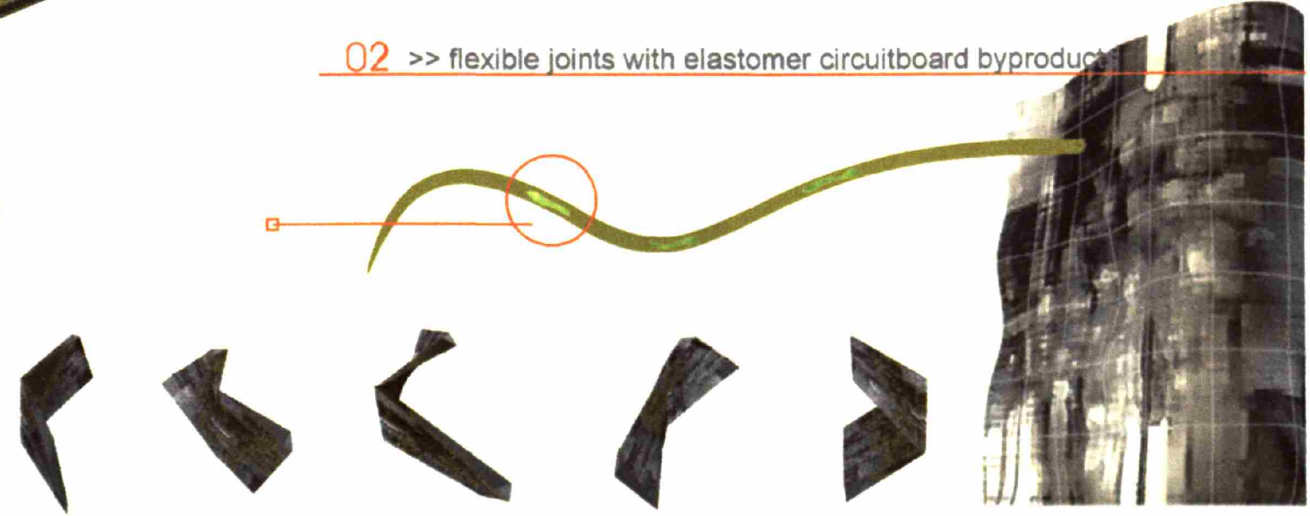
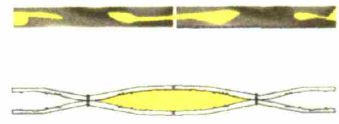
material bonds



01 >> flexible joints with actual circuitboards

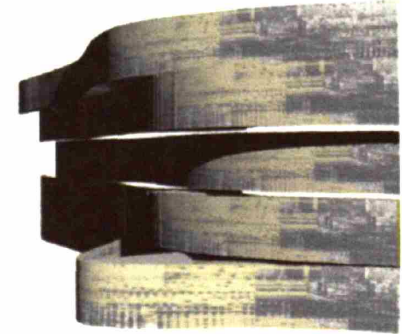
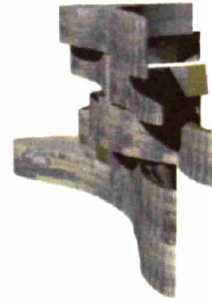
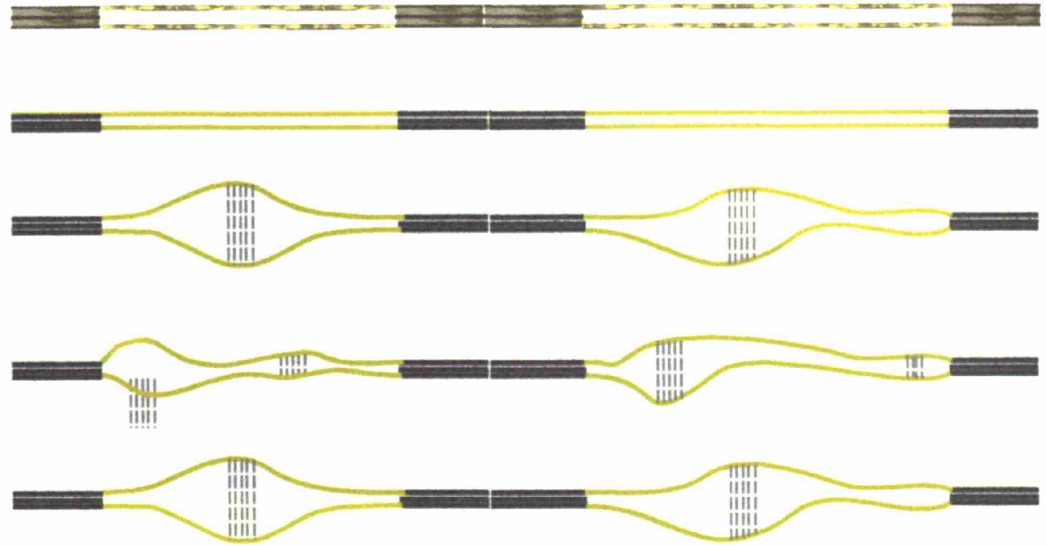
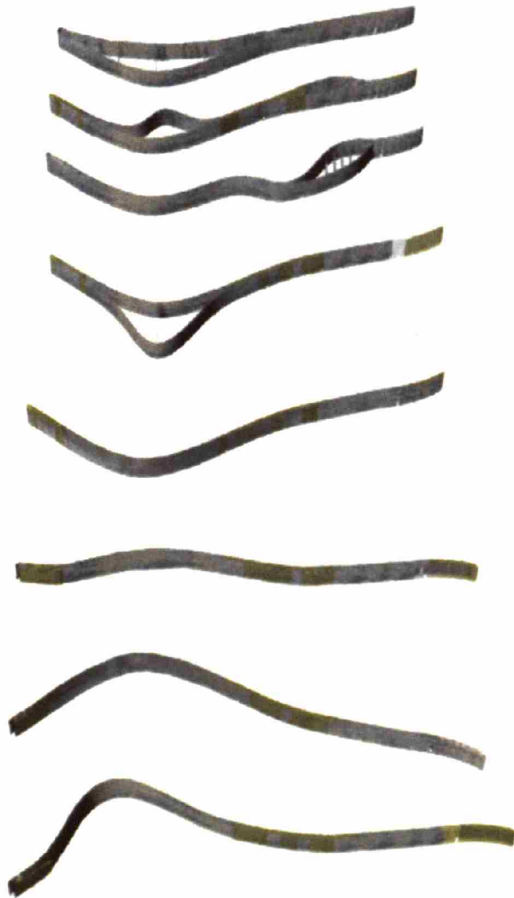
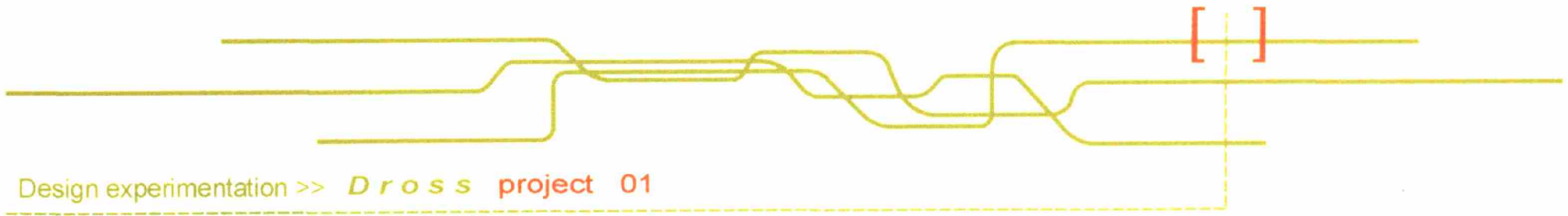


02 >> flexible joints with elastomer circuitboard byproduct



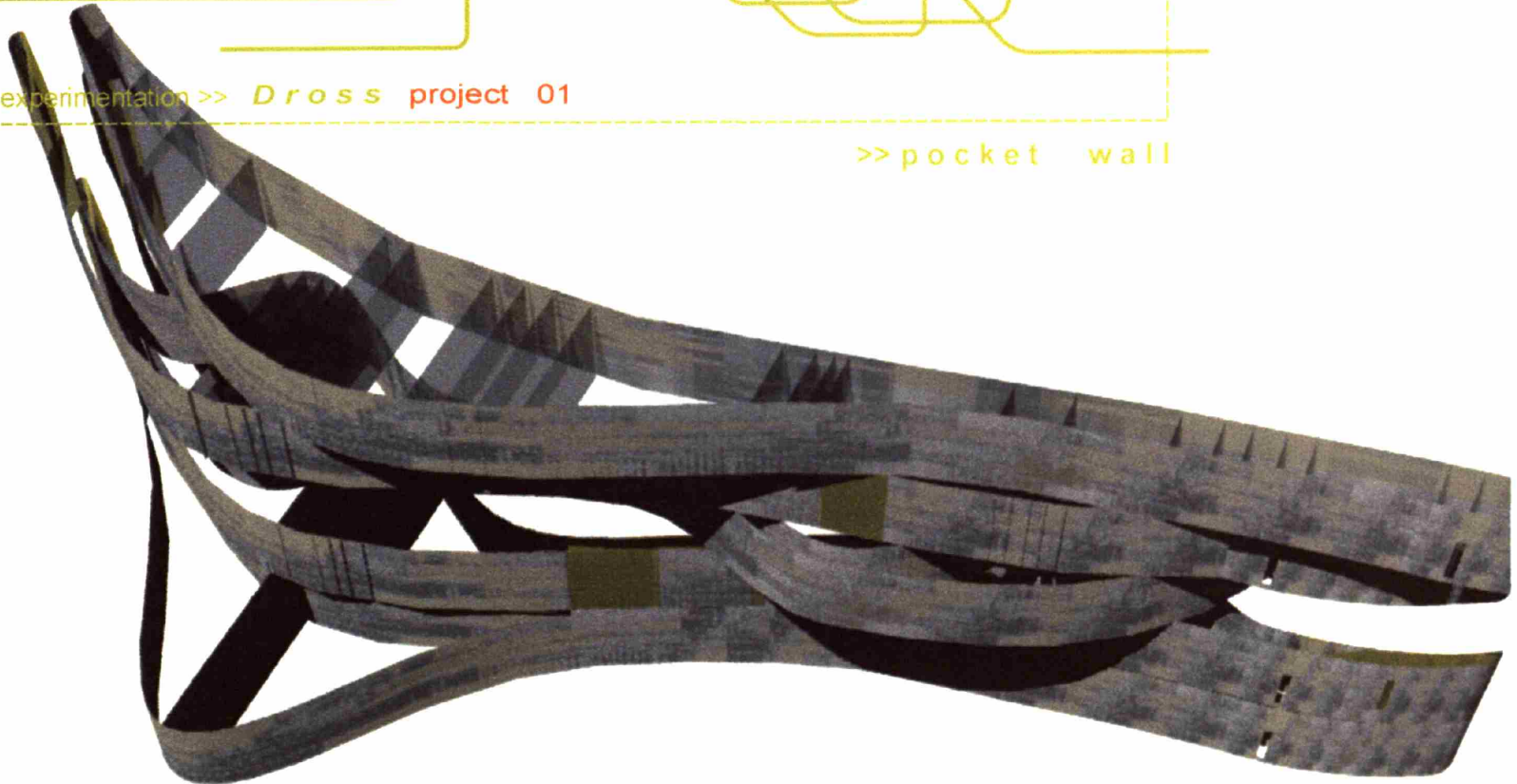
Design experimentation >> *Dross* project 01

03 >> double skin of circuitboards and circuitboard byproducts



Design experimentation >> *Dross* project 01

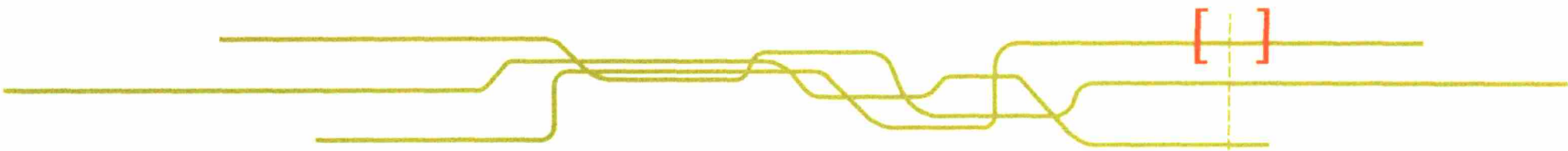
>> pocket wall



Design experimentation >> *Dross* project 01

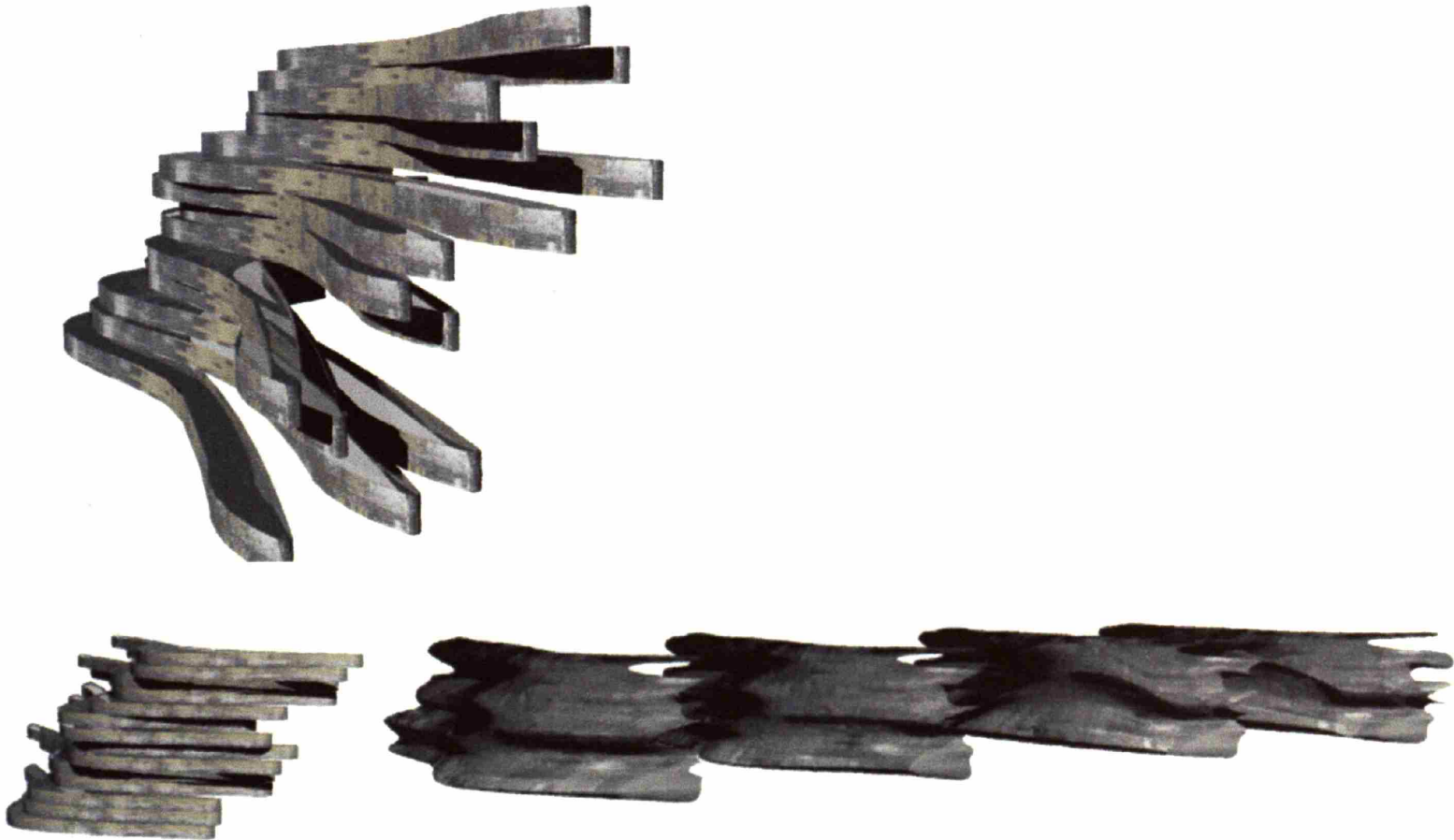
>> pocket wall





Design experimentation >> *Dross* project 01

>> pocket wall
stuffed in time



Design experimentation >> *Dross* project 01

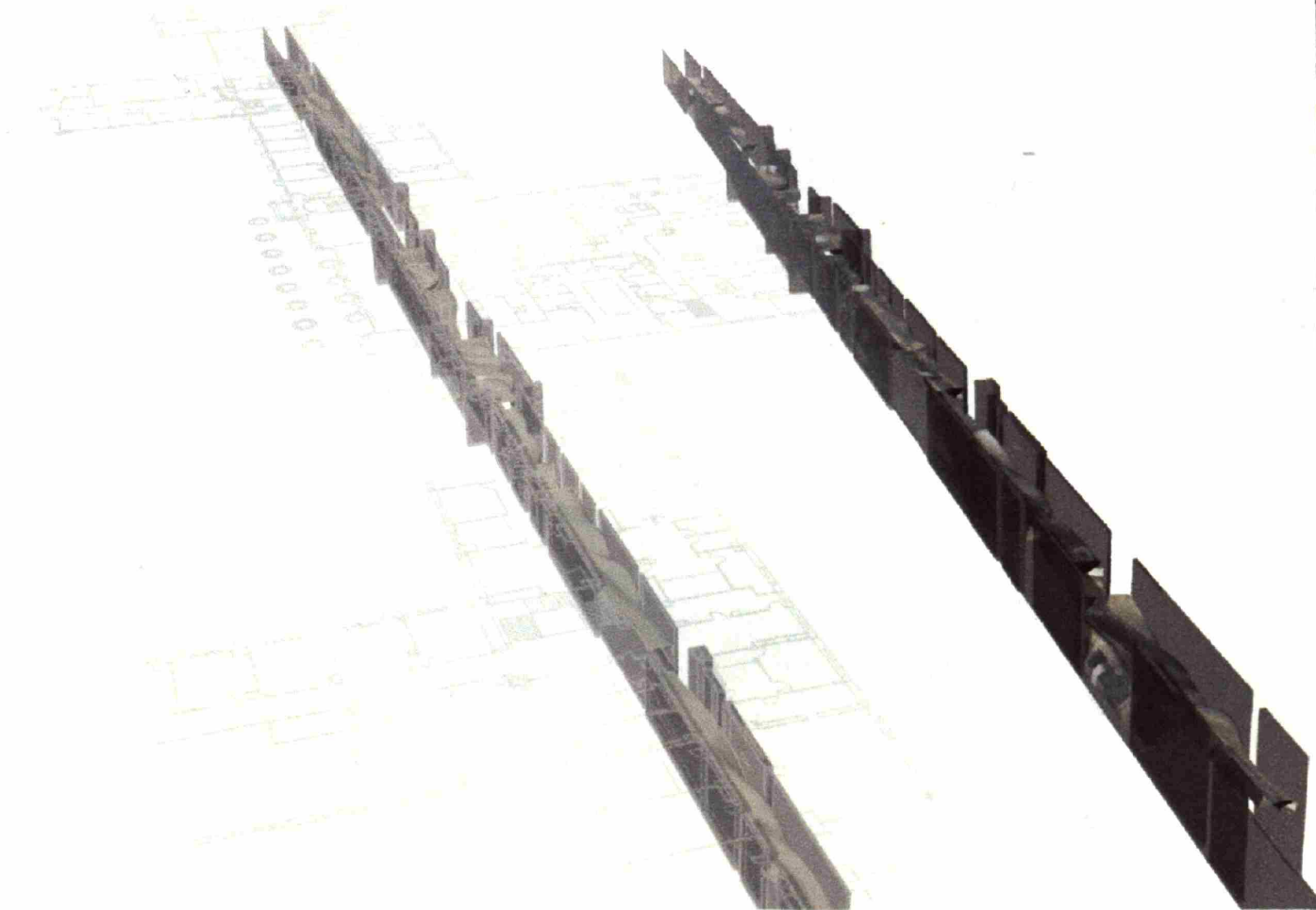
>> application of *pocket wall* in infinite corridor

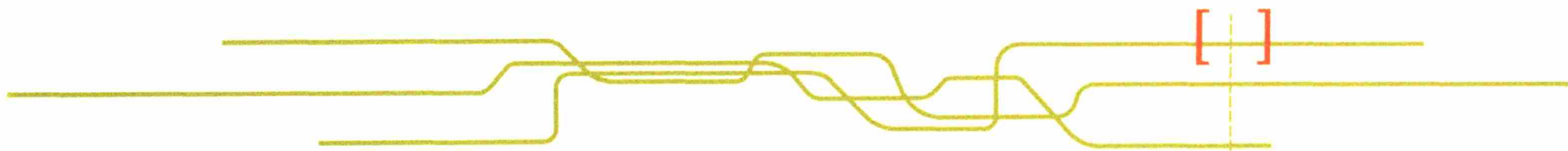




Design experimentation >> **Dross project 01**

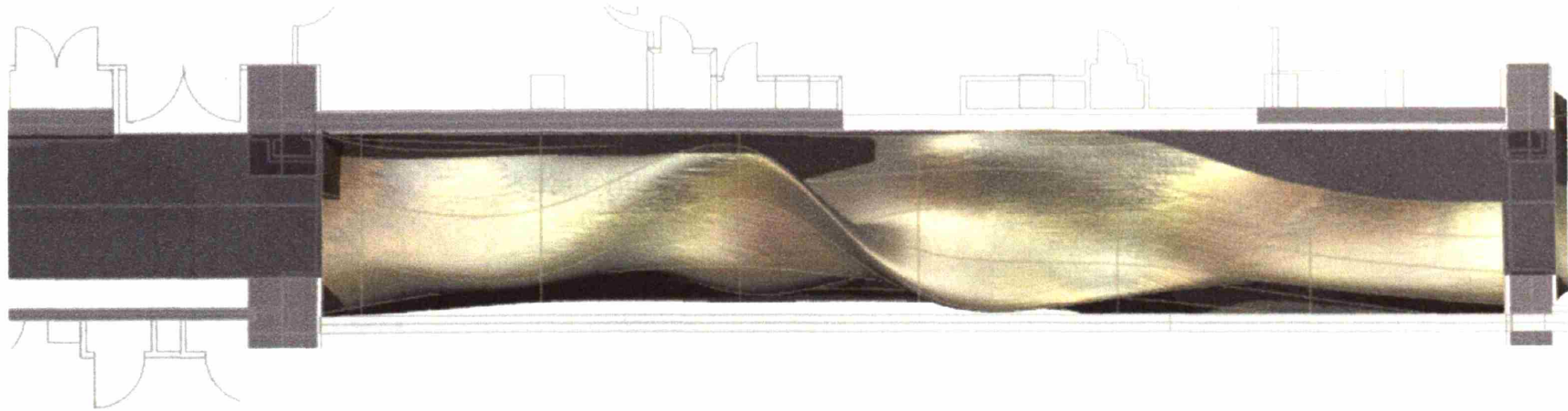
>> *registration* of obsolete matter *flux* along the length of the infinite corridor





Design experimentation >> **Dross project 01**

>> *registration of obsolete matter flux* along the length of the infinite corridor





Design experimentation >> *Dross* project 01

>> *stuffed space with obsolete matter*

Design experimentation >> *Dross* project 01



The selected site for this experiment is the generic condition of a partition or a blind wall. These 'blank' surfaces dispersed around the urban fabric are incidences that emerge out of the structure of the continuous building system. Blind walls comprise an apocalypse of the faults and the miscalculations of the system and at the same time an intriguing urban phenomenon mainly in Europe. In parallel to the urban discourse though, there is a structural one as well revolving around the same condition. In times of earthquakes, blind walls are the main feeble structural points of urban blocks and the surfaces that are subject to the most significant loads. This is due to the fact that the block is much more rigid when there are no void spaces within it; it behaves like a solid or a compact unit. Instead, the adjacent voids to blind walls disrupt the efficiency of energy dissipation along the block.

The idea in this project was to create a device of obsolete components that would be attached to the blind wall and have a twofold cause; first to augment the structural capacity of the wall and second to provide an earthquake registration device for the city or an installation *seismograph*. For this reason, this project is entitled *seismograph structural appendage*.

Design experimentation >> *Dross* project 02

blind _ partition wall as site

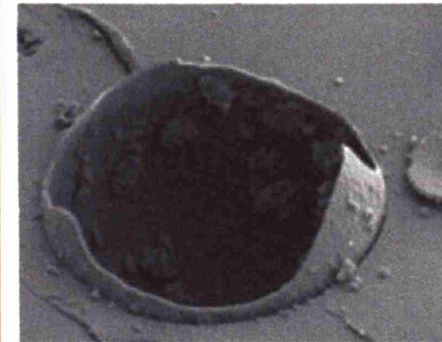


My intention of enhancing the structural system of the blind surface was never accompanied by visions of grandiose steel frameworks. Rather, I was seeking for minor operations located in strategic points along the surface, precisely at those points that would necessitate support. A major parallel concern was to create a system that would be activated in times of earthquake and remain dormant at all other occasions; as opposed to a scaffold system of continuous support.

Along the lines of this investigation, the technology of *self-healing polymers* served as a paradigm for the design of the appendage device. Self-healing polymers are currently used in viscoelastic dampers, where repeated stress is expected, for the dissipation of energy produced by an earthquake. Self-healing polymers are regular polymer materials that have embedded micro-capsules filled with raw resins. As cracks propagate through the polymer, the capsules rupture under a certain amount of stress and release the adhesive resin which hardens and heals the crack. [figure 49].

In my case, obsolete helmets comprise the capsules, containing the adhesive to be infused in the wall. In order for this layout of distributions to function systemically, the wall would need to undergo through a number of preparatory steps, such as drilling in order for the adhesive to be infused. Drilling should occur in the meager

Figure 49 >> Cracked micro-capsule in a self-healing polymer



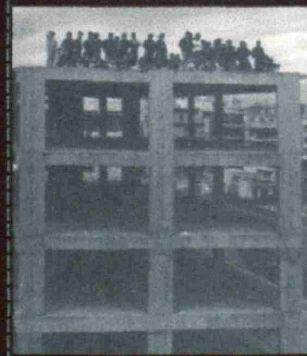
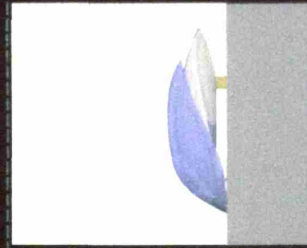
Design experimentation >> *Dross* project 02



>> helmet as a protective capsule

>> Self healing polymers with embedded capsules adhesives

seismograph structural appendage



points of the wall, which can be traced approximately in the center of each rectangular section defined by columns and beams. In detail, each capsule is comprised of a helmet and a pvc helmet by-product, the latter contained within the former. The pvc by-product encloses the polymer adhesive and may rupture under a certain amount of stress, whereas the helmet functions like a shell that guides the liquid to the duct.

In parallel, the helmet is used as a reproductive device for new components. Different molding processes were deployed using the helmet as a matrix in order to create a collection of new elastic pieces that would contrive a new surface. This new surface was designed by positioning the different elastic by-product parts onto a wire scaffold that encased the helmet distributions.

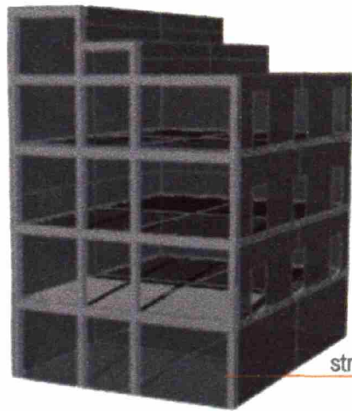
The new surface has a dual role. First, it becomes a *safety net*. In case of an earthquake, it retains parts from falling on the ground. Additionally it functions as a seismograph, by recording through its *deformation* the effects of the earthquake.

Finally, regarding the helmet by-products that would form the safety net, the intention was to enhance the cast material out of which they would be produced, with thermo-chromic pigments. Such pigments can be impregnated in any cast material

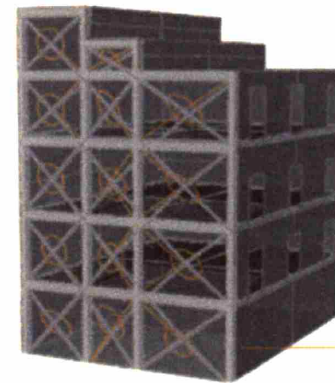
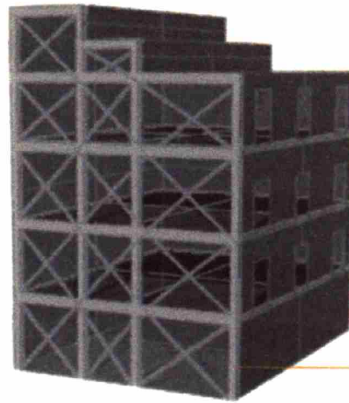
yielding a performance for the surface that registers shifts in temperature and accordingly changes its color. In this sense, the device functions both as an appendage that contributes to the structural efficiency of the wall and as a registration device of diverse conditions, both through the shift of form (earthquake) and texture (temperature).

Design experimentation >> *Dross* project 02

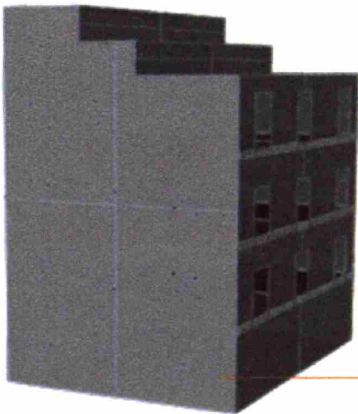
distribution of reinforcement points



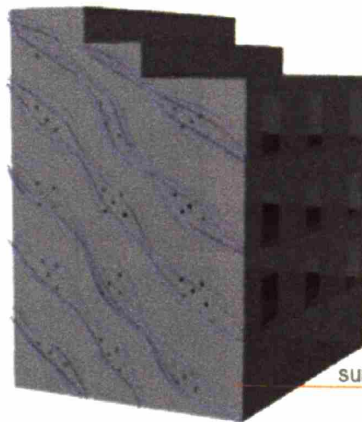
structural system



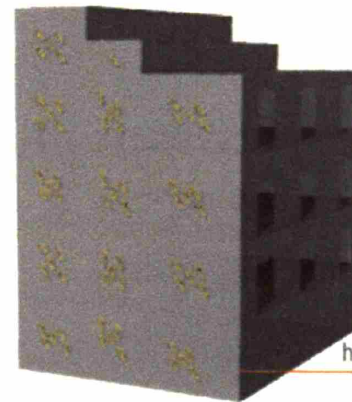
weak areas



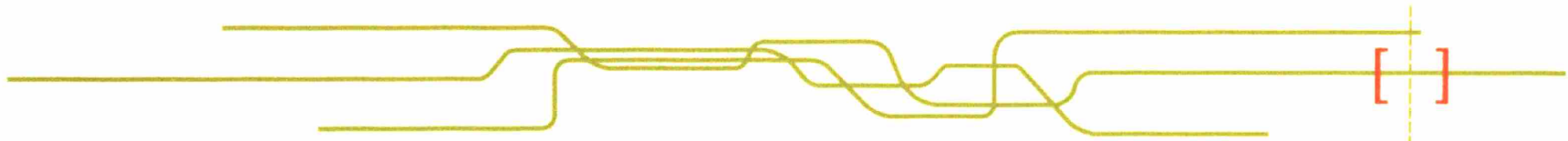
drilling



surface guidelines

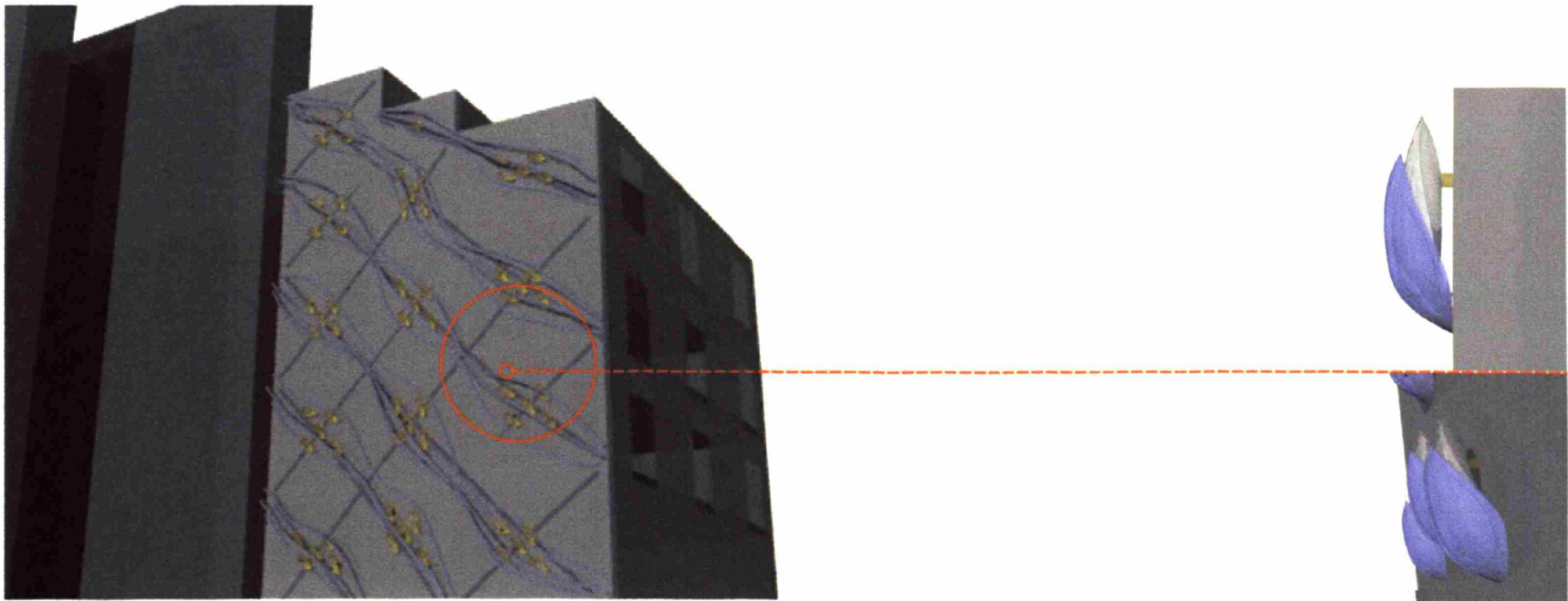


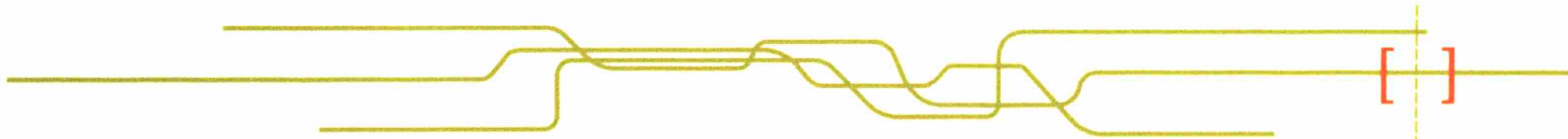
helmet distribution



Design experimentation >> *Dross* project 02

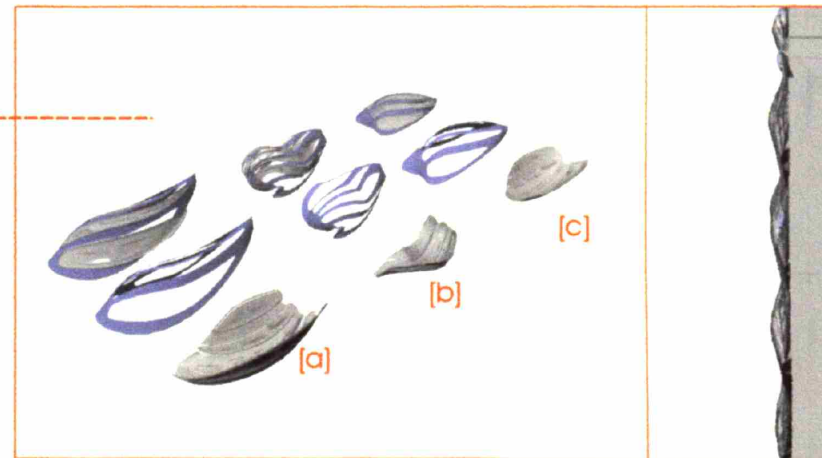
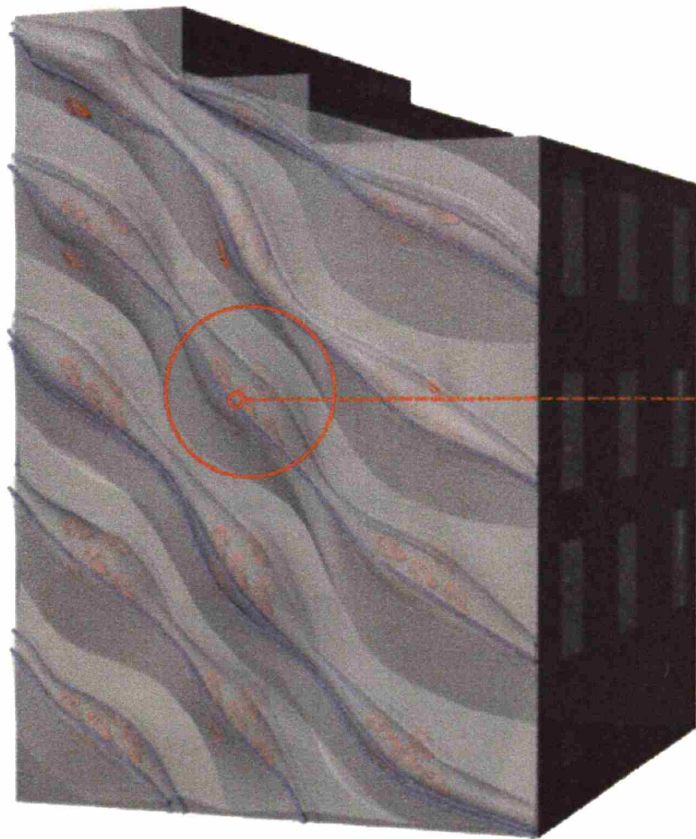
seismograph structural appendage _ detail + wire scaffold for safety net





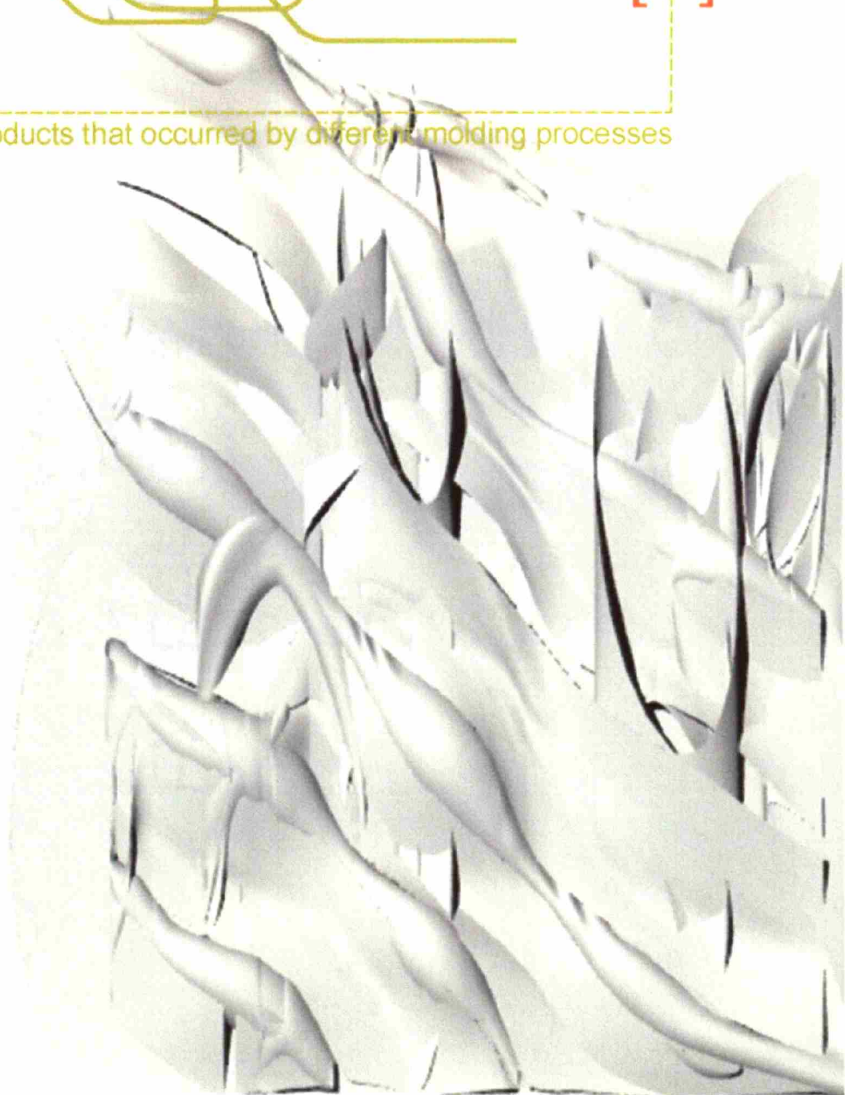
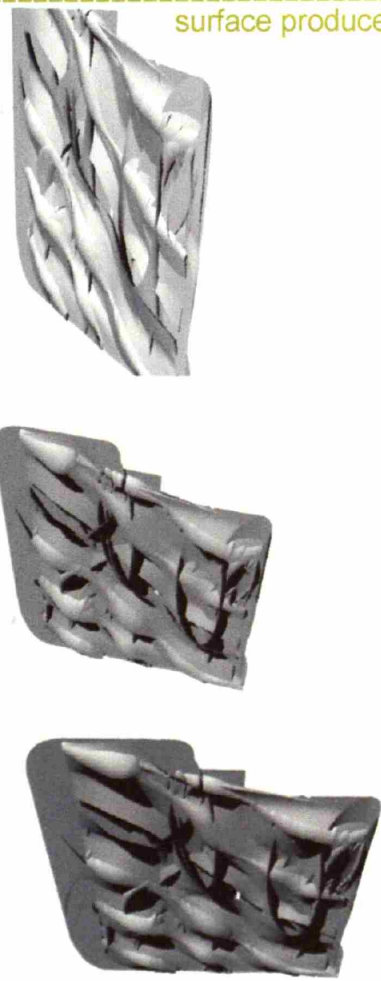
Design experimentation >> **Dross** project 02

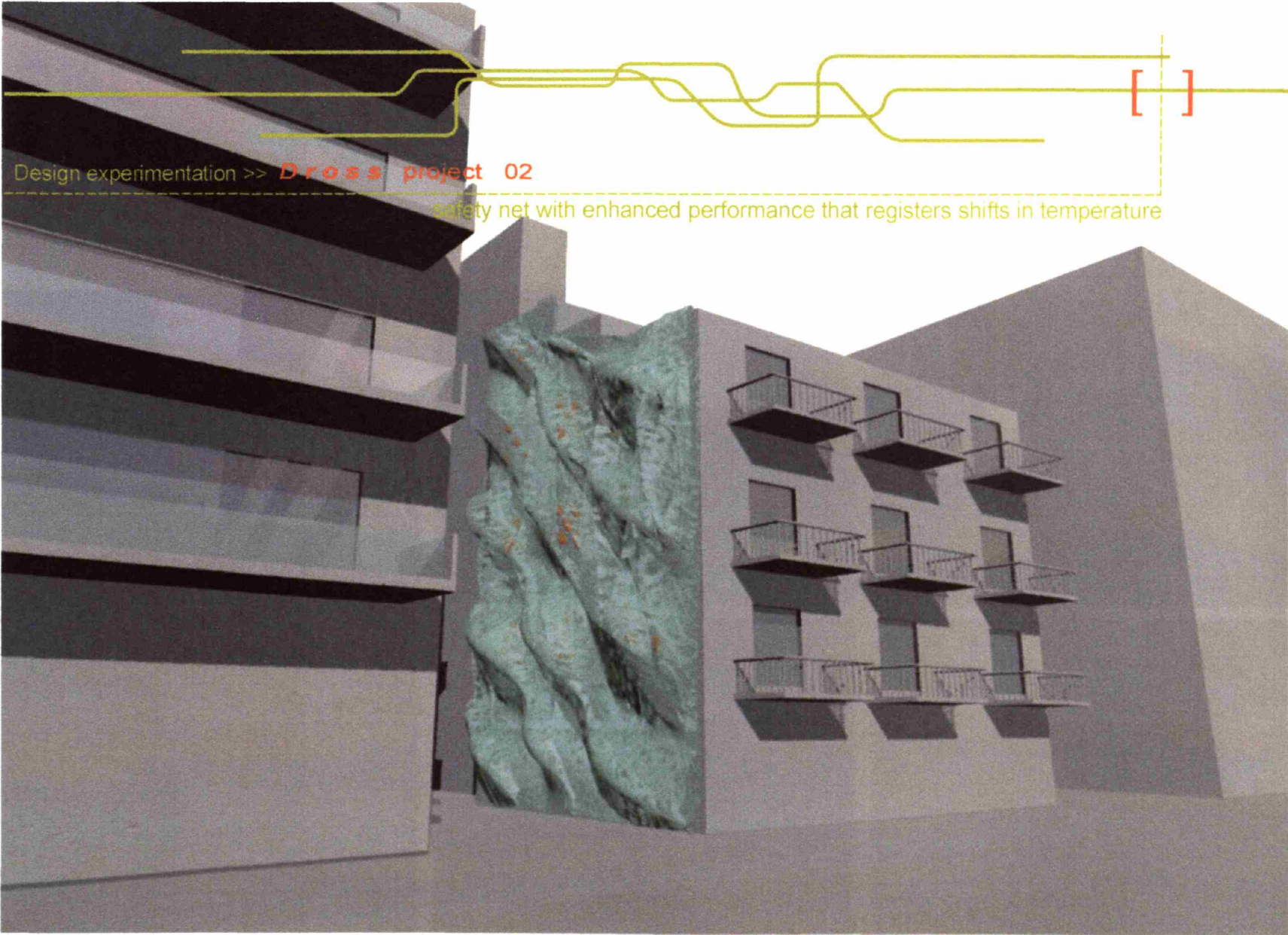
application of diverse molding components [helmet by - products] along the safety net scaffold



Design experimentation >> *Dross* project 02

surface produced by helmet by-products that occurred by different molding processes



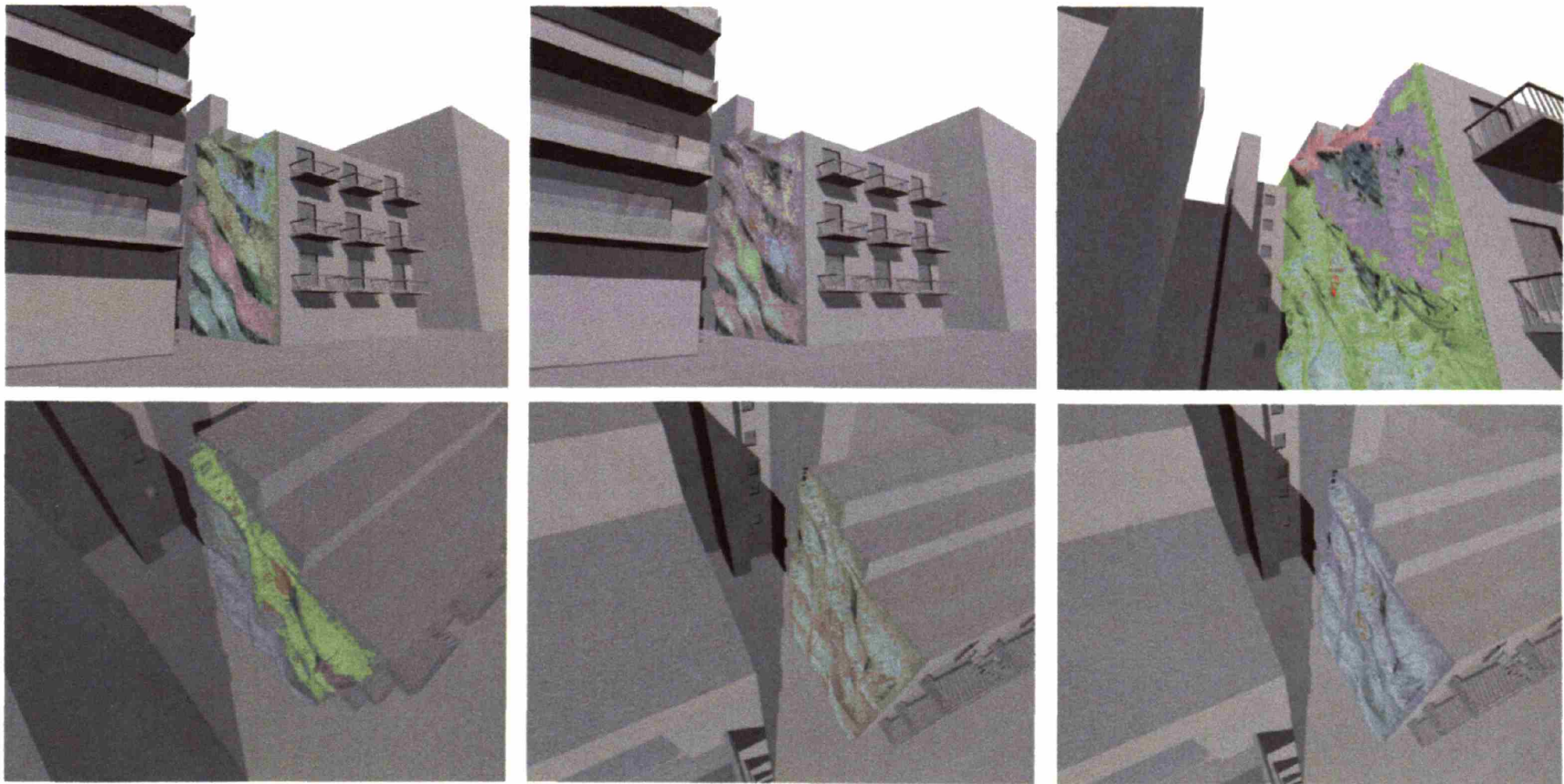


Design experimentation >> *Dross* project 02

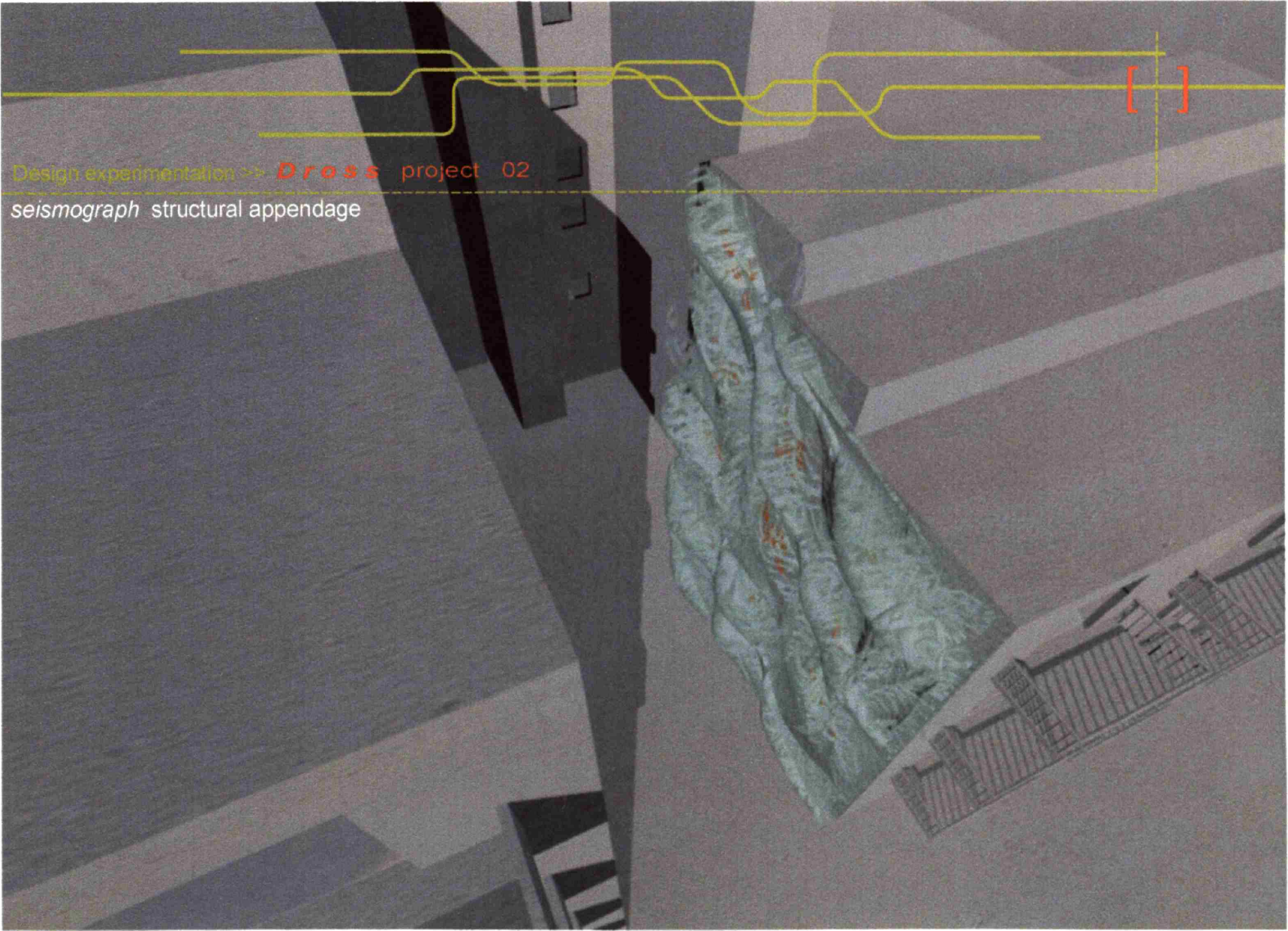
safety net with enhanced performance that registers shifts in temperature

Design experimentation >> **Dross** project 02

by-products cast in thermo-chromic material_ Celsius shifts

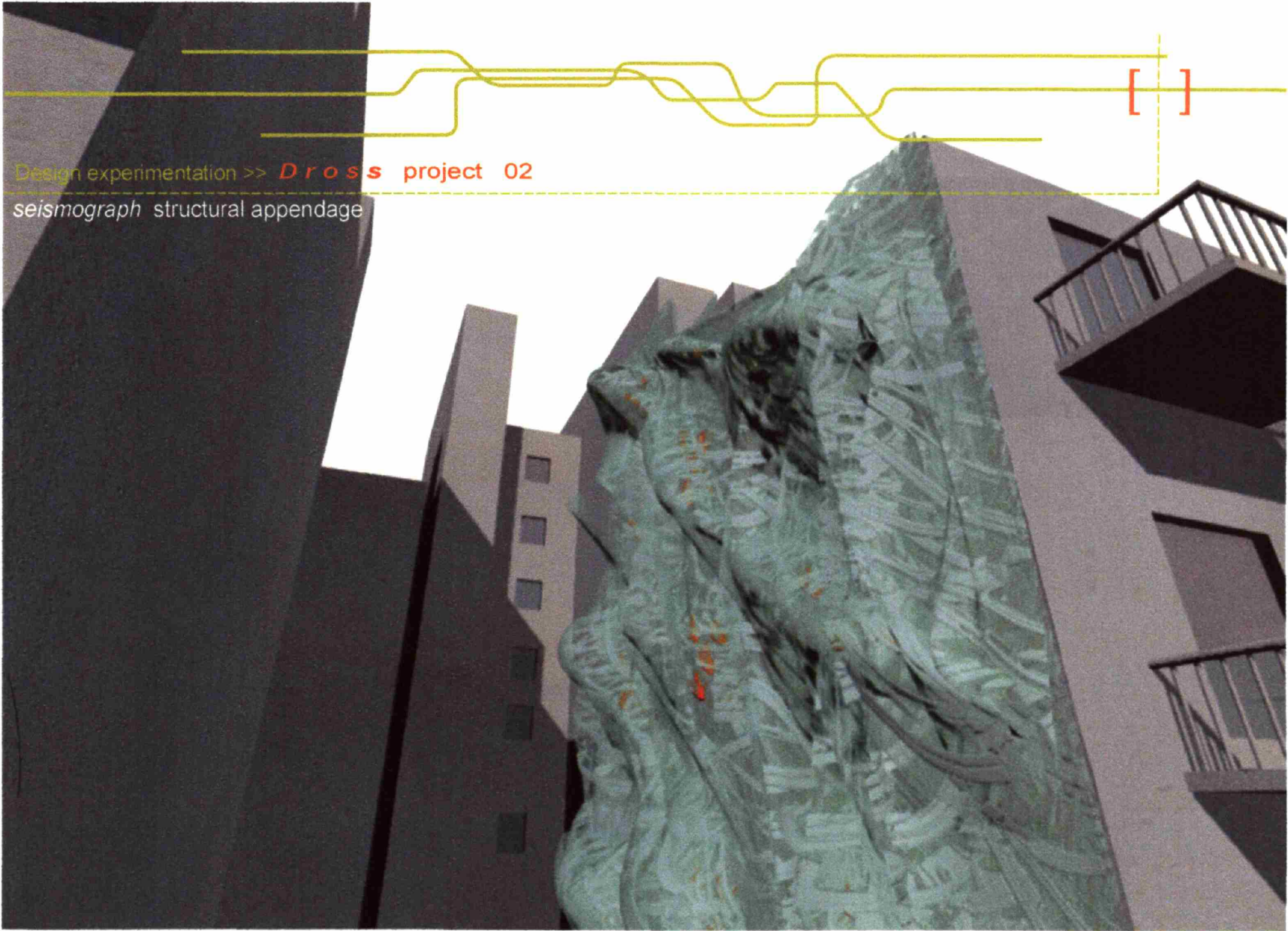


Design experimentation -> **Dross** project 02
seismograph structural appendage



Design experimentation >> *Dross* project 02

seismograph structural appendage



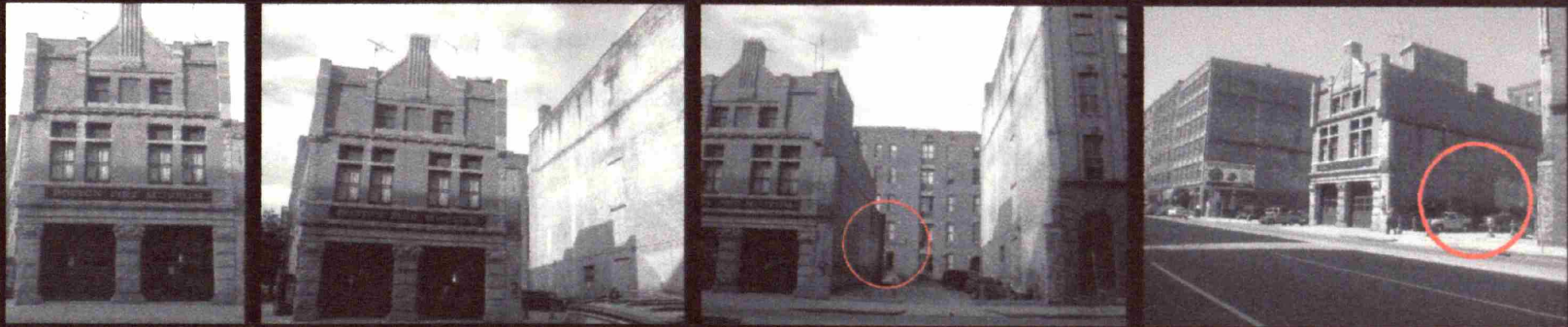
The *dross* condition in this final experiment, relates to the program of a building. It regards the Boston Fire Museum, located in South Boston on 344 Congress Street. The building is considered to be a historic landmark, built in the nineteenth century and previously used as a firehouse. It houses significant historic pieces used in the history of fire, such as pumpers, engines and carriers [figure 50]. Overall, it is a significant building with equally significant displays, the oldest fire museum in the country. Nevertheless, the building only operates every Saturday from noon to 4pm, just from October to April. The personnel responsible for the operation of the building is volunteer and as a result, in 95% of all circumstances the building is closed and inoperative. This is a particularly bizarre incidence, since the building is not abandoned or in a poor condition; it is not even empty or derelict. It is a preserved historic landmark with significant findings, but still remains *displaced from its function* up to this point. Essentially it is a phantom building that appears normal on the surface, but beneath that surface lays the issue of programmatic *dross*.

Figure 50 >> Historic Fire Vehicle in the Boston Fire Museum



Design experimentation >> *Dross* project 03

site_ Boston Fire Museum in South Boston _open only Saturday 12 - 4pm April through October / inoperative building



Interestingly enough, there is a notable waste stream of watertanks in the same area of South Boston. This opposition depicted here –fire, water– is not intentional or metaphoric, it is merely an incidence. It made me think however of the combination of the building and the watertanks. Could watertanks attack the dross program and restore its operation in some way?

This impulsive thought comprised the ground for my idea, which was to insert an obsolete watertank within the width of the building's exterior wall adjacent to the urban void beside it. Such an insertion did not have as an end goal a critique of the building's operation; on the contrary the implementation of the watertank was intended to create an additional space, allowing peeks through the building and partial access to the public. In other words, wrapped around the space of the watertank emerges a miniaturized museum that corresponds to the function and the space of the interior. This space, while working parasitically to the building, creates *a museum within the museum* for these times that the original is in a *dross* state.

More specifically the obsolete watertank itself is converted into a projection space that displays electronically in its interior, information about the building and the history of fire. The projection is not intended for demonstration in the wider urban space; it functions rather as an *interior, mystical projection* headed towards the

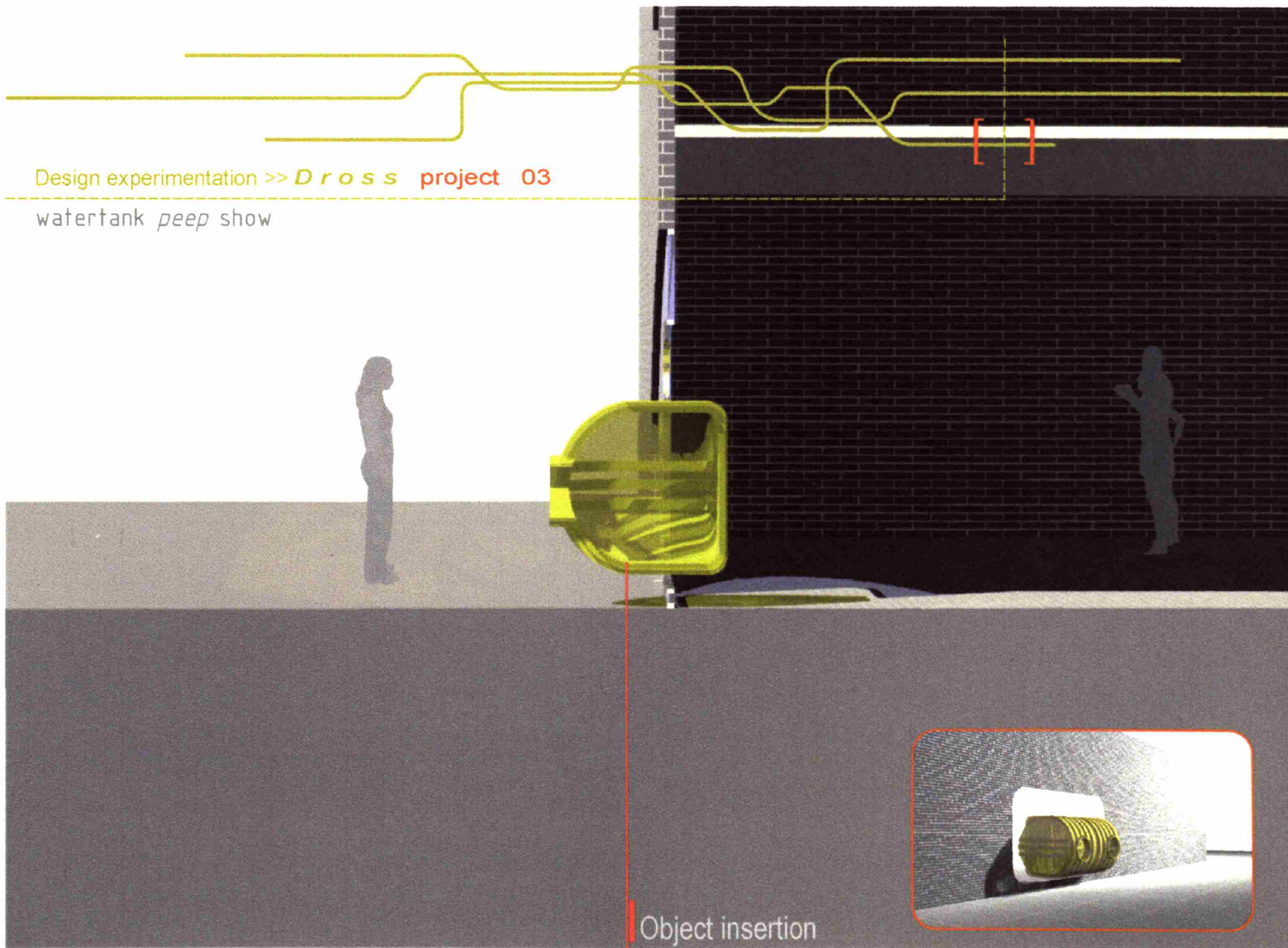
visitors of the museum. This decision of injection of the watertank into the section of the building is the core principle for this project.

There are though complementary actions translated in two additional layers of space wrapped around the obsolete component. Out of these two layers, the first one mediates the relationship between the visitor and the watertank and the second one mediates the relationship between the watertank and the building. The visitor-watertank mediator creates spaces that unfold along the void space neighboring the Fire Museum and invites visitors. At the same time, the plastic forms that have emerged from the molding of the watertank create a leisure space in the city and can be used for accommodating the body in various ways. The watertank-building mediator is an additional layer of space between the watertank and the building and is used for passage and *peeping* the items on display in the museum, for these times that the actual museum is not open.

The layers occurred through molding experiments, where the watertank was partially deformed to produce the necessary space, while retaining some of its characteristics. Since most watertanks are manufactured from thermoplastic polymers, this technique is potentially feasible through the application of heat to actual obsolete components.

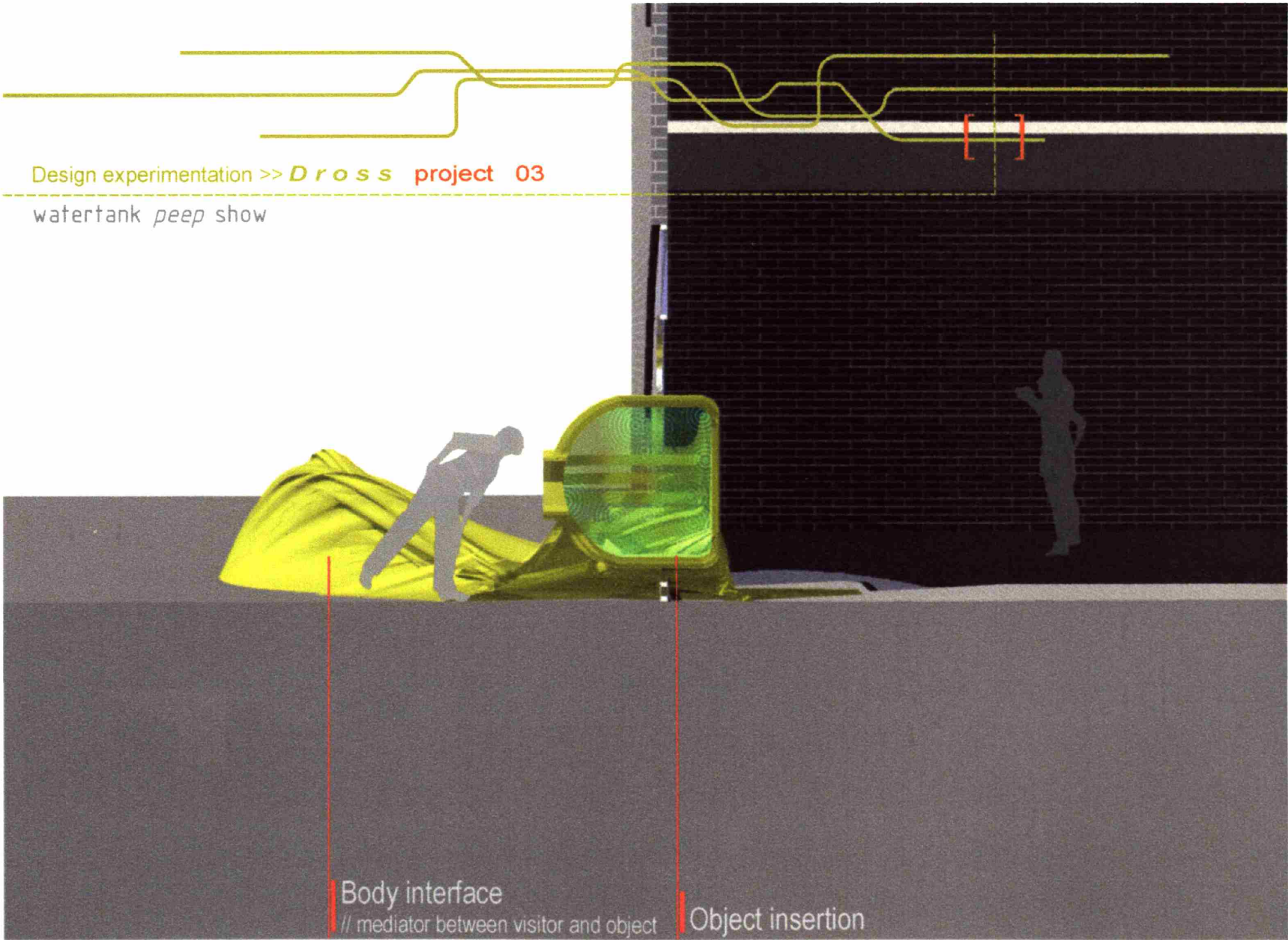
Design experimentation >> *Dross* project 03

watertank *peep* show



Design experimentation >> *Dross* project 03

watertank *peep* show

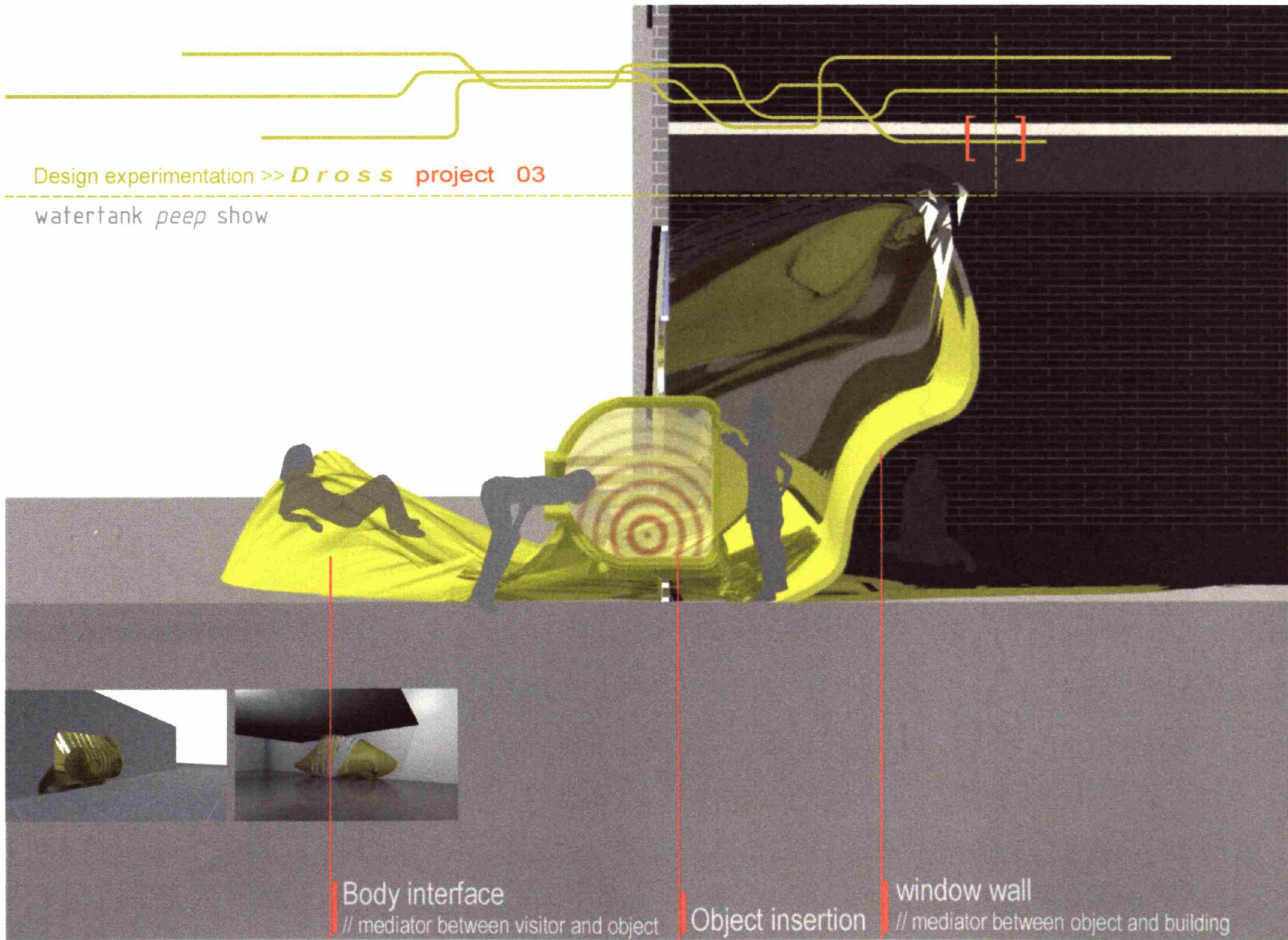


Body interface
// mediator between visitor and object

Object insertion

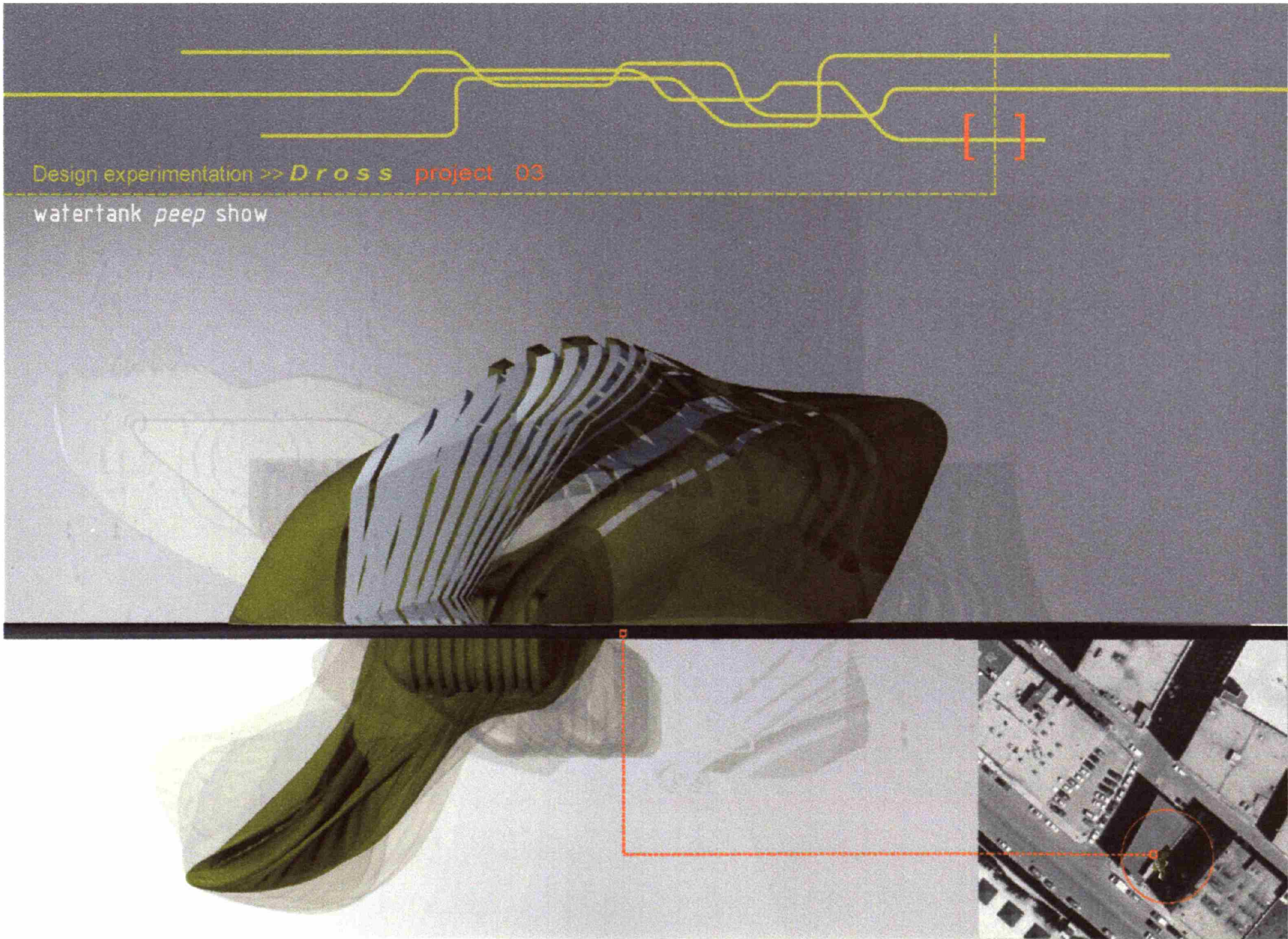
Design experimentation >> *Dross* project 03

watertank *peep* show



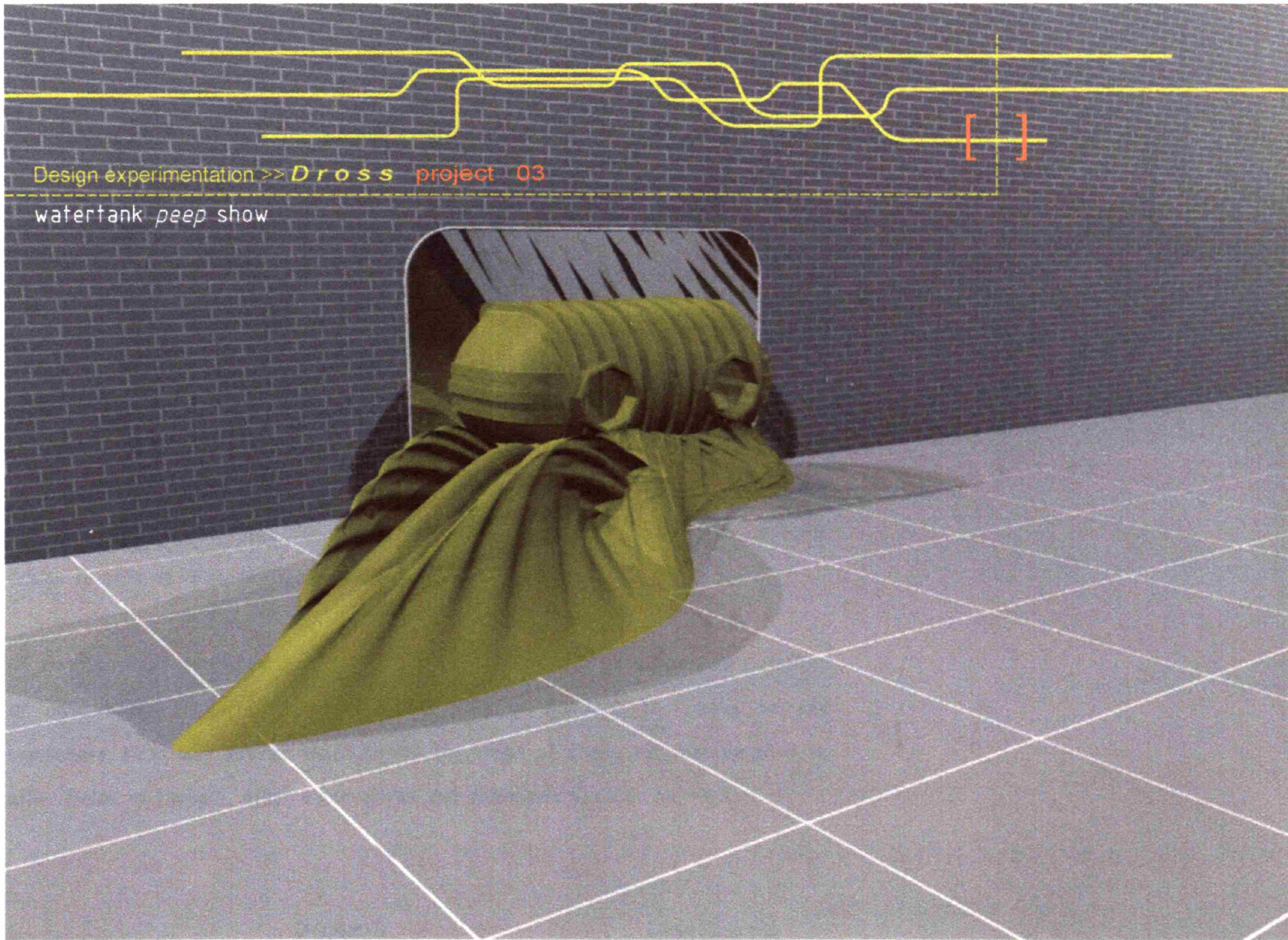
Design experimentation >> *Dross* project 03

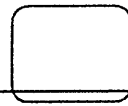
waterfank *peep* show



Design experimentation >> *Dross* project 03

watertank *peep show*





>> Discussion

This thesis would not like to conclude itself. Instead, the intention is to open a discussion and leave open questions. If this is my space for personal confession, it is particularly bizarre to me what precisely the drive for this thesis was. It was definitely not an environmental responsibility journey. I guess my drive was to intertwine and delineate common itineraries between two peripheral areas of the architectural discipline that are considered almost in all cases as *disjunctive fields; theory and building technology*. A conceptual thread of this thesis was to depict the occasional solipsism of the former and bring it to contact with a crude reality of a discourse about materiality. At the same time examine critically the naiveté of many building theories that are purely geared by functional parameters, reducing design to sets of rules and instructions.

At the center of my discourse lies the vision of *dross*; both as a *phantom condition of incidentally displaced material* and a *cultural mandate*. If I have to end somewhere, I can only assume that I revisit the vision of *dross* and then derail it to other fields of thought, other explorations and experiments, other journeys.

>> Abramson Daniel M., *"Obsolescence: Notes towards a History"*, Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003).

>> Ashby Mike & Johnson Kara, Materials and Design (Oxford, UK: Butterworth-Heinemann, 2002).

>> Barr Alfred, Picasso: Fifty Years of his Art (New York: Published for the Museum of Modern Art by Arno Press, 1946).

>> Bettum Johan, *"Skin Deep. Polymer Composite Materials in Architecture"*, Architectural Design (A.D), Vol.72 No.1, (London: Willey Academy, 2002).

>> Botond Bogner, *"The Japanese Example - The Other End of Architecture"* in Andreas Papadakis (Ed.) New Architecture (NA) No.2 (Windsor, UK: Andreas Papadakis Publisher, 1998).

>> Bourriaud Nicolas, Postproduction, Culture as Screenplay: How Art Reprograms The World (New York :Lukas & Sternberg, 2002).

>> Bradley Guy & Scott Shell (2002). *"Design for Deconstruction and Materials Reuse"* in http://www.deconstructioninstitute.com/download.php?dow_ID=18 .

>> Brand Stewart, How Buildings Learn: What happens after They' re Built, (New York: Viking, Penguin Books, 1994).

>> Brayer Marie-Ange, *"On the Surface of the Earth"* in Marie-Ange Brayer & Beatrice Simonot (Eds), Archilab's Earth Buildings. Radical Experiments in Earth Architecture (London: Thames & Hudson, 2003).

>> Brayer Marie-Ange & Simonot Beatrice (Eds), Archilab's Futurehouse: Radical Experiments in Living Space (New York: Thames & Hudson, 2002).

>> Cambridge Dictionaries Online, <http://dictionary.cambridge.org/>.

>> Catts Oron & Zurr Ionat, "*Emergence of the Semi-Living*" in **Thresholds No. 24; Reproduction and Production** (Cambridge, Massachusetts: Department of Architecture, Massachusetts Institute of Technology, 2002).

>> Chen C.T. Joseph, "*The Development of Anatomic Art and Sciences: The Ceroplastica Anatomy Models of La Specola*" in **Neurosurgery 45**, No.4 (October 1999).

>> Colomina Beatriz, "*I Dreamt I Was a Wall*" in **Rachel Whiteread: Transient Spaces** (New York: The Solomon R. Guggenheim, 2001).

>> Cook Peter, "*Plug-in City*" in **VV.AA.**, Archigram, Birkhauser, Boston 1972.

>> Couture Lise Anne & Rashid Hani, **Flux. Asymptote** (New York: Phaidon Press Limited, 2002).

>> Crowther P, *"Developing an Inclusive Model for Design for Deconstruction"*, Queensland University of Technology, Australia, in Proceedings of the CIB Task Group 39 Meeting (Wellington, New Zealand: April 2001).

>> Dailey Meghan & Franzen Elizabeth (Eds), Rachel Whiteread. Transient Spaces, (New York : Guggenheim Museum Publications, 2001).

>> Derrida Jacques, Positions, trans. Alan Bass (Chicago: University of Chicago, 1981).

>> Derrida Jacques, *"The Law of Genre"*, Glyph 7 (1980).

>> Duffy Frank, *"Measuring Building Performance"*, Facilities, May 1990.

>> Ednie-Brown Pia, *"The Will to Animation"* in Architectural Design (A.D), Vol.71, No.2 (London: Willey - Academy, April 2001).

>> Explore the World of Earth Science, Section of Investigations, Chapter 16: Wind, Waves, and Currents, In:

http://www.classzone.com/books/earth_science/terc/navigation/investigation.cfm .

>> Fernandez John E., *"Diversified Longevity: Orchestrated Obsolescence for Intelligent Change"* in Thresholds No.24; Reproduction and Production (Cambridge, Massachusetts: M.I.T Department of Architecture Publication, 2002).

>> Flood Richard & Morris Frances (Curators), Zero to Infinity: Arte Povera 1962–1972 (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001).

>> Frampton Kenneth, *"Intimations of Durability, Notes on Architecture and the Theme of Time"* in Harvard Design Magazine (Fall 1997).

>> Friedman Yona, *"L'architecture Mobile"*, Collection "M.O":Mutations, Orientations (Edition CASTERMAN/ Poche, 1970).

>> Gabor Dennis, Inventing the Future (New York: Alfred A. Knopf, 1963).

>> Gamard-Burns Elizabeth, Kurt Schwitters's Merzbau: The Cathedral of Erotic Misery (New York: Princeton Architectural Press, 2000).

>> Gamard-Burns Elizabeth, *"We Play until Death Shuts the Door"* in Bell Michael & Leong Sze Tsung (Eds), Slow Space (New York: The Monacelli Press, 1998).

>> Gissen David, *"Bigness Vs. 'Green-ness'"* in Thresholds No.26; Denatured (Cambridge, MA: Department of Architecture, Massachusetts Institute of Technology, 2003).

>> Glendinning Miles & Muthesius Stefan, *"Continuity and Change. Social Housing Types in Postwar Reconstruction Era"*, Architectural Design (A.D), Vol.70, No.4, 2000.

>> Groak Steven, The Idea of Building. Thought and Action in the Design and Production of Buildings (London: E& FN Spon, 1992).

>> Group *Mu* (Eds), Collages (Paris: Union Generale, 1978).

>> Haraway Donna J., *"Teddy Bear Patriarchy: Taxidermy in the Garden of Eden 1908-1936"* in The Haraway Reader (New York : Routledge, 2004).

>> Haraway Donna J., Simians, Cyborgs and Women. The Reinvention of Nature (New York: Routledge, 1991).

>> Harpman Specht, "*Hypertexture*", Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003).

>> Henahan Sean, "*Asexual Stem Cell Production*", in <http://www.accessexcellence.org/WN/SU/SU102001/parthenogenesis.html> .

>> Heuman Jackie & Deighton Sandra, "*Natural Selection. Antony Gormley*" in Heuman Jackie (Ed), Material Matters. The Conversation of Modern Sculpture (London: Tate Gallery Publishing Ltd., 1999).

>> Jameson Frederic, "*Postmodernism and Consumer Society*" in Hal Foster (Ed.), The Anti-Aesthetic. Essays on Postmodern Culture (New York: The New Press, 1998).

>> Jarzombek Mark, "*Sustainability, Architecture & Nature; Between Fuzzy Systems and Wicked Problems*", Thresholds No.26; Denatured (Cambridge, Massachusetts: M.I.T Department of Architecture Publication, 2002).

>> Kaspori Dennis, *"A Communism of Ideas: Towards an Open-Source Architectural Practice"* in Archis, No.3, 2003.

>> Kennedy Sheila & Grunenberg Christoph, KVA: Material Misuse (London: AA Publications, 2001).

>> Kenney E.J, *"Introduction"* in Ovid, Metamorphoses translated by A.D. Melville (Oxford, UK: Oxford University Press, 1986).

>> Kepes Gyorgy, *'Art and Ecological Consciousness'* in Gyorgy Kepes (Ed.), Arts of the Environment (New York: George Braziller, 1972).

>> Kibert, J.Charles. *"Deconstruction as an Essential Component of Sustainable Construction"*, Proceedings: Strategies for a Sustainable Built Environment (Pretoria, August 2000).

>> Klein Joseph J, *"Depreciation and Obsolescence"*, Proceedings of the Annual Convention of the National Association of Building Owners and Managers (Chicago 1922: 240).

>> Konrads Ulrich (Ed.), Programs and Manifestoes on the 20th Century Architecture, (Cambridge, Massachusetts: MIT Press, 1964).

>> Krauss Rosalind, The Originality of the Avant - Garde and Other Modernist Myths (Chicago: University of Chicago Press. 2003).

>> Levi Primo, The Periodic Table, trans. Raymond Rosenthal (New York: Schocken Rose, 1984).

>> Limley Robert, "*Spaces of Arte Povera*" in Richard Flood & Frances Morris (Curators), Zero to Infinity: Arte Povera 1962-1972 (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., 2001).

>> Lynch Kevin, Wasting Away, edited by Michael Southworth (San Francisco, CA: Sierra Club Books, 1990).

>> Macozoma Dennis S., "*Understanding the Concept of Flexibility in Design for Deconstruction*" in Design for Deconstruction and Materials Reuse CIB Publication

272: Proceedings of the CIB Task Group 39 – Deconstruction Meeting, Edited by Abdol R. Chini and Frank Schultmann, (Karlsruhe, Germany: April 2002).

>> Margetts Martina (Ed), International Crafts (London: Thames & Hudson, 1991).

>> Martin Reinhold, "*Organicism's Other*" in Grey Room 04 (Cambridge, MA: MIT Press, Summer 2001).

>> Material without Boundaries. Material ConneXion Catalogue, (New York – Milano: Material ConneXion Publication).

>> MBDC Cradle to Cradle Design in <http://www.mbdc.com/>.

>> McCarthy Battle, "*Multi-Source Synthesis. Embodied Energy*", Architectural Design (AD), Vol.66, No.11/12, 1996.

>> McDonough William & Braungart Michael, Cradle to Cradle. Remaking the Way We Make Things (New York: North Point Press, 2002).

>> Merriam- Webster Online Dictionary, <http://www.m-w.com/dictionary.htm> .

>> Migayrou Frederic, "*Extensions of the Oikos*" in Marie-Ange Brayer & Beatrice Simonot (Eds), Archilab's Earth Buildings. Radical Experiments in Earth Architecture (London: Thames & Hudson, 2003).

>> Nesbit Molly, "*Casting Out*" in Rachel Whiteread: Transient Spaces (New York: The Solomon R. Guggenheim, 2001).

>> Novak Markos, "*Speciation, Transvergence, Allogenesis: Notes on the Production of the Alien*" in Architectural Design (AD), Vol.72, No.3, (London: Wiley- Academy, 2002).

>> Ovid, Metamorphoses translated by A.D. Melville (Oxford, UK: Oxford University Press, 1986).

>> Oxford English Dictionary Online, <http://dictionary.oed.com/entrance.dtl> .

>> Pawley Martin, "*Chile and the Cornell Programme*" in Architectural Design (A.D), Vol XLIII 12 (London: The Standard Catalogue Co Ltd, 1973).

>> Pawley Martin, "*Garbage Housing*" in Architectural Design (AD), Vol. XLIII 12 (London: The Standard Catalogue Co.LTD, 1973).

>> Pidgeon Monica, "*Snow Moulding*" in Architectural Design (AD), Vol XL III 12 (London: The Standard Catalogue Co Ltd, 1973).

>> Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, "*Exporting Harm. The High-Tech Trashing of Asia*", Prepared by The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC), (February 25, 2002).

In http://www.svtc.org/resource/pubs/pub_index.html .

>> Rabinow Paul, "*Artificiality and Enlightenment: From Sociobiology to Biosociality*" in Jonathan Crary & Sanford Kwinter (Eds), Incorporations. Zone (Series);6 (New York, NY: Zone, MIT Press, 1992).

>> Raymond S. Eric, *"The Cathedral and the Bazaar. The Importance of Having Users"*. In

http://www.redhat.com/knowledgebase/otherwhitepapers/whitepaper_cathedral-2.html

>> Reichardt Jasia, *"Multiples"* in Architectural Design (AD), Vol XLI, (London: The Standard Catalogue Co Ltd, 1971).

>> Rowe Colin & Koetter Fred, Collage City (Cambridge, Massachusetts: MIT Press, 1978).

>> Rybczynski Witold, *"From Pollution to Housing"* in Monica Pidgeon (Ed), Architectural Design (AD), Vol. XLIII 12 (London: The Standard Catalogue Co Ltd, 1973).

>> Schultz Helmut C., *"Structure for Change and Growth"*, Architectural Forum, Vol. 134, No. 2, (New York: Whitney Publications, March 1971).

>> Schwartz M. Mel, Composite Materials. Processing, Fabrication and Applications (Volume II) (United States: Prentice Hall Inc., 1997).

>> Smithson Robert, Le Paysage Entropique 1960-1973 (Paris, RMN; Brussels, Palais des Beaux - Arts; Marseilles, Musees de Marseille, 1944).

>> Southworth Michael, "*Wastelands in the Evolving Metropolis*" (April 1, 2001). Institute of Urban & Regional Development, IURD Working Paper Series. Paper WP-2001-01. <http://repositories.cdlib.org/iurd/wps/WP-2001-01>.

>> Spiller Neal, "*Leaving Nadir*" in Architectural Design Profile (A.D), No.123 (London: Academy Group Ltd., 1996).

>> Tobias Jennifer, "*Artificial Skin; Ingrown and Outsourced*" in Ellen Lupton (Ed.) Skin. Surface, Substance + Design (New York: Princeton Architectural Press, 2002).

>> Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan (New York: Princeton Architectural Press, 2002).

>> Ulmer L. Gregory, "*The Object of Post - Criticism*" in Hal Foster (Ed.), The Anti-Aesthetic. Essays on Postmodern Culture (New York: The New Press, 1998).

>> Urbach Henry, *"Trojan Horses, Smart Missiles: The Renegade Architecture of Mas Yendo"* in RIEA Europa (Ed), Mas Yendo. Ironic Diversion (Wien, Austria: Springer-Verlag, 2001).

>> Verona Irina, *"Urban Upgrading: A new Community Center in the Barrios of Caracas. Matias and Mateo Pinto"* in Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003).

>> Vidler Anthony, The Architectural Uncanny. Essays in the Modern Unhomely (Cambridge, Massachusetts: MIT Press, 1992).

>> Wikipedia, The Free Encyclopedia, http://en.wikipedia.org/wiki/Main_Page .

>> Wilson, Forrest, *"Building with the Byproducts of Society"*, AIA Journal, Vol.68, No.8, July 1979.

Figure 1 >> Ovid the Poet

In Wikipedia, The Free Encyclopedia, <http://en.wikipedia.org/wiki/Ovid>.

Figure 2 >> Antony Gormley's Coconut Lead Shell contaminated by an incidental, undefined material that originated from the lead's interaction with the coconut.

In Heuman Jackie & Deighton Sandra, *"Natural Selection. Antony Gormley"* in Heuman Jackie (Ed), Material Matters. The Conversation of Modern Sculpture, (London: Tate Gallery Publishing Ltd., 1999).

Figure 3 >> Best Buy Advertisement

In Wired Magazine; *Step in to Liquid*, August 2004, p.81.

Figure 4 >> *Between Cinema and a Hard Place*, viewers left back view of nine modified Panasonic 13-inch color monitors which attached circuitboards on pedestal. Bill Viola & Gary Hill Art work.

In Heuman Jackie (Ed), Material Matters. The Conversation of Modern Sculpture, (London: Tate Gallery Publishing Ltd., 1999), p.113.

Figure 5 >> Amount of E-waste exported in Asia yearly

In Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, *"Exporting Harm. The High-Tech Trashing of Asia"*, Prepared by

The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC),
(February 25, 2002), http://www.svtc.org/resource/pubs/pub_index.html .

Figure 6 >> The 'Six S's' diagram for shearing building layers by Stewart Brand
In Brand Stewart, **How Buildings Learn: What happens after They' re Built**, (New York: Viking, Penguin Books, 1994), p.13.

Figure 7 >> Diagram by Helmut C. Schulitz estimating the difference between physical deterioration and functional obsolescence.
In Helmut C. Schulitz, "*Structure for Change and Growth*", **Architectural Forum**, Vol. 134, No. 2, (New York: Whitney Publications, March 1971), p.61.

Figure 8 >> DEGW from Francis Dyffy & Alex Henney, **The Changing City (London: Bullstrode, 1989), p.61.** On this diagram Bran explains that "over fifty years, the changes within a building cost three times more than the original building. Frank Duffy explains the diagram: "Add up what happens when capital is invested over a fifty-year period: the structure expenditure is overwhelmed by the cumulative financial consequences of three generations of services and ten generations of space plan changes... It proves that architecture is actually of very little significance".
In Brand Stewart, **How Buildings Learn: What happens after They' re Built**, (New York: Viking, Penguin Books, 1994), p.13.

Figure 9 >> Plug-in City, Peter Cook, 1964
In Coupe. Coll. Centre Georges Pompidou, photo Jean-Claude Planchet.

Figure 10 >> Plug-in City detail, Peter Cook, 1964.

In Abramson Daniel M., *“Obsolescence: Notes towards a History”*, Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003).

Figure 11 >> Watervliet Paper Mill

In <http://www.alliedpaper.org/watervliet/> .

Figure 12 >> Watervliet Paper Mill

In <http://www.alliedpaper.org/watervliet/> .

Figure 13 >> Watervliet Paper Mill

In <http://www.alliedpaper.org/watervliet/> .

Figure 14 >> Plastic container

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002).

Figure 15 >> TV Tank_ Petroleum trailer tank transformed into t.v lounge by Lo/Tek

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002), p.159.

Figure 16 >> Segregating materials in an obsolete computer

In <http://www.spectrumwest.com/CRI.html> .

Figure 17 >> E-waste

In <http://www.spec.bc.ca/project/project.php?projectID=11> .

Figure 18 >> Recycled Groundcover material

Material without Boundaries. Material ConneXion Catalogue, (New York – Milano: Material ConneXion Publication).

Figure 19 >> Reuse of mammoth bones

Wilson Forrest, "*Building with the Byproducts of Society*", **AIA Journal**, Vol.68, No.8, July 1979, p.41.

Figure 20 >> The Theater of Marcellus, originally a Roman amphitheater, became a fortress, then a palace, and now houses apartments.

In Southworth Michael, "*Wastelands in the Evolving Metropolis*" (April 1, 2001). **Institute of Urban & Regional Development, IURD Working Paper Series**. Paper WP-2001-01. <http://repositories.cdlib.org/iurd/wps/WP-2001-01>, p.12.

Figure 21 >> Duchamp's Urinal

In <http://www.danchan.com/weblog/miz/88701> .

Figure 22 >> Schwitters Hanover 'Merzbau'

In Gamard-Burns Elizabeth, **Kurt Schwitters's Merzbau: The Cathedral of Erotic Misery**, (New York: Princeton Architectural Press, 2000).

Figure 23 >> IBA Emscher Park_Reutilization of a former industrial complex for recreation.

In <http://www.02.org/ideas/smartarch/smartarch995.html> .

Figure 24 >> Garbage Housing Sketch by John Dickinson (1971) in his Master's Thesis entitled 'Why Leave London' at the Architectural Association, London.

In Martin Pawley, "Garbage Housing", **Architectural Design (A.D)**, Vol XLI, 1971.

Figure 25 >> Architectural Design (AD) Covers in 1971 & 1973.

In Migayrou Frederic, "*Extensions of the Oikos*" in Marie-Ange Brayer & Beatrice Simonot (Eds), **Archilab's Earth Buildings. Radical Experiments in Earth Architecture** (London: Thames & Hudson, 2003).

Figure 26 >> Posters of 'Arte Povera' exhibitions by Germano Celant (1969)

In Flood Richard & Morris Frances (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001).

Figure 27 >> Gilberto Zorio [Torch] 1967.

In In Flood Richard & Morris Frances (Curators), **Zero to Infinity: Arte Povera 1962-1972** (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001).

Figure 28 >> I_Scape Multiple by the group 'Asymptote'

In Couture Lise Anne & Rashid Hani, **Flux. Asymptote** (New York: Phaidon Press Limited, 2002).

Figure 29 >> Detail of a Cathode Ray Tube_ Collage Method

In Heuman Jackie (Ed), Material Matters. The Conversation of Modern Sculpture (London: Tate Gallery Publishing Ltd., 1999), p.114.

Figure 30 >> Chimera No.5 & No.8, by Anthony Aziz & Samuel Cucher _Moulding Method. Art work of metallic screws & components wrapped by human skin.

In Ellen Lupton (Ed.) Skin. Surface, Substance + Design (New York: Princeton Architectural Press, 2002), p.76, 77.

Figure 31>> Miller/Jones Studio_Lo/Tek, New York 1996.

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002), p.86.

Figure 32>> Morton Duplex Residence_Lo/Tek, New York 1998.

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002), p.99.

Figure 33 >> Mutant & Silent Architecture_ Santiago Cirugeda Parejo, 2000.

In Brayer Marie-Ange & Simonot Beatrice (Eds), Archilab's Futurehouse: Radical Experiments in Living Space, (New York: Thames & Hudson, 2002), p.91.

Figure 34 >> Living Unit by Mas Yendo

In RIEA Europa (Ed), Mas Yendo. Ironic Diversion, (Wien, Austria: Springer-Verlag, 2001).

Figure 35 >> Housing in Alabama by Rural Studio

In A. Oppenheimer Dean, Rural Studio. Samuel Mockbee and an Architecture of Decency, (New York: Princeton Architectural Press, 2002).

Figure 36 >> Prefabricated 'concacero' system of steel and concrete structure_ La Vega Community Center by Matias and Mateo Pinto in Caracas Venezuela.

In Verona Irina, "*Urban Upgrading: A new Community Center in the Barrios of Caracas. Matias and Mateo Pinto*" in Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003), p.77.

Figure 37>> Lite-Gate Project by Lo/tek_ Hochberg Apartment, New York, 2001.

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan, (New York: Princeton Architectural Press, 2002), p.68.

Figure 38 >> House by Rachel Whiteread_ Grove Road London, 1993.

In Lisa Dennison, "*A House is not a Home: The Sculpture of Rachel Whiteread*" in Rachel Whiteread: Transient Spaces (New York: The Solomon R. Guggenheim, 2001).

Figure 39 >> Antony Gormley_Natural Selection 1981.

In Heuman Jackie & Deighton Sandra, "*Natural Selection. Antony Gormley*" in Heuman Jackie (Ed), Material Matters. The Conversation of Modern Sculpture, (London: Tate Gallery Publishing Ltd., 1999).

PAGES (S) MISSING FROM ORIGINAL

Pg. 246

Figure 46 >> Snow Moulding by David Sellers 1973

In Pidgeon Monica, "Snow Moulding" in Architectural Design (AD), Vol XL III 12 (London: The Standard Catalogue Co Ltd, 1973), p.751.

Figure 47 >> Material Scaffolds for the production of artificial skin with local/global pore structures

In <http://www-personal.umich.edu/~scottho/BSD.HTML> .

Figure 48 >> Growth of Artificial Skins in laboratories

In Lupton Elen (Ed), Skin. Surface, Substance + Design, (New York: Princeton Architectural Press, 2002).

Figure 49 >> Cracked micro-capsule in a self-healing polymer

In <http://www.abc.net.au/science/news/stories/s247019.htm> .

Figure 50 >> Historic Fire Vehicle in the Boston Fire Museum

In www.bostonfiremuseum.com.

All page illustrations are credited to the author unless otherwise stated in this section.

Illustration >> Page 25

The Reef Machine by Mas Yendo_ In RIEA Europa (Ed), Mas Yendo. Ironic Diversion (Wien, Austria: Springer-Verlag, 2001).

Diagram indicating the composition of a personal desktop computer_ In Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, "*Exporting Harm. The High-Tech Trashing of Asia*", Prepared by **The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC)**, (February 25, 2002). http://www.svtc.org/resource/pubs/pub_index.html .

Illustration >> Page 31

Fluxspace Installation by Asymptote_ In Couture Lise Anne & Rashid Hani, Flux. Asymptote (New York: Phaidon Press Limited, 2002), p.6,7.

Number patterns by the author.

Illustration >> Page 33

Background Image: Gotham Gothic; Unpacking the Cathedral, Desire and Technique, Advanced Studio V, Karen Bausman (Critic), Fall 1996. Project by Stephen Shwe_ In Bernard Tschumi & Matthew Berman (Eds), Index Architecture (Cambridge, MA: MIT Press, 2003), p.21.

Digital drawings by the author.

Illustration >> Page 35

Defunct machinery. Photographs by Lo/Tek_ In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan (New York: Princeton Architectural Press, 2002).

Illustration >> Page 39

Demolition of the Gillender Building, New York (Charles Berg and Edward H. Clark) _ In Abramson Daniel M., "*Obsolescence: Notes towards a History*", Praxis: Journal of Writing + Building 2003, No.5 (Cambridge, MA: Praxis Publications, 2003), p. 106, 107.

Illustration >> Page 44

Diagram for comparative energy requirements of a selection of building materials _In McCarthy Battle, "*Multi-Source Synthesis. Embodied Energy*", Architectural Design (AD), Vol.66, No.11/12, 1996, p.V.

Illustration >> Page 49

Photographs by Frank Shih Her Wang _In <http://www.fiu.edu/~bienal/miamibeach2003/futures-en.html>.

Photographs of the author.

Diagram of building systems_ In McCarthy Battle, "*Multi-Source Synthesis. Embodied Energy*", Architectural Design (AD), Vol.66, No.11/12, 1996, p.IV.

Illustration >> Page 56

Mount Cabin by Wes Jones_ In Phyllis Richardson, Lucas Dietrich (Eds), XS: Big Ideas, Small Buildings (Singapore: Universe Publishing, 2001).

Adaptable Plans and Infill Systems by John Habraken _ In N.J. Habraken, J.Th. Boekholt, P.JM Dinjens, AP. Thijssen, Variations. The Systematic Design of Supports, Laboratory of Architecture and Planning MIT, MIT Press, USA, 1976, p.135.

Illustration >> Page 62

Living Unit by Mas Yendo_ In RIEA Europa (Ed), Mas Yendo. Ironic Diversion (Wien, Austria: Springer-Verlag, 2001).

Illustration >> Page 79

Photographs of obsolete items_

In Tolla Ada, Lignano Giuseppe & Nobel Philip, LOT/EK: Urban Scan (New York: Princeton Architectural Press, 2002).

In Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, *“Exporting Harm. The High-Tech Trashing of Asia”*, Prepared by **The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC)**, (February 25, 2002). http://www.svtc.org/resource/pubs/pub_index.html .

In <http://www.alliedpaper.org/watervliet/> .

Illustration >> Page 82

Obsolete items_ In In Puckett Jim, Byster Leslie, Westervelt Sarah, Gutierrez Richard, Davis Sheila, Hussain Asma & Dutta Madhumitta, *“Exporting Harm. The High-Tech Trashing of Asia”*, Prepared by **The Basel Action Network (BAN) & Silicon Valley Toxics Coalition (SVT SVTC)**, (February 25, 2002). http://www.svtc.org/resource/pubs/pub_index.html .

Acoustic Recycled Paper Fiberboard_ In Kennedy Sheila & Grunenberg Christoph, **KVA: Material Misuse** (London: AA Publications, 2001).

Alkemi material, Metal waste with silicone_ In **Material without Boundaries**. Material ConneXion Catalogue, (New York – Milano: Material ConneXion Publication).

Illustration >> Page 92

Chile & The Cornell Programme_ In Pawley Martin, *“Garbage Housing”* in **Architectural Design (AD)**, Vol. XLIII 12 (London: The Standard Catalogue Co.LTD, 1973).

Sulphur Reuse by Rybczynski Witold_ In Rybczynski Witold, "*From Pollution to Housing*" in Monica Pidgeon (Ed), Architectural Design (AD), Vol. XLIII 12 (London: The Standard Catalogue Co Ltd, 1973).

Illustration >> Page 96

Living Sculpture by Mariza Merz & columns by Alighiero Boetti_ In Flood Richard & Morris Frances (Curators), Zero to Infinity: Arte Povera 1962-1972 (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001).

Illustration >> Page 97

The Mirror of Italy by Luciano Fabro & Maritime Alps by Guisepppe Penone_ In In Flood Richard & Morris Frances (Curators), Zero to Infinity: Arte Povera 1962-1972 (Minneapolis, Minn: Walker Art Center ; New York ; Available through D.A.P./ Distributed Art Pub., c2001).

Illustration >> Page 100

I_Scapes by Asymptote_ In Couture Lise Anne & Rashid Hani, Flux. Asymptote (New York: Phaidon Press Limited, 2002).

Illustration >> Page 104

Rubber Lamp by Moorhead & Moorhead_ In Ellen Lupton (Ed.) Skin. Surface, Substance + Design (New York: Princeton Architectural Press, 2002), p.170.

Initial formation of the Merzbau by Kurt Schwitters _ In Elizabeth Burns- Gamard, **Kurt Schwitters Merzbau: The Cathedral of Erotic Misery**, New York: Princeton Architectural Press (2000).

Illustration >> Page 109

Morton Duplex Residence by Lo/Tek_ In Tolla Ada, Lignano Giuseppe & Nobel Philip, **LOT/EK: Urban Scan** (New York: Princeton Architectural Press, 2002).

Mutant & Silent Architecture by Santiago Cirugeda Parejo_ In Brayer Marie-Ange & Simonot Beatrice (Eds), **Archilab's Futurehouse: Radical Experiments in Living Space** (New York: Thames & Hudson, 2002).

Illustration >> Page 112

Structure in Alabama by the Rural Studio_ In David Moos & Gail Trechsel (Eds), **Samuel Mockbee and the Rural Studio** (Birmingham, UK: Birmingham Museum of Art Publications, 2003).

Illustration >> Page 116

The La Vega Community Center by Mateo & Matias Pinto_ In Verona Irina, "*Urban Upgrading: A new Community Center in the Barrios of Caracas. Matias and Mateo Pinto*" in **Praxis: Journal of Writing + Building 2003**, No.5 (Cambridge, MA: Praxis Publications, 2003).

Packaging Experiments by Specht Harpman_ In Harpman Specht, "*Hypertexture*", **Praxis: Journal of Writing + Building 2003**, No.5 (Cambridge, MA: Praxis Publications, 2003).

Illustration >> Page 119

Lite-Gate Project by Lo/Tek_ In Tolla Ada, Lignano Giuseppe & Nobel Philip, **LOT/EK: Urban Scan** (New York: Princeton Architectural Press, 2002).

Water Tower (1998) & Bsement (2001) by Rachel Whiteread_ In Lisa Dennison & Craig Houser (Eds), **Rachel Whiteread: Transient Spaces** (New York: The Solomon R. Guggenheim, 2001).

Illustration >> Page 125

Natural Selection by Anthony Gormley_ In Heuman Jackie & Deighton Sandra, "*Natural Selection. Antony Gormley*" in Heuman Jackie (Ed), **Material Matters. The Conversation of Modern Sculpture** (London: Tate Gallery Publishing Ltd., 1999).

The Hanover Merzbau by Kurt Schwitters _ In Elizabeth Burns- Gamard, **Kurt Schwitters Merzbau: The Cathedral of Erotic Misery**, New York: Princeton Architectural Press (2000).

Illustration >> Page 133

Basket by Karyl Sisson entitled 'Just Ripe'_ In Margetts Martina (Ed), **International Crafts** (London: Thames & Hudson, 1991).