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PLASTIC: THE BANAL AND THE INTERESTING

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This article highlights the role of synthetic plastic in forming and reproducing architectural self-identity in western architectural discourse in the liberal capitalist postwar era. Progressively, it argues, plastic bifurcated into two ever-widening sets of conceptual meanings and discipline-specific uses, referred to here as the *banal* and the *interesting*. That is, plastic came to be treated one way in everyday building (banal plastic) where it quietly proliferated beneath architecture's radar, and as something altogether different in architectural discourse (interesting plastic). Even when ignored or denigrated in architecture, plastic remained a palpable, ghostly absence, mirroring architectural identity.

Part one identifies historical moments and throughlines that represent the deep transformation petrochemicals and plastics have had on buildings, building practice, and everyday life in industrial economies. These include the explosive growth of industrial plastic production after the Second World War, plastic's heyday in Pop Art, its subsequent disappearance from architectural discourse, and lastly its limited resurgence among a niche, globalised avant-garde. Part two focuses on the centrality of plastic to two predominant architectural theoretical positions of the 1980s and 90s: phenomenology and post-structuralist neo-materialism. This section argues that, while ostensibly set in opposition to one another, these schools of thought have each reinforced, in different ways, the bifurcation between banal and interesting plastic in architecture. A brief concluding section argues that this split between the interesting and banal helps explains why the discipline's role in the present plastic crisis has been primarily characterised by reactivity, ineffectiveness, and collusion.

INTRODUCTION: PNEU URBANISM

Some people found the balloon interesting.[1]

In Barthelme's short story, 'The Balloon', a massive amorphous balloon mysteriously appears, hovering over the streets of Manhattan — a kind of immense, off-season Thanksgiving Day parade *blob*. Variously delighting or consternating the city's denizens, the balloon's slow, bulging expansion, at once sublime and absurd, exciting yet somewhat menacing, upends (for a time) the routine forms and experiences of daily life, creating unexpected new adjacencies, affordances, pleasures, and tensions, 'especially to people whose lives were rather rigidly patterned, persons to whom change, although desired, was not available'.[2] The balloon 'offered the possibility, in its randomness, of getting lost, of losing oneself, in contradistinction to the grid of precise, rectangular pathways under our feet'.[3]

The balloon, Barthelme's narrator recounts, unleashes multiple anarchic flows of meaning and activities, eliciting 'a complex of attitudes' and attempted explanations. 'There were reactions', he writes, 'some people found the balloon *interesting*' — a response that may strike the reader as, in light of the balloon's outrageous appearance, restrained.[4]

Perhaps this restraint represents a subtle defensive reflex. Like a clearing of the throat or stroking of the chin, *interesting* asserts in a small way the speaker's physical presence in the face of the unknown. Confronted with the undefined, uncategorised, and unpredictable, *interesting* releases and contains anxiety, unease, and estrangement.[5]

Consider for a moment how 'big A' architecture (encompassing for our purposes: architectural criticism, scholarship, and avant-garde practice), aspires, like Barthelme's balloon, to disrupt the rigid patterns of the ordinary, what Henri Lefebvre called *everyday* life. For Lefebvre, everyday life constitutes "'what is left over" after all distinct, superior, specialized, structured activities have been singled out by analysis'.[6] Everyday life includes … everything: the built, unbuilt, anonymously designed, natural or synthetic; plain buildings, empty lots, unpicturesque ruins; as well as the psychic and emotional lives of residents, after specialised discourses have staked off their turf. In this view, architecture's other, against which it reflects its identity, is not building (as is commonly claimed). Rather, architecture sets itself off against the backdrop of the *ordinary*.[7] Far from a relationship between equals, however, the conceptual dyad of architecture and everyday life serves to exalt the former, projecting onto everyday life a diminished quality. Architecture's identity is reflected in the mundane, boring, and banal against which the *interesting* is discerned.

Plastic, the subject of this essay, reflects this dualism, acting as a kind of chemical tracer, exemplifying, mirroring, and illuminating architecture's othering of the everyday.[8] Throughout the postwar period, it argues, plastic progressively bifurcated into two sets of meanings and uses, referred to here as the *banal* and the *interesting*. That is, plastic came to be

1. Donald Barthelme, 'The Balloon', *The New Yorker*, 16 April 1966 <https://www.newyorker.com/magazine/1966/04/16/the-balloon>.

2. Barthelme, 'The Balloon'.

3. Barthelme, 'The Balloon'.

4. Barthelme, 'The Balloon', emphasis added.

5. As critic Sianne Ngai notes, Susan Sontag uses the category *interesting* to represent an increasingly predominant, and distinctively modern aesthetic posture inexorably 'identified with the idea that everything in the world could be made interesting through the camera'. See Susan Sontag, *On Photography* (Farrar, Straus and Giroux, 1977), p. 99; and Sianne Ngai, *Our Aesthetic Categories: Zany, Cute, Interesting* (Harvard University Press, 2012), p. 5. Like the photograph, the interesting 'nourishes aesthetic awareness and promotes emotional detachment'. Disruptions become codified, institutionalised, tamed, and instrumentalised. 'Its main effect', Sontag writes, 'is to convert the world into a department store or museum-without-walls in which every subject is depreciated into an article of consumption, promoted into an item for aesthetic appreciation'. Politely noncommittal, the *interesting* is inserted, like a bookmark, declaring an object minimally worthy of mental consideration, displacing anxiety, action, or passion.

6. Henri Lefebvre, *Critique of Everyday Life, Volume 1* (Verso, 2008), p. 97.

7. For architectural historian Kenneth Frampton, the distinction between architecture and building accords with Arendt's distinction between *labour* (which is degraded, ephemeral, consumed cyclically, and is necessary for mere survival) and *work* (which is exalted, exceeds mere animal functioning, produces something durable and memorable, and is constitutive of the public realm). See Kenneth Frampton, 'Labour, Work and Architecture: The Status of Man and the Status of his Objects', in *Labour, Work and Architecture: Collected Essays on Architecture and Design* (Phaidon, 2002), pp. 7–31 (p. 7).

8. In this article I am using 'plastic' synonymously with 'synthetic polymers'. Polymers are long-chain hydrocarbon molecules both found in nature and synthesised in industrial processes. Petrochemicals are by-products of oil refining or are derived from natural gas, or (less commonly today) coal, which are used to produce synthetic polymers.

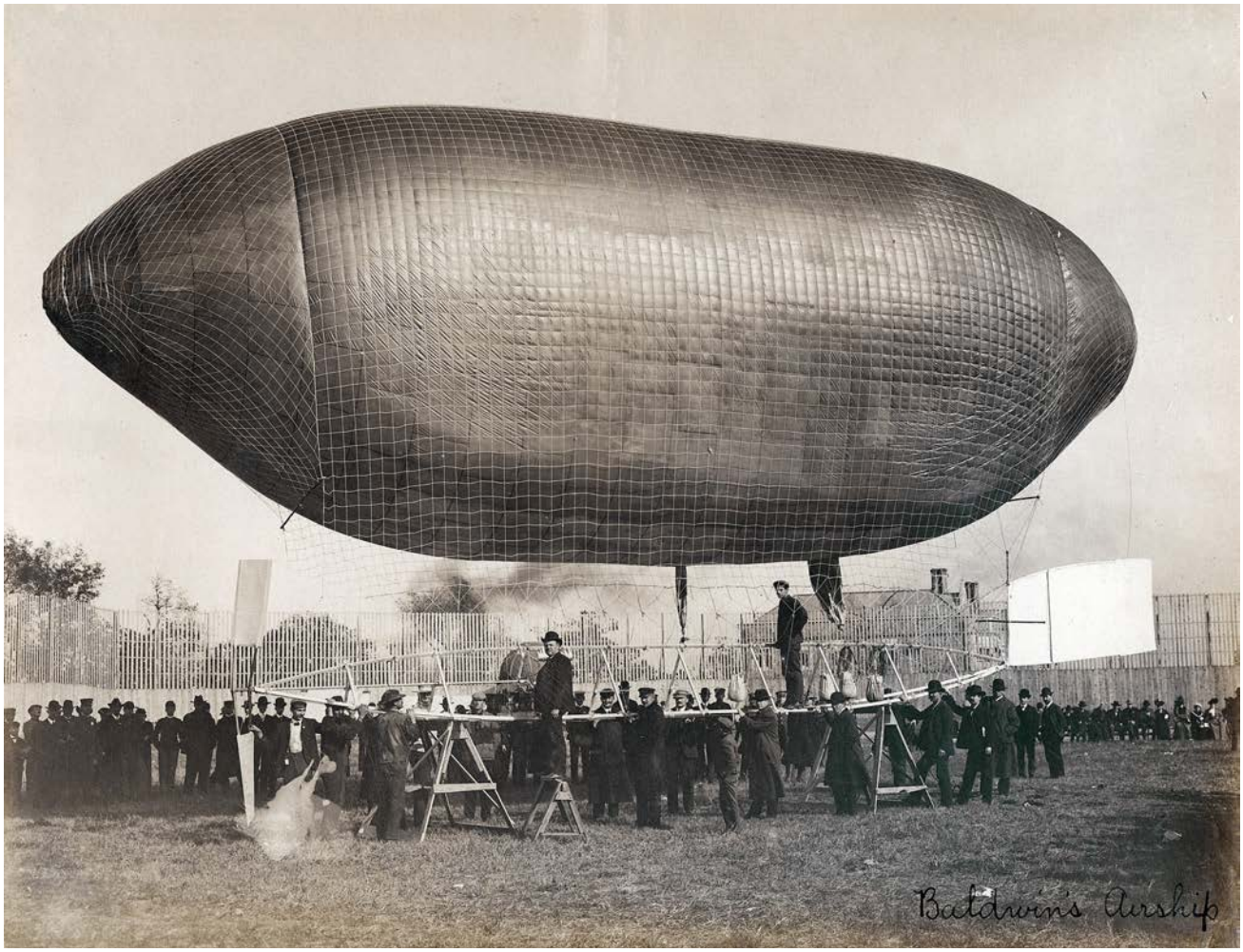

Figure 1. 'Baldwin's Airship'. California Arrow Airship, St. Louis World's Fair (1904). Missouri Historical Society. Public Domain.

treated one way in everyday building practice (the banal) — where it quietly proliferated, substituting for traditional materials, either through mimicry or concealed within building products and construction materials — and as something altogether different in architectural discourse (the interesting). Simply put, plastic in *building* became banal: hidden, cheap, and utilitarian. Plastic in *architecture,* while progressively receding from architectural discourse, emerged intermittently and aspirationally in avant-garde experimentation and high-profile building projects.

While plastic entered *buildings* via mass-produced components and construction materials, typically for operational or budgetary reasons, plastic in *architecture* became associated with bespoke design, aesthetics, and pure research. Plastic in building became vilified, the quitessential expression of of cultural and environmental degradation. Plastic in architecture became associated with technical and formal innovation. Plastic in architecture became, in a word, *interesting*. This split, I hope to show, is not merely incidental, but reflects the active managing and framing of plastic in architectural discourse, employed to maintain and reproduce architecture's disciplinary identity and relative autonomy.

Part one frames this bifurcation within the development of the deeply intertwined fossil fuel, petrochemical, plastics, and building product industries, focusing on the deeply transformative effect petrochemicals and plastics have had on buildings and building practice (both architectural and constructional) as both developed from within liberal western economies, particularly the United States (U.S.). It traces a progression from plastic's emergence as a major industry in the latter postwar period in the United States to its cultural heyday in Pop Art, through a decades-long 'plastic gap' marking plastic's absence from architecture discourse. It concludes with plastic's subsequent re-emergence in the 1990s, associated with a newly-revitalised focus on 'plasticity' among a niche, globalised avant-garde.

Part two focuses on the centrality of plastic to two predominant architectural theoretical positions of the 1980s and early-to-mid 1990s: phenomenology represented by the Heideggerian-influenced work of architectural historian Kenneth Frampton, and post-structuralist neo-materialism represented by the architect and theorist Greg Lynn. This section argues that, while divergent, both of these schools of thought have reinforced, in different ways, the bifurcation between banal and interesting plastic in architecture: the former by rejecting plastic on the basis of an ethic of material authenticity; the latter by situating plastic within a sophisticated, reworked formalist framework.

The conclusion discusses how architecture's clinging attachment to the interesting and denigration of the banal have contributed to the discipline's present crises of legitimation, malaise, and aesthetic foreclosure, and further, how these crises are exemplified by its predominantly reactive, ineffectual, and collusionary response to the present plastics crisis.

1966: Annus inflati, plastic's cultural zenith

In *The Balloon*, Barthelme's narrator explains the mysterious appearance of the great balloon to his lover who has recently returned from a business trip to Bergen in Norway:

> You asked if it was mine. I said it was. The balloon, I said, was a spontaneous autobiographical disclosure having to do with the unease I felt at your absence, and with sexual deprivation.[9]

9. Barthelme, 'The Balloon'.

Few sophisticated readers of the New Yorker magazine of the day would have failed to have drawn further associations. For, around the time *The Balloon* appeared in print in 1966, inflated things in general were emerging as kind of cultural trope. Balloons, that is, were very much *in the air*, or *blowing up*, or …

As documented by art historian Lucy Lippard, inflatables emerged from around 1966 to 1972 as part of a range of 'dematerialised' post-Pop strategies including happenings, performance, and later, process and conceptual art — in part, a reaction to what some artists and critics considered to be Pop Art's institutional assimilation, its challenge to high art precepts defanged and appropriated.[10] Far from fulfilling its insurrectionary promise, it seemed, to flatten distinctions between high and low culture, good taste and vulgarity, art and commerce. Pop artefacts — notably paintings by Andy Warhol, Roy Lichtenstein, James Rosenquist, and Robert Rauschenberg — were swiftly neutralised and commodified by museums and collectors ensuring their locked-in status as chic commodities. Dematerialisation shifted attention from objects to fleeting experience in the attempt to evade the institutional capture that conventional art pieces — permanent, portable, and commodifiable — accommodated.

For Reyner Banham, ephemerality stood for iconoclasm and populism. Associated with reconfigurability, deployability, and mobility, ephemerality stood at once for anti-monumentality, fleeting sensual pleasure, and ready adaptability to technological change. For Banham, architectural authenticity, permanence, and immobility represented the vestiges of elitist conventions that reflected and perpetuated the separation between high and low culture, and between art and everyday life. The true spirit of modernity was represented neither in functionalism, nor a timeless classicism reclothed in modern materials, but by flexibility, impermanence, and expendability. For Banham and his cohort, the churn of ephemera — not yet associated with climate breakdown — facilitated the accelerating pace of technological innovation. Planned obsolescence represented not the scourge of throw-away culture, but acknowledgment of products' time-delimited usefulness and dwindling power to elicit consumer excitement. For Banham, so rapid was technological change that choosing to live in a two-hundred-year-old building should make as little sense as driving a 'sixty-year-old car'.[11]

What inflatable plastic offered to Pop culture, as plastic historian Penny Sparke writes, was 'a material which could unite transparency, anti-solidity, flexibility, softness and friendliness'.[12] Serving as a kind of combination club banner and portable playroom, inflatables were deployed as a tool for liberating social space through shared play, futurism, and expanded sexuality.

THE BANAL

Plastic's expansionary phase

Plastic's cultural zenith represents a hingepoint in plastic's bifurcation into the banal and the interesting. To understand why requires diving more deeply into the history of plastic's growth alongside its ambivalent relationship with architecture.

As Jeffrey Meikle writes in his definitive history, *American Plastic*, the plastic industry as we know it did not exist prior to the Second World War. While commercial synthetic polymer plastics existed as early as the 1860s, until the 1930s plastic production remained a cottage industry providing mostly incidental decorative or personal items promoted as low cost substitutes for natural materials.[13] While the development of Bakelite, a coal tar derivative

10. Lucy Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (University of California Press, 1997), p. vii.

11. Reyner Banham, 'Design by Choice' in *Design by Choice* (Academy Editions, 1981), p. 98.

12. Penny Sparke, 'Plastics and Pop', in *The Plastics Age, From Modernity to Post-modernity*, ed. by Penny Sparke (Overlook, 1993), pp. 92–103 (p. 97).

13. Jeffrey L. Meikle, *American Plastic* (Rutgers University Press, 1995), p. 125.

Figure 2. Miles Monroe, played by Woody Allen, in *Sleeper*, dir. by Woody Allen (United Artists, 1973). Courtesy of United Artists.

Figure 3. Willard Maas, 'Andy Warhol's Silver Flotations', 4min, 8mm film (1966). Public Domain.

invented in 1907, represented the first industrially-produced plastic promoted for commercial use, the fully-scaled plastics industry did not emerge in the US until an urgent need for synthetics arose during the war. By 1942, fighting in the Pacific had interrupted trade routes for natural materials, most significantly rubber.[14] In response, the War Production Board (WPB) urgently allocated 700 million dollars to the US's largest rubber, chemical, and textile companies to urgently develop and fabricate synthetic rubber.[15] Ultimately fifty-one factories would be built between 1942 and 1945 that would be operated by the US's largest chemical and rubber companies. By the end of the war, US polymer production had quadrupled, transforming the production of synthetic polymers into a major industry.[16]

Plastic's explosive expansion is typically framed within a standard historical narrative: after the war, the massive industrial productive capacity that had been built up (factories, machines, and supply chains) was redirected to meet the needs and long-repressed desires of a populace eager to partake of the fruits of peace, modernity, and affluence. With the cessation of military commissions, recipients of the wartime subsidies such as Monsanto, Dupont, Goodyear, and US Rubber, wishing to keep factories running with minimal disruption and retooling, cast about for new uses for polymers (Fig. 4). Ultimately, they looked to the burgeoning construction industry, newly confronted with an urgent shortage in postwar housing.

A number of experimental houses emerged in response, built of durable, rigid, and fireproof composite glass-fibre reinforced composite plastic (GFRP), some intended as prototypes for potential rollouts of mass-produced, plastic housing. The most famous of these was Hamilton and Goody's House of the Future (HOTF) fabricated for the Monsanto chemical company and exhibited at Disneyland's 'Tomorrowland' between 1957 and 1967, where it was seen by millions of visitors.[17] Despite the public's fascination with the Monsanto House's imagined future lifestyle, investors balked due to what turned out to be significant unforeseen complexity and cost of its fabrication, as well as scepticism over the public's readiness to embrace domestic life within its unconventionally curved shape — consigning the HOTF to theme park spectacle.

Unlike GFRP, which is a thermoset plastic composite, plastics developed or expanded during the war, known as thermoplastics, lacked the strength and rigidity for use as structure and exterior applications, tending to deform under stress, degrade under ultraviolet light, ignite at low temperature, emit toxins when burned, or become brittle with changing temperature. However, many of the qualities that disqualified plastic as a durable building material — elasticity, moldability, malleability, and insulative properties — proved amenable to the development of countless secondary building components. Consumers readily embraced the 'damp-cloth' domestic convenience of newly-available plastic interiors. Wartime plastics such as such as polybutadiene (a main component of synthetic rubber), polyamide (nylon, a replacement for silk for parachutes), polymethyl methacrylate (a glass substitute used for bomber turrets, later sold as Acrylite, Lucite, and Plexiglass), and polyvinyl chloride (PVC) soon found new, or wider postwar applications ranging from flooring to cladding, roofing, sealants, insulation, decor, furniture, polyester-based decorative

14. Meikle. *American Plastic*, p. 125.

15. At the time of these deliberations, two major economic sectors vied to be awarded the valuable commission to provide the organic feedstocks to produce synthetic polymers: agriculture and oil. For oil companies, petrochemicals represented a lucrative new source of revenue, independent of highly cyclical oil markets. Generated from the byproducts of petroleum refining, petrochemicals monetised an oil industry waste product, requiring no raw material input. Rather than being based on petroleum and centring operations in Houston and the Mississippi Gulf Coast, plastic production very nearly might have been alcohol-based, derived from plant material, and centred in what is now Iowa farmland. At the beginning of World War II, Standard Oil, through its partnership with German chemical company IG Farben, held in its possession patents that could have been used to develop grain alcohol as a feedstock for synthetic rubber. Even as the likelihood of a dangerous wartime shortage of rubber began to emerge, Standard withheld patents to prevent competition against future use of petroleum by-product as feedstock for synthetic rubber. See Robert A. Solo, 'Synthetic rubber: a case study in technological development under government direction' (US Government Printing Office, 1959), pp. 8–15.

16. The US government continued to own factories operated by private companies after the war. Seeking to transfer ownership, the government passed the Rubber Producing Facilities Disposal Act of 1953. The Act unloaded factories to a small number of oil, rubber, and chemical firms including Standard Oil, Shell, Goodyear, Firestone, and Dow Chemicals at fire sale prices — an enormous one-time subsidy to the burgeoning plastics industry. See Adam Hanieh, *Crude Capitalism* (Verso, 2024), p. 143.

17. Stephen Phillips, 'Plastic', in *Cold War Hothouses: Inventing Postwar Culture, from Cockpit to Playboy*, ed. by Beatriz Colomina, Annmarie Brennan, and Jeannie Kim (Princeton Architectural Press, 2004), pp. 91–123 (p. 92).

laminates (Formica), vinyl flooring, wall finishes, upholstery, and, eventually, fiberglass panels, nylon carpeting, and per- and polyfluoroalkyl-based anti-stain fabric treatment (Scotchguard) (Fig, 5, Fig. 6).[18]

The substitution of natural materials such as timber, stone, metal, rubber, and silk with plentiful, inexpensive plastic reduced the need to secure and transport natural supplies from multiple distant outposts. In addition, plastic, the product of replicable processes, eliminated the need to adapt to the variability of natural materials, maintaining consistency between production batches across time and space, their behaviour reliably predicted by engineers' calculations, and more readily subject to principles of business management — the skills of the weaver, blacksmith, and cooper replaced by those of the chemical engineer. Synthetic rubber required no labour-intensive tapping of trees; polyester and nylon required no harvesting of silkworms or cotton, nor shearing of sheep.

In construction, in addition to costing less, plastic improved over traditional materials in countless ways. Plastic weighed less, was easier to build with (Fig. 7), and required less maintenance and replacement. Moreover, plastic provided superior waterproofing, insulation, durability, chemical stability, and corrosion resistance. Above all, however, plastic reduced building developers' greatest, and most unreliable, production cost: labour.[19]

Material consistency streamlined continuous-assembly-line factory production, reducing the need for workers who were practiced in the handling and working of variable materials such as wood and stone.[20] Off-site production translated into easier and better quality control, the offsetting of liability, and waste reduction. In construction, the petrochemicalisation of construction materials arose in tandem with mass production, which translated into the growing prefabrication of components. For building developers, the industrial production of prefabricated, petroleum-based modular parts and assemblies streamlined and rationalised building construction. Standardisation and factory outsourcing streamlined project schedules, reducing the need for on-site workers, and requiring fewer skills of those who remained. Plastic forms could be moulded, extruded, or calendered *en masse* via continuous automated line production requiring 'little hand labour for assembling and finishing'.[21] Prefabricated plastic building components could be moulded with integral flanges, reducing attachment points (Fig. 8), or could be extruded with tension locks capable of snapping together without tools, pre-finished and ready to be installed, and infused with integral color requiring no refinishing.

Natural plastic polymers such as wood, mud, and bitumen provided buildings with mass, adhesion, insulation, and weather protection long before flow, pliancy, and deformability became central preoccupations of the architectural avant-garde.[22] Over millennia, traditional builders adapted available polymer materials as well as fats, oils, and waxes to the demands of specific regional climates: thick walls of adobe to stave off heat, pitched wooden shingle roofs to slough off snow, fibre thatch to shed tropical rain. Many of these techniques remained essentially unchanged well into the beginning of the twentieth century. Plumbers and glaziers, for example, commonly prepared putty until the 1910s and 20s using the same raw ingredients (lime, clay, chalk, combined with linseed or fish oil) used centuries earlier (Fig. 9, Fig. 10).[23] Modern roofing consisting of liquid asphalt applied over layers of fibrous material differed little in principle

18. Meikle, *American Plastic*, p. 216.

19. 'Petrochemicals', Hanieh writes, 'were one of the first branches of industry to exhibit […] almost full automation, where plants were designed around "automated flow systems", integrated networks of machinery, vessels and pipes that ran continuously with only a few workers monitoring the process'. Adam Hanieh, 'Petrochemical Empire. The Geo-Politics of Fossil-Fuelled Production', *New Left Review*, 130 (2021), pp. 25–51 (p. 45).

20. For a discussion of isotropism in architecture, see Katie Lloyd Thomas, 'Going into the Mould: Materials and Processes in the Architectural Specification', *Radical Philosophy*, 144 (2007), pp. 16–25.

21. Jeffrey Meikle, 'Plastics in the American Machine Age', in *The Plastics Age: From Bakelite to Beanbags and Beyond*, ed. by Penny Sparke (Overlook, 1993), pp. 45–53 (p. 46).

22. See Paul A. Fay, 'A History of Adhesive Bonding', in *Adhesive Bonding: Science, Technology and Applications*, ed. by Robert D. Adams (Woodhead, 2021), pp. 3–30 (pp. 3–9); and Jerome M. Klosowski and Andreas T. Wolf, 'The History of Sealants' in *Handbook of Sealant Technology*, ed. by K.L. Mittal and A. Pizzi (Taylor and Francis, 2009), pp. 3–25.

23. Klosowski and Wolf, 'The History of Sealants', p. 5.

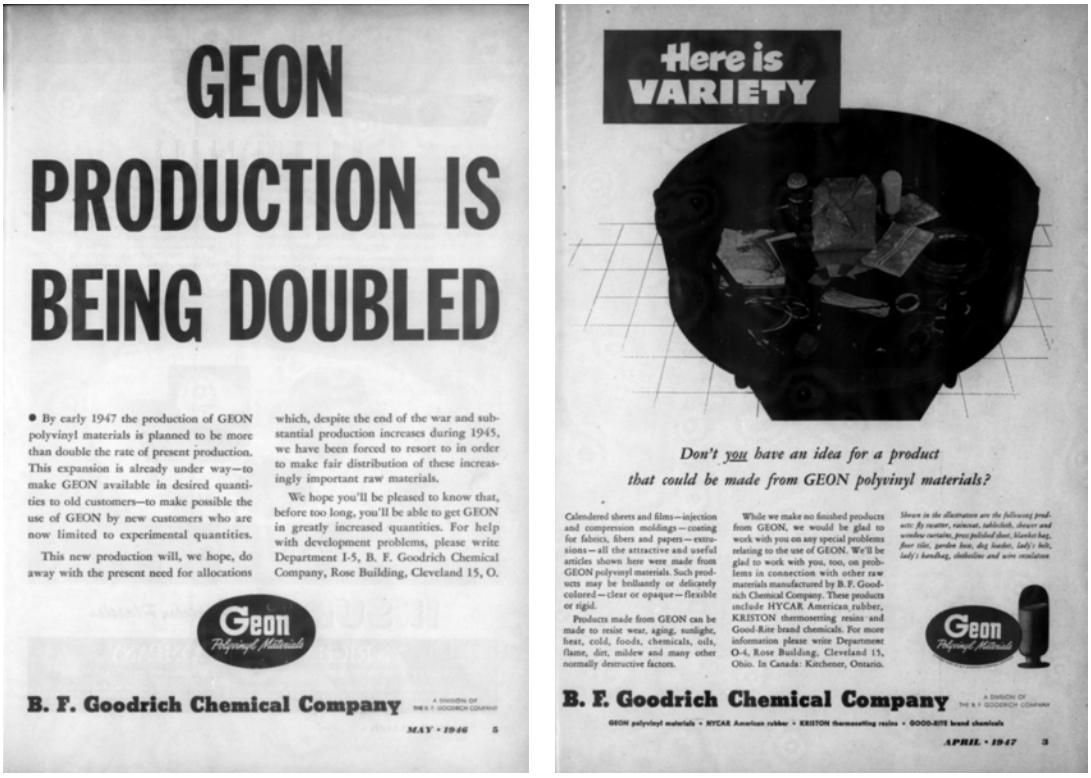

Figure 4. 'Don't you have an idea for a product that could be from Geon polyvinyl chloride?'. Advertisements promising increased production of GEON polyvinyl chloride, *Modern Plastic*, May 1946 and April 1947. Public Domain. Trade journals reflect the struggle of companies such as B.F. Goodrich to align plastic output with the shift to a post-war consumer-based economy.

Figure 5. Rohm and Haas Company, Woman Polishing Plexiglas at Rohm and Haas Facility, c. 1943. Science History Institute. Public Domain.

Figure 6. Advertisement for Dupont Lucite, *DuPont Magazine* (1950s), demonstrating the transformation of wartime productive capacity of plastic to new peacetime uses. Public Domain.

Figure 7. A homeowner easily climbs a ladder carrying lightweight plastic beams likely produced by B.F. Goodrich. Building Research Institute (1955). Courtesy of Bjorksten Research Laboratories. The burgeoning postwar housing and home improvement industry provided plastics fabricators with new uses and markets for plastics developed during the war.

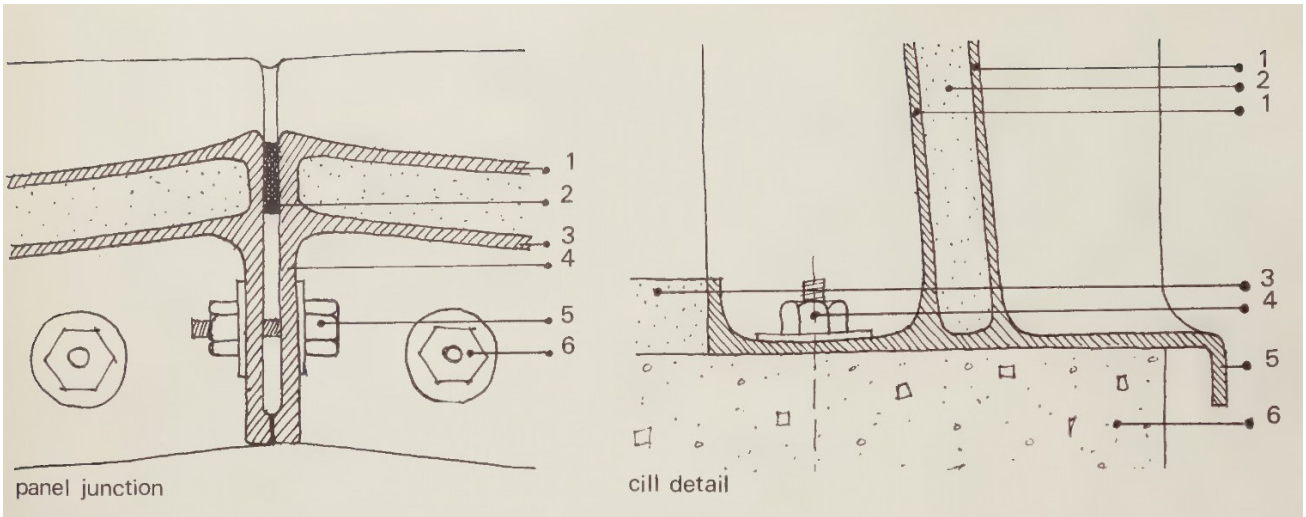

Figure 8. Panels fabricated with integral flanges. Details, British Railways Relay Room, 1959. Drawing by Arthur Quarmby with David Appleby. Reprinted from Arthur Quarmby, *Plastics and Architecture* (Praeger, 1974), p. 56. No known copyright.

from waterproofing techniques found in antiquity until the development of synthetic elastomeric membranes in the late 1950s and 60s.[24]

With industrialisation, natural ingredients, typically freely or cheaply obtained, and usually prepared by tradespeople themselves, began to be replaced by prefabricated products often having proprietary chemical recipes. With the postwar boom in petrochemicals these would progressively come to be replaced by expanding types of synthetic polymer resins, epoxies, solvents, membranes, foam insulation, and composites (Fig. 11).[25]

The shift from natural to synthetic polymer-based building materials between the 1940s and 70s coincided with a kind of aesthetic suppression of polymers in high-modern architecture. Postwar International Style aspired to the expression of pure planes and linear forces. As theorist Mark Wigley has observed, while modernist architecture celebrated ever larger expanses of plate glass, cut cleanly into pristine geometric sheets, much of the utility ascribed to these sheets — such as weather-, temperature-, and sound-proofing — began to be provided by invisible synthetic polymer interlayers, as well as varieties of gaskets, sealants, and caulk tucked invisibly around its perimeters.[26] While rigid materials delineated orthogonal form and static diagramming, plastics mediated between them in countless unglamorous ways: behind every flange, a gasket; under every footing, a pad. Sticky, pliable, and formless, plastic was pushed out of sight like dirty thought while becoming increasingly depended upon to do much of the heavy operational lifting behind the scenes, negotiating between unending variations in temperature, movements of the earth, effects of wind, and settling and aging of materials — absorbing deflection, deforming while maintaining elasticity and adhesion. High modernist architecture's image of static solidity was only possible via the abject, formless substances without which rigid materials would crush and shatter.

Plastic as a weapon

Brazilian architect and theorist Sergio Ferro has shown how material innovations in modern architecture are determined by the specific historical and economic conditions under which they emerge.[27] In the essay 'Concrete as Weapon', Ferro demonstrates how, in the late nineteenth and early twentieth century, building developers in England and France were impelled to adopt the use of prefabricated steel posts and steel-reinforced concrete. These innovations, Ferro argues, far from simply arising spontaneously out of a general will to advance technology or humanity, were due rather to the need, on the part of building developers, to increase productivity and reduce costs in the face of declining profits and increased competition.

Ferro understands this period in terms of what Karl Marx calls a transition from 'formal subsumption', to 'real subsumption of labour under capitalism'.[28] Prior to industrialisation, traditional craft know-how had been controlled by craft guilds. Protected and reproduced intergenerationally, the specialised knowledge held by skilled masons and carpenters provided them the leverage to negotiate wages, control job sites, or to shut them down by striking. The innovations of reinforced concrete and prefabricated steel parts allowed developers to bypass this monopoly power of workers. On site construction work progressively began to shift from the working of raw timber or stone to the assembly of prefabricated parts

24. J. Connan, R. P. Evershed, L. Biek, and G. Eglinton, 'Use and Trade of Bitumen in Antiquity and Prehistory: Molecular Archaeology Reveals Secrets of Past Civilizations', *Philosophical Transactions: Biological Sciences*, 354.1379 (1999), pp. 33–50 (p. 35); Dorel Feldman and Güneri Akovali, 'The Use of Polymers in Construction: Past and Future Trends', in *Polymers in Construction,* ed. by Güneri Akovali (Rapra Technological, 2005), p. 17; and Alex Wilson, 'Low-Slope Roofing: Prospects Looking Up', *Environmental Building News*, 7.10 (1998) <https://buildinggreen.com/feature/low-slope-roofing-prospects-looking>.

25. Klosowski and Wolf, 'The History of Sealants' pp. 7–18. Many caulks are silicone- rather than hydrocarbon-based. While the chemical backbone of these is inorganic, commercial products sold as 'silicone sealants' typically contain petroleum-based additives. See 'Is Silicone a Petroleum Product?', *California Learning Resource Network* (2025) <https://www.clrn.org/is-silicone-a-petroleum-product/>.

26. Mark Wigley, 'The Plastic Line", in *Permanent Change: Plastics in Architecture and Engineering'* ed. by Michael Bell and Craig Buckley, (Princeton Architectural Press, 2014), pp. 68–85 (p. 68).

27. Sergio Ferro, 'Concrete as Weapon', *Harvard Design Magazine*, 4 (2018) pp. 8–33 (pp. 16–23).

28. Ferro, 'Concrete as Weapon', p. 22. Technically, this marked, in Marxist terms, the transition from formal (extensive) to real (intensive) subsumption of labour in the construction industry, i.e. from the mere incorporation of labour into capitalist relations (the structuring of craft labour spatially and temporally) to altering the nature of the work itself according to capitalist imperatives resulting in the deskilling, displacing, fragmenting, and alienating of labour. See Karl Marx, *Capital Volume 1*, trans. by Ben Fowkes (Pelican, 1976), pp. 1019–25 and 1034–38. For the development of 'subsumption' as a concept within Marxist thought, see 'The History of Subsumption', in *Endnotes 2: Misery and the Value Form* (2010), pp. 130–153.

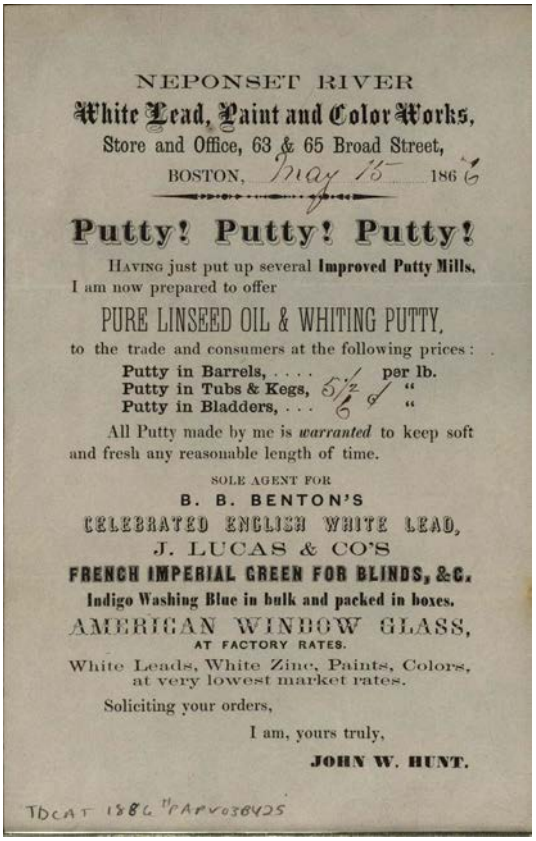

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Figure 9. Advertising flier, Neponset River White Lead, Paint and Color Works, Boston (1886). Building Technology Heritage Library. Public Domain.

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Figure 10. Advertisement, *Progressive Architecture*, January 1950, p. 14. Public Domain.

Figure 11. Full line of Sanvo polymer and silicone sealants and adhesives (2026). Photograph courtesy of Sanvo.

or the erection of concrete formwork. It relocated construction work from the job site to the workshop, and eventually to the factory floor, to tasks requiring less skilled, fewer, and more easily replaceable workers on site. Specialised know-how, previously ingrained in the bodies of skilled craftsmen, became the prerogative of architects and engineers, placing production increasingly within owners' control. In this way, Ferro explains, new materials, far from politically neutral, became tools or 'weapons' — not an effect of technical innovation, but rather its originating purpose.[29]

The subsequent petrochemicalisation of construction created a similar type of enclosure, drawing skilled workers into the nexus of a petroleum-based economy. 'At the heart of the petrochemical revolution', writes Adam Hanieh, 'was a radical change to the nature of production itself: the materiality of commodity production had become a derivative — or a by-product — of the production of energy'.[30] Spatially, petrochemicalisation linked construction to the oil industry's globally scaled supply chains while shifting the locus of value production from the mechanical to the molecular level. This expansion, both extensive and intensive, extended beyond the workplace, fusing production with new modalities of consumption, reproduction, and waste in the form of disposability and planned obsolescence.

Today, oil, petrochemical, and plastic manufacturing companies are highly vertically aligned, having evolved complex intertwined connections due to extensive, mutual, and overlapping infrastructural, institutional, ownership, and ideological interests. Nearly all of the world's largest private and state-owned fossil fuel companies produce petrochemicals, which they either sell directly to product manufacturers, or to chemical companies for further processing to produce thousands of building products ranging from rigid insulation boards to pipes, waterproofing membranes, extruded panels, adhesives, coating, films, binders, sealants, admixtures, and insulating foams.[31] These connections allow them to exploit economies of scale and co-location, to maintain greater control over input materials and outflows, to control product line diversity, and to combine related industrial processes. The scale and interdependency of this build-up create an inertial force, termed 'lock-in' by climate theorists, which has the effect of blocking reform and innovation from interrupting a fossil status quo designed to protect the long- and short-term sunk assets of industry and its financial backers.

The long plastic gap: 1966 to 1993

By the late 1960s, the public's appetite for acquiring plastic goods had begun to decline. Plastic's durability, a boon in countless ways, including the airtight storage and transport of perishable goods, began to represent an existential threat to plastics and petrochemical companies. Their solution? *Disposability*. Not, as industry portrayed it, in response to consumers' demand for convenience and hygiene, but as a fix guaranteeing never-ending demand in response to growing saturation of the market for plastic things. Overlaid on these trends was, by the early 1960s, a growing awareness of plastic pollution, toxicity, and flammability, feeding an antipathy which culminated with the global oil shocks of October 1973 and 79.[32] By the mid 1970s, as Meikle writes, 'a powerful antiplastic

29. Ferro, 'Concrete as Weapon', p. 22.

30. Hanieh, *Crude Capital*, p. 144. Elsewhere, Hanieh points out, borrowing concepts from Ernest Mandel, that 'petrochemicals were one of the first branches of industry to exhibit […] almost full automation, where plants were designed around "automated flow systems" […] that ran continuously with only a few workers monitoring the process', and therefore 'the cost of labour for the petrochemical industry in the early 1970s was calculated at significantly less than 1 per cent of total production expenses.[…] a leading element within the post-war increase in the organic composition of capital'. See Adam Hanieh, 'Petrochemical Empire: The Geo-Politics of Fossil-Fuelled Production', *New Left Review*, 130 (2021), pp. 25–51 (pp. 45–46).

31. For a detailed discussion of petrochemical and fossil-petrochemical-plastic intertwinement, see Joachim Peter Tilsted and others, 'Ending fossil-based growth: Confronting the political economy of petrochemical plastics', *One Earth*, 6.6 (2023), pp. 607–619; and Fredric Bauer and Germain Fontenit 'Plastic dinosaurs: Digging deep into the accelerating carbon lock-in of plastics', *Energy Policy* 156 (2021), 112418. One of the ten largest plastic companies worldwide is US-based Dow chemical company. Dow manufactures over one thousand distinct petrochemical-based building products including adhesives, sealants, insulating foams, membranes, resins, lubricants and additives. Construction products made up 44.2 billion dollars (between fifteen and twenty per cent) of its revenue in 2023. Dupont, another US company, is the parent company of well-known brand subsidiaries Styrofoam, Tyvek, and Corian, as well as Tudar, a fabricator of polyvinyl fluoride protective films.

32. The oil shock provided oil companies justification for spiking oil prices by around 400 per cent, disrupting industrial sectors worldwide, and setting off a global recession which revealed the depth to which industrial economies had come to rely on the fossil-fuel energy regime. See Hanieh, *Crude Capitalism*, p. 171.

mentality' had developed, and with it, the end of the art world's captivation with plastic, inflatables, and the liberative potential of the ephemeral throw-away.[33]

Accordingly, beginning at the time of Pop Art's apotheosis around 1966, as historian Alexander Davidson has documented, the very use of the word 'plastic' in architectural journals began to decline, and has continued to do so ever since.[34] But while plastic's declining reputation throughout the 1960s and 70s aligned with plastic's disappearance from architectural discourse, as Meikle remarks, it had 'little impact on legislation or on actual consumption of plastic'.[35] Disruptions to the industrial production of plastic passed quickly; output bounced back vigorously from 1970s oil shocks, returning to pre-oil crisis levels by the early 1980s. By 1993, production had quintupled, driven by production improvements, enhanced efficiency, expanded global markets, and the discovery of ever greater uses for plastic and petrochemicals. In construction, some of these new uses for plastic emerged in response to the energy crisis itself, such as styrenic foam insulation, the extensive use of vinyl doors and window profiles, and widespread use of improved synthetic sealants.

Plastic's stealth infiltration

Ubiquitous, ordinary, and chameleon-like, plastic infiltrated modern buildings without fanfare, becoming ever-increasingly diffused and normalised, skirting architecture's disciplinary boundaries and disappearing in its crevices. One way plastic passes unobserved into buildings is that unlike steel, concrete, glass, wood, or stone, plastic often goes unnamed. For example, 'rubber', while sharing a name with its natural precursor, rarely refers to natural latex rubber in specifications and product literature, but to synthetic rubber (typically ethylene propylene diene monomer copolymer (EPDM)). All modern water-based 'latex paint' uses synthetic binders, containing no more natural tree rubber than epoxy- or polyurethane-based paints.[36] 'Wood' can refer to any manner of resin-impregnated, acrylic-laminated, urea- or phenolic-adhered, or creosote-fire-treated forest product, often finished with synthetic polymer stain, sealer, or paint (Fig. 12).[37]

Plastics pass into buildings unobserved — concealed within, laminated to, or co-extruded with heterogeneous materials or other plastics, processes which all but preclude separation and recycling. Such building products containing plastics include hybrid prefabricated assemblies and systems: laminated panels, composite flooring, structural insulated panels (SIPs), sandwich panel cladding, roofing systems, high pressure plastic laminates (HPLs), vinyl flooring, vinyl-surfaced gypsum wall board, ceiling tiles, synthetic terrazzo, acoustic and insulating panels, carpet, resin-filled natural stone, and acrylic (methyl acrylate) and epoxy/amine-based liquid-applied flooring systems (Fig. 13, Fig. 14, Fig. 15). Such plastic components also tend to be identified not by what they are, but what they do ('sealant', 'insulation', 'weatherproofing', 'roofing', 'flooring', etc.).

Plastic also escapes notice in architecture by simple virtue of being small. With the development of assembly-line injection moulding in the 1950s plastic fabrications made from polyamide (nylon), polypropylene, polyvinyl chloride (PVC), and others began to infiltrate into buildings in the form of countless useful small parts, many developed in response to the demands of the increasing complexity and performance of modern electrical, plumbing, and mechanical building systems. The ease and inexpensiveness of producing such parts spurred an explosion of plastic bushings, bearings, washers, flanges, anchors, grommets, clips, seals, gaskets, nuts, pads, stops, plugs, pulls, reglets, offsets, spacers, backer rods, switches, finish plates, snap fittings, and countless other widgets, which — while essential,

33. Meikle, *American Plastic*, p. 271.

34. Alexander Davidson, 'Self-insulated, Rotproof and Fireproof? The Poetry of Plastics in Architecture from the House of the Future to the Grenfell Tower Disaster', in *The Routledge Handbook of Archaeology and Plastics,* ed. by Geneviève Godin and others (2025), pp. 211–227 (p. 212).

35. Meikle, *American Plastic*, p. 271.

36. National Institute of Standards and Technology, 'Generic Latex Paint Products', *NIST BEES Database* <https://ws680.nist.gov/bees/productlistfiles/generic%20latex%20paint%20products.pdf>.

37. Synthetics binders are used in nearly all engineered wood. See Antonio Pizzi, Antonios N. Papadopoulos, and Franco Policardi, 'Wood Composites and Their Polymer Binders', *Polymers,* 12.5 (2020), 1115. For a history of polymer wood binders, and their crucial role in postwar US housing, see Janet Ore, 'Mobile Home Syndrome: Engineered Woods and the Making of a New Domestic Ecology in the Post–World War II Era' *Technology and Culture*, 52.2 (2011), pp. 260–286.

Figure 12. Dow Chemical Company, "'You Say I'm Selling Phenol?'", 9 January 1950. Science History Institute. Public Domain.

Figure 13. Left: Insulated metal panels (IMPs) are fabricated by blowing polyisocyanurate foam into aluminum skins in a continuous, high-volume automated process. Photograph courtesy of by DJ Srki.

Figure 14. Prefabrication streamlines installation. Photograph courtesy of Zigmunds Dizgalvis.

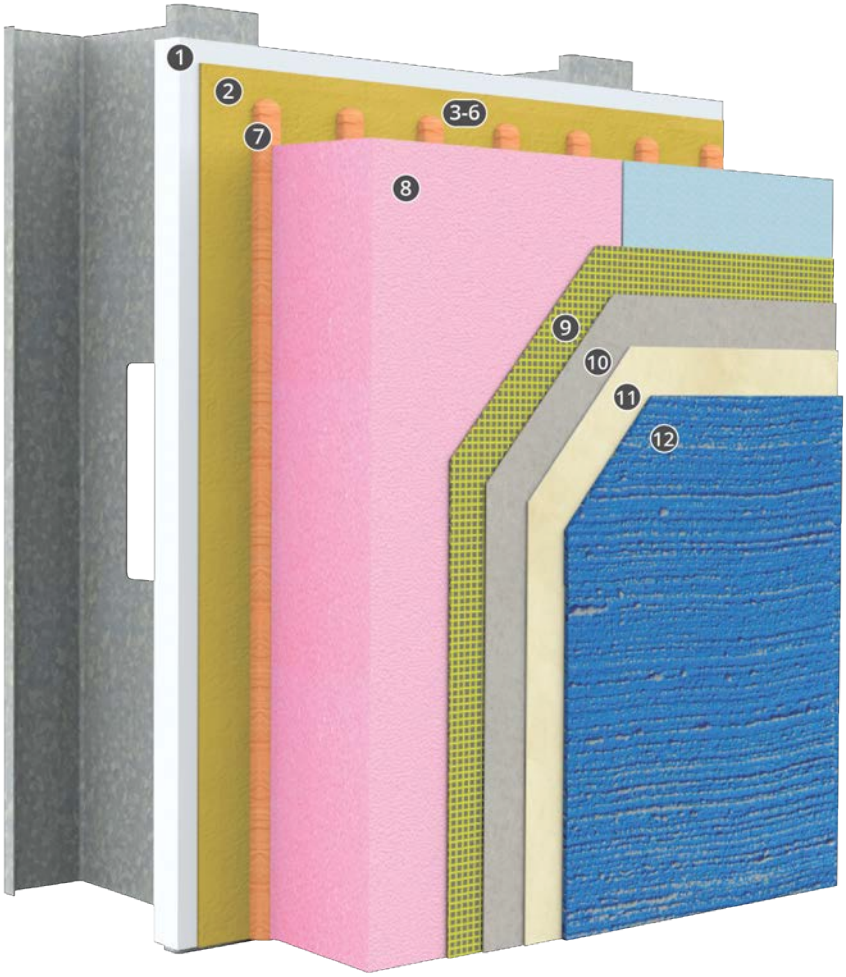

Figure 15. StoTherm prefabricated exterior insulated finish system (EIFS). 1. Structural Wall Assembly 2. Polyethylene vapour barrier 3-5. Polyether joint filler 6. Aluminum tape 7. Polyurethane foam adhesive 8. Dow Chemical Expanded polystyrene (XPS) foam insulation 9. Fiberglass mesh 10. Acrylic Base Coat Basecoat 11. Sand Layer 12. Acrylic finish. Illustration courtesy of Sto Corporation.

and representing, in aggregate, a huge material shift — individually were too diminutive, concealed, and banal to be considered architecture (Fig. 16).

Even less readily apparent are the myriad petrochemical-based polymers invisibly dispersed in buildings at the chemical level. Dissolved in solvents or dispersed as emulsions, petrochemical- derived polymers invisibly impregnate substrates, coatings, and binders in paints, varnishes, sealants, adhesives, and admixtures. Polymers are commonly added to asphalt (itself a petrochemical product) and concrete mixes to enhance workability, strength, waterproofing or other properties. Nearly all forest products used in construction, such as plywood — the single most common building product — are treated in some way with polymer adhesives, waterproofing, or fire retardant and may be further finished with urethane or acrylic paint.

Lastly, are the plethora of components, fixed or loose, that, while a major source of plastic in buildings, are not considered architecture at all.[38] These include interior decor — carpet, vinyl wallcovering, fabric, window treatments, toilet seats, modular partition systems and prefabricated office units, fixtures, fittings, mattresses, and furniture including synthetic fabric and polyurethane foam — as well as the fire and stain treatments they are coated with, not to mention the countless, ever-growing types of appliances and equipment with which buildings are appointed and furnished.[39]

Needless to say, all this plastic adds up. Today, excluding interior fixtures and furniture, construction accounts for somewhere between sixteen and twenty per cent of global plastic consumption, a quantity second only to packaging.[40] Despite increased recycling of plastic construction waste, particularly in the EU, as well as growing efforts to turn away from petrochemical-based building products in recent years, plastic consumption in the building industry doubled between 1990 and 2019 alone, and is expected to double again by 2060.[41] The 'petrochemical revolution', for Hanieh, entailed 'the *syntheticization* […] of the very substance of daily life — transforming it, alchemy-like, into various derivatives of petroleum'. Here is oil not as energy source, he writes, but as feedstock, the literal raw material of commodity production itself.[42]

By mimicking their appearance and function, buildings' components became progressively replaced with petrochemically-based substitutes, beginning with the smallest and most interstitial. What emerged was neither cyborg nor zombie exactly, but rather replicant buildings whose components were substituted, leaving their appearances relatively unaltered.

Architecture's retreat

Meanwhile, the growing complexity of construction projects throughout the twentieth century required architects to begin delegating portions of the scope of work previously within their purview: firstly, by shifting technical responsibility to a growing coterie of engineers and consultants; secondly, by shifting

38. Interior items, categorised as decor or equipment by architects and as durable goods by economists, while typically excluded from assessments of building-related carbon emissions and construction waste, can be far greater sources of plastic waste than base building components due their higher polymer-intensity and more frequent turnover. According to one source, yearly plastic carpet waste, for example, in the US equals that of the total amount of plastic straws, bags, and water bottles. See Teresa McGrath and Rebecca Stamm, *Buildings' Hidden Plastic Problem* (Habitable, 2024), p. 11. A 2022 case study by LMN architects 'estimated that the sum of multiple interior renovations over 60 years resulted in embodied carbon emissions comparable to the structure and envelope'. See LMN Architects, *Tenant Improvements Embodies Carbon Study* (2022), p. 2.

39. Over 90 per cent carpet produced today is made from polypropylene (PP), polyester, or nylon. Fifty per cent of upholstery fabric produced worldwide is synthetic.

40. See Roland Geyer Jenna R. Jambeck, and Kara Lavender Law, 'Production, Use, and Fate of All Plastics Ever Made', *Science Advances*, 3.7 (2017), e1700782 (p. 1); and Khaoula Houssini, Jinhui Li, and Quanyin Tan, 'Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis', *Commun Earth Environ*, 6 (2025), 257 (p. 4). Construction consumes between sixty and seventy per cent of globally produced polyvinyl chloride (pipes, flooring, roofing, cables, and window and door profiles) and twenty per cent of styrene (foam insulation). PVC and styrene-based construction plastics used in construction entail higher life-cycle toxicity than other commercial plastics such as polyethylene, polypropylene, and PET, due to carcinogenic monomers, hazardous additives, and (especially for PVC) highly toxic combustion products such as hydrogen chloride and dioxins. See Sasha Bylsma and others, *We Can Cut Petrochemicals Use Today: Buildings* (Rocky Mountain Institute, 2023), p. 9.

41. The industry organisation Plastics Europe reported that twenty-four per cent of post-consumer plastic recovered from building and construction was mechanically recycled in the EU in 2014. See Plastics Europe, *Overview Plastic Waste from Building and Construction by Polymer and by Recycling, Energy Recovery and Disposal* (2017); and OECD, *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options* (2022), p. 26.

42. Hanieh, 'Petrochemical Empire', p. 27.

Figure 16. Fabio Viale, 'Anchors' (2022), marble.
Photograph by Michele Sereni, courtesy of the artist.

responsibility for construction errors and cost management to contractors; and thirdly, by shifting the risk of performance failure to providers of building products, assemblies, and systems.[43] Architects' power became increasingly subordinated to real estate, codes, zoning, product testing, and commercial marketing. As sociologist Magali Sarfatti Larson has observed, 'the historical definition of the architect as the organiser of construction' began to 'disintegrate', and a retreat 'to concentrate on the aesthetic dimension of building was therefore an inevitable strategic choice'.[44] Tethered to aesthetics, 'big A' architecture retreated, limiting its focus to matters of style, morphology, and meaning. Architecture thus failed to confront plastic. Unequipped to follow plastic down the rabbit hole of petrochemicalised factory prefabrication, modern architecture abandoned plastic to materials science, toxicology, and the building product industry. Granularised and dispersed, plastic downscaled out of architecture's purview, while synchronously increasing quantities of plastic passed through the nexus of everyday architecture and building, hidden, and unnamed.

THE INTERESTING

The centrality of plastic to architecture's confrontation with commercial production remained repressed in the debates over artifice and authenticity resurgent throughout the 1980s. As Sparke observes, certain strains of postmodernism resurrected Pop Art themes, rejecting the purity and rigidity of high modernist ideals in favour of surface, semiological play, connotative meaning, and popular taste.[45] Plastic re-emerged as both an embodiment and medium for conveying a broadened expressivity which foregrounded decor, scenography, ornament, chromaticity, symbolism, narrative, eclecticism, collage, and impermanence.

Plastic's use by proponents of this strain of postmodernism, however, had less to do with its inherent technical or expressive capabilities than its blank anonymity. Lacking specific immutable inherent qualities, plastic's smooth characterlessness held the capacity to carry cultural meaning transparently, either as a screen for graphic information or as a rigid, isomorphic foam substrate for modelling three-dimensional applique, often mimicking traditional ornamentation.

Somehow, however, despite its seeming centrality to debates over material authenticity, popular taste, and mass production, plastic itself — its meaning, its impact — remained nearly exclusively unexamined among the foundational texts of architectural postmodernism, unmentioned in either Venturi, Scott Brown, and Izenour's paean to commercial populism, *Learning From Las Vegas*, or its antipodean inspiration, Peter Blake's 1964 jeremiad against the degraded roadside landscape, *God's Own Junkyard*.[46]

By the early 1980s, a counterposition began to emerge. Critical Regionalism (CR) shared with postmodernism an antipathy to the homogenising universality and utilitarian instrumentality endemic to modernity. CR, however, rejected what it saw as postmodernism's abandonment of materiality in favour of signification as manifest in its historicist, populist strains, as well as the semiotics-influenced formalism epitomised by the work of Peter Eisenman. For CR, while it rejected modernist rationalism, postmodernism's propensity towards the spectacular, superficial, and scenographic represented an even deeper capitulation to the alienating force of abstract instrumentality and commercial culture. Against this, CR posited the haptic: tactility and kinesthetic empathy, represented above all in truth to materials associated with the moral quality of craft labour, and espoused by architectural theorist Kennth Frampton.[47]

43. Architecture's progressively shrinking remit was codified in successive iterations of standard contracts provided by the US's foremost professional organisation, the American Institute of Architects (AIA). See AIA, *The American Institute of Architects Official Guide to the 2007 AIA Contract Documents* (John Wiley and Sons, 2009), pp. 12–31.

44. Magali Sarfatti Larson, 'Emblem and Exception', in *Professionals and Urban Form*, ed. by Judith R. Blau and others (SUNY Press, 1983), pp. 49–86 (p. 71).

45. Sparke, 'Plastics and Pop', p. 103.

46. Robert Venturi, Denise Scott Brown, and Steven Izenour, *Learning from Las Vegas* (MIT Press, 1972); Peter Blake, *God's own Junkyard: The Planned Deterioration of America's Landscape* (Holt, Rinehart and Winston, 1964). The interesting and the banal align with Venturi, Scott Brown, and Izenour's distinction between 'heroic-original' and 'ugly-ordinary' architecture. See also Robert Venturi, *Complexity and Contradiction in Architecture* (Museum of Modern Art, 1966); and Aldo Rossi,. *The Architecture of the City* (MIT Press, 1982).

47. See Kenneth Frampton, 'Towards A Critical Regionalism: Six points for an architecture of resistance' in *The Anti-Aesthetic: Essays on Postmodern Culture*, ed. by Hal Foster (Bay Press, 1983), pp. 16–30; and Kenneth Frampton, 'Rappel a l'Ordre', *Architectural Design*, 60.3–4 (1990), pp. 19–25.

Such criteria excluded plastic at the outset. Plastic epitomised the cheap provisionality, shoddiness, and falsity endemic to 'the relentless onslaught of global modernization'.[48] Unlike wood and stone, plastic appears as neither the product of natural processes nor human fashioning, and from its first commercial use, plastic was employed to create false appearances. Early plastics were substituted for exotic materials, often rare natural polymers such as tortoiseshell, jade, and ivory — its propensity for mimicry at once celebrated and associated with duplicity and counterfeiting.

Plastic is unable to reveal its bare, unacculturated material essence because it has none — traces of its deep geological history having been erased via successive steps of industrial processing.[49] So exactingly does plastic oppose Frampton's evaluative system on every measure — permanence, authenticity, civic responsibility, and cultural continuity — that it almost seems almost to have been conjured up for the purpose of doing so.

Plastic's relationship to visuality per se, however, is more complicated than Frampton allows. Despite its blank anonymity, its inexorable association with mass visual culture, plastic proliferates not by veiling material authenticity like a shroud. Rather, as Barthes writes, plastic 'transforms' reality instantiating its own mass and embodied history, specific and new.[50]

Chemical architecture: plasticity and the petrochemical detail

> There is something decidedly strange about the way plastic is designed to be both durable and disposable. Plastic objects endure but are worthless; they invert a more conventional logic whereby what is durable is also valuable.[51]

Not until the widespread availability of digital modelling and visualisation tools in the 1990s did plastic experience a kind of limited resurgence in architectural discourse. Led by a small cohort of practitioners and theorists, predominant among them was Gregg Lynn, whose oeuvre can be seen as a remarkably cohesive yet wide-ranging exploration into the formal and aesthetic potential of plastic and plasticity. Uniquely among this group, Lynn's early focus extended beyond abstract formal plasticity to consideration of the materiality of plastic itself: its characteristics, capabilities, fabrication, and use. This focus is inseparable from a wholesale reconceptualisation of materiality in accordance with the poststructuralist theory his work is immersed in.

'There is a sea change going on in the world of construction', Lynn wrote in a short 2011 essay entitled 'Chemical Architecture' — a 'shift from assemblage to fusion'.[52] Echoing Banham, who believed that to be relevant, a cultural practice must engage the technology specific to its historical conjuncture, Lynn expressed admiration for the ability of automotive and aerospace industries to rapidly incorporate technical innovation. Of specific interest to Lynn is these industries' employment of synthetic composite plastic to form shell-like, homogenous, self-supporting, curvilinear structures — a capability he sees as offering as-yet-unexplored expressive possibilities for architects. Such monocoque forms, Lynn remarked, unify structure and skin without resorting to mechanical connections: 'where once there were rivets, bolts, and screws, now there are heat and chemical welds, as well as glued joints'.[53] These new connections, Lynn emphasised, are chemical rather than mechanical in nature, marking a shift from the tectonic adherence to diagrammatic, static structural load pathways expressed in the stacking and attaching of discrete components to

48. Frampton 'Towards A Critical Regionalism', p. 29.

49. See Meikle, *American Plastic*.

50. Roland Barthes, 'Plastic', in Mythologies (Editions du Seuil, 1957) pp. 97–99 (p. 99).

51. Debra McDougall, 'Trash And Treasure Pathologies of Permanence on the Margins of Our Plastic Age', in *Decay*, ed. by Ghassan Hage (Duke University Press, 2021), pp. 28–36 (p. 32).

52. Greg Lynn, 'Chemical Architecture', *Log*, 23 (2011), pp. 27–29 (p. 28).

53. Lynn, 'Chemical Architecture', p. 28.

forms whose internal structural forces are modulated incrementally across the surfaces of continuously curved forms and expressed non-linearly.

Read alongside the petrochemicalisation of construction sketched above, however, Lynn's chemical 'sea change' might also be read in terms of the progressive shift from on-site mechanical work to the off-site chemical fusion of prefabricated assemblies on the factory floor. Which is to say, it might be seen as part of the global displacement of the primary locus of value-creation in construction, shifting from skilled, living labour on site, to globalised factory labour entangled and entrenched within petrochemicalised supply chains. Frampton's and Lynn's theories reflect different meanings when set in the context of this economic transformation. Frampton laments the loss of the tectonic detail as an index of the worker's presence; chemical architecture's seamless joints displace and conceal production, leaving no perceptible trace of physical work on building surfaces. Lynn celebrates the expanded expressive possibilities and material optimisation that composites and chemical bonding make available. Yet for both, architecture's task is to mediate the commercialising and flattening effects of modernisation — channelling its expansion toward higher cultural ideals in a way that positions the architect as the primary historical agent. In both accounts the building as *work* must be set to resist the brute advance of commercial culture: for Frampton by embodying continuity and cultural memory against the throwaway logic of modernization; for Lynn by elevating technological innovations from 'engineering and styling' to participation in 'broader cultural practices'.[54]

Parametricism's plastic problem

Frampton and Lynn both, in different ways, address the long entrenched habit of thought, codified within systems of western philosophy and religion, known as *hylomorphism*, which splits form and material, conceiving them as separate entities. Frampton does so by elevating the status of materiality. In Frampton's existentialist aesthetic, materiality is the conduit through which the body of the worker and the body of the viewer achieve a kind of communion; the strike of a hammer upon stone replicates perceptually the impact of sense data on the eye, linking production inexorably with reception through the indexical marker of the worker's and viewer's embodied presence which, in a moment of sublime instantaneity transcends all social and historical contingencies.

For Critical Regionalism, material authenticity serves as a kind of inertial blockade defending against the progressive spread of the alienating, instrumentalising effects of modernisation represented by ephemerality, mass production, and visual commercial culture. The setting down of permanent material mass is seen as foundationally necessary for establishing a locus for public appearance and democratic communication. Alienation is seen as rooted, not in the estrangement of workers from their own labour, but by a distancing from essential embodied nature experienced by all of humanity. Materials are seen to be less expressions of labour and history than of bearers of either authenticity or artifice. Modernisation thereby becomes demonised not for the exploitation of living labour under capitalism, but for the abstracting effect of rational instrumentality in general.[55]

Lynn's challenge to hylomorphism is born of his engagement with poststructuralist theory, which rejects the ontological division between form and matter. Instead, form and materials are co-determinate, emerging concurrently and spontaneously from vast undifferentiated fields of countless vectors — independently of any pre-existing overarching, organising code or form-determining force. Material is never raw, inert, or formless, but is rather always already coded in the sense that

54. Lynn, 'Chemical Architecture', p. 29.

55. Far from inherently resistant to instrumentalist expansion, 'authenticity' can be weaponised in its interest. In the US and UK throughout the Reagan-Thatcher years, 'authenticity' aestheticised and legitimised urban displacement gentrification, providing it with preservationist overtones as new arrivals began assiduously removing dropped ceilings, and stripping layers of linoleum and paint from pre-war tenements and industrial buildings, exposing original brick and woodwork, raw floorboards, and unpainted ironmongery. In this instance, the transformation of global relations of production are epitomised, not via specular commerciality, but by an aesthetic of material authenticity which provided the necessary ground for real estate reinvestment schemes. By the early 1990s material authenticity had become a dominant marker of good taste within everyday lifestyle marketing for a growing international class of architecture consumers. See, for example, Rosalyn Deutsche, *Evictions: Art and Spatial Politics* (MIT Press, 1996); and Neil Smith, *The New Urban Frontier: Gentrification and the Revanchist City* (Taylor and Francis, 2005).

it contains potentialities and constraints. These comprise the range of all the possible manifestations its physical capabilities allow, the expression, or unfolding of which can only become manifest in the presence of myriad external co-determining forces. Material and form are not opposed in kind, but rather lie on a continuum of dynamic forces, flows, constraints, and gradients maintaining only a provisional distinction. Objects, continuously deformed by a multiplicity of 'external, differential, disparate forces', are reconceived as 'intensive bodies' having only relative, temporary stability.[56]

'What precisely are the forces that go to make up this dynamism?' asked historian Ole Bouman in the introduction to Lynn's collection of writing from the 1990s, Folds, Bodies and Blobs — 'are they only quantifiable forces, or others as well?'.[57] Bouman's question, addressing Lynn's early work in digital morphogenesis, foreshadowed later criticisms of algorithm-driven computational design that would become so influential as to largely dominate avant-garde architectural production for decades. 'Coded potentiality' and 'context' in Lynn's early work were exclusively defined in ways that were limited to the physical, local, and measurable (inertial resistance, gravity, elasticity, and efficiency in weight and performance), over the abstract, global, and indeterminate. Parameters that were meant to represent contextual forces, while they could conceivably accommodate any type of data set, were exclusively limited to physical forces, tropisms, and gravitational pulls or repulsions, identifiable within the immediate local surround such as vehicular and pedestrian traffic circulation, weather, solar angle, and the provision of 'views', etc.[58] Consequently, outputs reflected the tension between the program and context primarily in physical terms, primarily: structural load paths, skin deformations, and the placement of openings. As long as the architect/programmer/client still needed to determine what parameters, internal and context-based, to include, outputs remained constrained by the necessarily limited choices of parametric inputs they were programmed to incorporate. Authorship seemed to be not so much elided, as displaced onto programming decisions about which parameters count as significant in determining morphology.

Why, Bouman's question implies, privilege codes and forces that are physical, quantifiable, and local? Why assume they exert a greater determinative effect on architectural morphology than socio-political ones which may be abstract, indeterminate, and distant (both geographically and temporally)? Does plastic emerge 'already set in motion', only in terms of velocity and density? Or does its bearing include the extraction of material and surplus labour, and the exportation of industrial pollution? Does it not include the prefiguration of disposability and recycling in its production prefiguratively inscribed as a monetised export, competed over between poor countries typically having little infrastructural capacity to safely process it? Does it not include the deployment of petrochemistry to fix cyclical economic crises of declining profit by recasting, replacing, or impregnating previous materials, forms, and petrochemicalising construction methods? Lynn writes:

> Because of its civic charge, architecture is expected to make connections and relationships between a sensibility of assembly and composition and broader cultural practices and significance—what would be understood as aesthetics. […]
>
> It is important to acknowledge the aesthetic principles germane to our field and find the possible cultural expressions of forms and spaces thought in composite terms.[59]

56. Greg Lynn, *Folds, Bodies and Blobs: Collected Essays* (La Lettre Volée, 1998), p. 140.

57. Ole Bouman, 'Amor(f)al Architecture or architectural multiples in the post-humanist age' in Greg Lynn, *Folds, Bodies and Blobs: Collected Essays* (La Lettre Volée, 1998), pp. 9–14 (p. 13).

58. This is the case for each of the projects included in Greg Lynn, *Animate Form* (Princeton Architectural Press, 1997). See especially pp. 142–163 and Massumi's commentary: Brian Massumi 'Becoming Architectural Affirmative Critique, Creative Incompletion' *Architectural Design*, 83.1 (2013), pp. 50–55 (p. 53).

59. Greg Lynn, 'Chemical Architecture', p. 28.

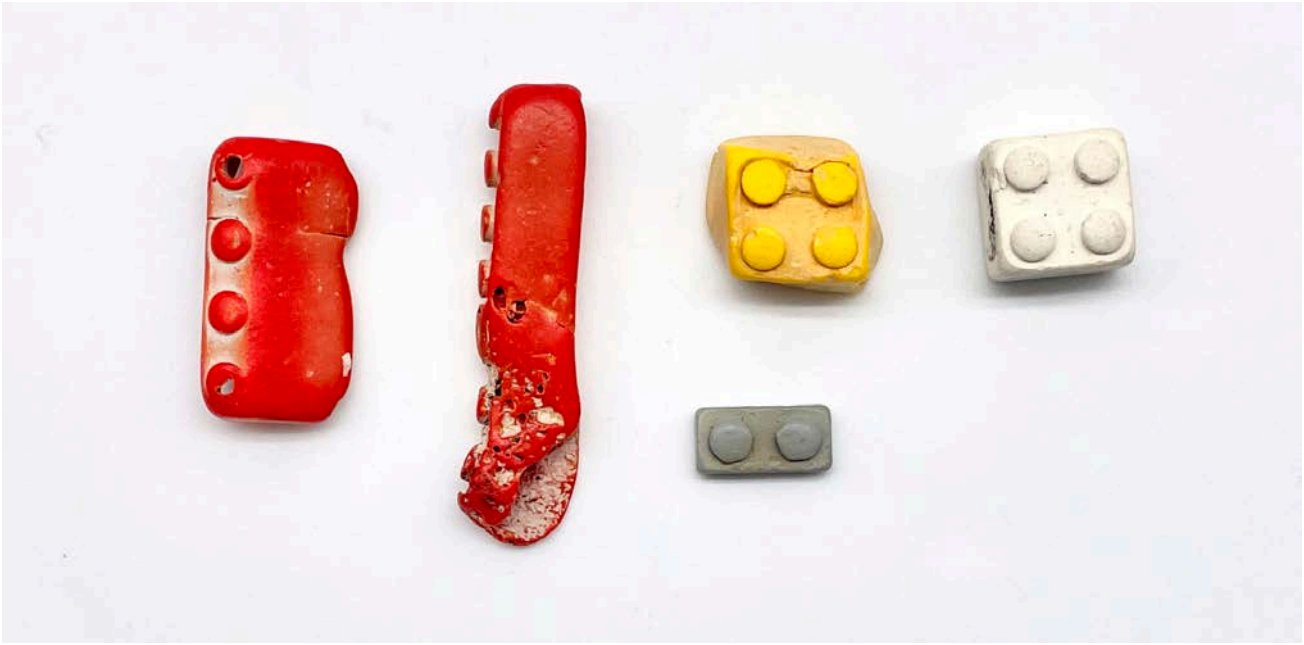

Figure 17. Weathered Lego bricks. Photograph courtesy of Tracey Williams, beachcomber.

Figure 18. 'Cocktailwürstchen', photograph courtesy of rdnzl.
Greg Lynn Form did not respond to requests for use of proprietary images.

More so than his fellow parametricist Patrik Schumacher, Lynn appears agnostic — rather than outright hostile — toward the infiltration of genealogical or institutional critique into architectural discourse.[60] For both however, architecture advances, not via external political critique, but through 'principles germane to our field', what Schumacher sees as the unfolding of an intradisciplinary, self-referential set of perennially revisited topics and debates that have come to comprise — if not the rigid boundaries, then at least — the gravitational centre around which architecture coheres as a discipline.[61] For Lynn, architecture's core mission is to elevate the use of innovative materials such as polymer-based composite plastic from exclusively functional and stylistic applications born by science, industry, and commerce. By amplifying their unique, improved attributes and capabilities, architects manifest their forward-looking, emancipatory potential — to the benefit of architecture and humanity. Questions pertaining to plastic's historical emergence, and its current function within social systems (economic, ideological, etc.), while perhaps crucial to political and environmental struggles, remain relatively extraneous to architects' unique role and mission and to architecture's internal, evolutionary advancement. Plastic's history and social function become excluded from Lynn's account not because these factors are external to the generation of form, but because they cut transversally across disciplines rather than orbit conventional disciplinary centres of gravity. The result has been that while intending to upend hylomorphic habits of western thought, the predominant effect of digital form-finding in architecture has been to shore up the boundaries of its disciplinary autonomy.

The issue of architecture's relative autonomy becomes integral to a position Lynn assumes regarding waste. Not long after the publication of 'Chemical Architecture' in 2011, Lynn appeared in what was the first major symposium on plastic in architecture in decades to be held at Columbia University.[62] In his talk,'Goodbye Tectonics, Hello Composites', Lynn briefly pivots to discuss plastic's benefits in relation to climate and sustainability:

> Ironically, due to their ease in forming, efficiency, strength-to-weight ratio, and recyclability […] plastics often prove to be more sustainable […] than natural materials such as timber and brick.
>
> [Plastics] are so efficient […] that we throw them away, and this becomes the entire problem with them. If there is a way to encourage permanent, and not disposable, use of plastics, then they will become a long term sustainable solution.[63]

Lynn glitches on plastic's central paradoxes: durable yet disposable; immeasurably useful yet quickly devalued; and inexpensive yet costly to society. His catachresis here serves to limit plastic's definition for architecture to its physical properties, completely avoiding confronting its economic properties. Plastic here is a politically neutral substance, its physical attributes extractable from its circulation, free of all codings except for its potentiality to express novel physical form — whose problem lies solely in the misalignment between its material permanence and its disposability, a misalignment that design might repair

60. Patrik Schumacher, 'The End of Architecture', *Khorein*, 2.2 (2024), pp. 3-40 (pp. 18–26).

61. 'The first aspect to make explicit is that architecture, as distinguished from mere building, is inherently connected to architectural discourse and theory. Theoretical treatises are essential components of the discipline and profession of architecture'. Schumacher, 'The End of Architecture', p. 5.

62. Greg Lynn 'Goodbye Tectonics, Hello Composites', at *Permanent Change: Plastics in Architecture and Engineering*, Columbia University, March 2011, later published in *Permanent Change: Plastics in Architecture and Engineering*, ed. by Michael Bell and Craig Buckley (Princeton Architectural Press, 2014), pp. 86–111.

63. Lynn, 'Goodbye Tectonics, Hello Composites', p. 108. Lynn's view comports with the opinions of most sustainability advocates — proponents of regulatory and market-based solutions alike. Both recognise a correlation between permanence, price, and consumption. If the prices of plastic goods captured and reflected plastic's true cost to society and future generations (in the form of pollution, poorer health, etc. — what climate economists refer to as 'negative externalities'), higher prices would depress sales, slowing plastic churn. This could lead industry to increase prices and return to producing durable rather than disposable plastics, stemming the tide of plastic waste. For his part, Lynn claims (although perhaps not without self-conscious irony) to be encouraging the 'permanent' use of plastic via entering bespoke plastic artifacts into circulation in art markets where they are collected and preserved.

by rerouting plastic from ephemeral to permanent uses unrelated to, say, plastic's employment as a periodic fix within cycles of economic overaccumulation.[64]

Sociologist Gay Hawkins offers an alternate application of topological methodology, which sets plastic within a more broadly-conceived physio-cultural field of flows and meaning inclusive of economic and industrial processes.[65] For Hawkins, as much as plastic is a thing with physical attributes, it can also be seen, at any given time, as a frozen moment within systemic flows, embedded in history and social relations. As Rebecca Altman puts it, the problem with plastic is not disposability per se: it is that 'disposability is socialized, incentivized and otherwise designed into products and social systems in order to coerce endless consumption'.[66] Whereas Lynn foregrounds flow and context, his framing of disposability as 'the entire problem' with plastics isolates architectural production from the deeper and broader flows and circuits of materials, capital, building, commodities, waste, and subjectivities, within which everyday building and avant-garde practices are entrenched — distancing architecture from responsibility for the plastic crisis, or an essential role in addressing it. For Hawkins, plastic's efficiency and disposability, far from simple properties of plastic that we may in the future selectively retain or jettison, represent integral links in these deeply entrenched circular chains.[67]

'[Plastic] may have momentary functionality', Hawkins writes, 'but this is generally subsumed by its more substantial material presence as a transitional object'.[68] Its greater purpose is to operate within cycles of extraction, monetisation, and waste within which disposability has become an indispensable link. 'Plastic is made to be wasted', she writes. With disposability — along with its brother, planned obsolescence, and its younger cousin, recycling — plastic's end-of-life became prefigured in its production, a calculated component of plastic's productive value.

While defined in opposition to tectonics, Lynn's chemical architecture shares with Critical Regionalism the elision of a core feature of architecture under capitalism: namely the reflection of hylomorphism in the hierarchical division of labour between designer and builder embedded in prescriptive work. Their aesthetic programmes both, in different ways, (however unintentionally) obscure the role of architectural design in the extraction of surplus value from the production of the built environment, mystifying the source of social value, eliding its origin in antagonistic class relations: for Frampton through a quasi-sacral communion of worker and viewer in the sublime presence of the indexical sign; for Lynn via a normative, quasi-teleological narrative which postulates architecture's mission as sublimating technological innovation in pursuit of higher aesthetic aspirations. Seemingly locked in filial tension, Frampton and Lynn make the argument

64. Of course, plastic embedded in buildings is far more 'permanent' than packaging plastic waste or even consumer goods. See Geyer and others, 'Production, Use, and Fate of All Plastics', *Science Advances*, 3.7 (2017), e1700782 (p. 3). Sequestered in buildings, plastic can be prevented from entering waste streams for decades, over which time, it is argued, better end-of-life technology may evolve. While a full discussion of plastic sequestration is beyond the scope of this article, suffice it to mention three points. One, that experts universally repudiate this strategy. Two, that while sequestration *delays* plastic disposal, buildings themselves are increasingly subject to the same logic of disposability and planned obsolescence as are throw-away consumer goods. Daniel H. Abramson, in *Obsolescence: An Architectural History* (University of Chicago Press, 2016), describes how, over the course of the twentieth century in the US, building value began to be assessed, for tax and insurance purposes, not simply in terms of *depreciation* (physical deterioration) but in terms of economic *obsolescence* (capturing abstract economic factors such as fire risk and increasing land values). This created financial incentives for rapid building replacement, as property owners could maximise tax deductions by writing off economically 'obsolete' buildings faster than their physical condition warranted. This shift encouraged the demolition of structurally sound but underperforming buildings, normalising rapid turnover and attracting capital flows that further accelerated the cycle of demolition and rebuilding. Three, rarely acknowledged, is that certain 'circular' material strategies can bypass labour, lock owners into proprietary service contracts, and even feed into planned obsolescence. While modularisation, design for disassembly, and monomaterial fabrication can facilitate recycling, they also, by decoupling building components such as cladding, finishes, and carpeting from overall building lifecycles, set them, alongside roofing and window replacement, within fixed replacement schedules which provide a consistent level of demand for petrochemical products.

65. Hawkins, 'Made to be Wasted: PET and Disposability' in *Accumulation: The material politics of plastic*, ed. by Jennifer Gabrys and others (Taylor and Francis, 2013), pp. 49–67.

66. Rebecca Gasior Altman, 'Being Plastic', *Interalia Magazine*, February 2019 <https://www.interaliamag.org/interviews/rebecca-altman/>.

67. Hawkins shows how, for example, out of the dialogic relationship between cheese and plastic emerged the novel form of liquid cheese contained in a plastic tube able to be sucked on the move. 'Cheese, and plastic, each giving and receiving form within multi-scalar flows' created not only emergent material and spatial forms, but temporalities of movement, consumption, decay, digestion, and waste. Hawkins, 'Made to be Wasted', p. 61.

68. Hawkins, 'Made to be Wasted', p. 61.

about the positive or negative progressive import of technology *tout court* — framing architectural discourse as an intramural debate between competing styles of structural delineation within highly defined, if unacknowledged, social structurations.

The soft power of the campus inflatable

> Why should the study of the banal itself be banal? […] Why wouldn't the concept of everydayness reveal the extraordinary in the ordinary? [69]

'Is boring architecture interesting?' Venturi, Scott Brown, and Izenour asked in 1972.[70] Certainly the reverse can be true. Misrecognising the banal as the source of alienation, architecture excludes the everyday, failing to appreciate the built-up energy it contains, perpetuating a plastic gap that divides, not theory and practice, but, everyday practice and the *interesting.*

Cloud (Fig. 19), an ambitious temporary inflated design installation by Columbia University Graduate School students and faculty, engages these themes. Suspended between buildings on Columbia's campus, *Cloud* recalls the exuberance, ephemerality, and sensuousness of inflatable architecture of the 1960s.[71] In contrast to that era's provocations, *Cloud* offers a composed picturesqueness, its shimmery texture and blobbiness playing off the campus's hard, flat rectilinearity. Its ambitions are modest, touching down softly, traveling lightly, and consuming little. Perhaps nothing more needs to be asked of *Cloud* than, as it seeks, to enhance and enliven everyday campus life, seemingly unconcerned with skewering elitist pretensions. Nonetheless, *Cloud* feels unresolved, as though, like a hovering question mark, it is asking whether its own careful pliability rises to meet the urgency of the times.

While Barthelme's balloon elicits excitement and menace, *Cloud* is contained and precious. Its modest participatory and communal aspirations, the impact of its adjusted gravitational centre, feel overwhelmed by the abstract — but real — network of social relations and institutional positioning that govern its production and use. *Cloud*'s begged comparison with the freewheeling speculative architecture of the 1960s underscores that period's engagement with — rather than, unquestioning rejection of — the forms of everyday work and life: mass production, mass media, and consumer culture. Rather than monuments, these projects asked: why couldn't architecture be deployable, a portable shell or bubble — worn, occupied, and disposed of? Why couldn't it be infrastructural, like a municipal plumbing system, or something between a car and a house — a kind of mobile module navigated among infrastructural nodes? However speculative, performative, and ultimately consigned to architecture's boudoir, Pop architecture attempted to imagine not merely new shapes for buildings, addressing buildings as an integrated component of everyday life — on a continuum with cars and clothing, that is not only form, but new ways of living.

Inflatables hit differently today. Far less likely to suggest an expanded sexuality, or insurrectionary or parasitic possibilities, they commonly serve as backdrops for bourgeois milestone life events, 'College Balloon' taking its place alongside 'Burning Man Balloon' (Fig. 20), 'Wedding Canopy Balloon', and 'Corporate PR Balloon'. Rather than ushering in a new age of mass-produced housing, and streamlined transport, the legacy of Pop plastic avant-garde futurism lives on in degraded form as prefabricated outbuildings, office privacy pods, and vacuum-moulded surrounds for children. The distant progeny of plug-in plastic communitarian nomadism returned as 'MAGA' recreational caravan blockades and pleasure-boat armadas.

69. Henri Lefebvre, 'The Everyday and Everydayness' *Yale French Studies*, 73 (1987), pp. 7–11 (p. 9).

70. Venturi, Scott Brown, and Izenour, *Learning from Las Vegas*, p. 93.

71. GSAPP students and faculty with Professors Laurie Hawkinson and Galia Solomonoff, Hubert Chang, Silman Structural Engineers, and teaching assistants Tristan Schendel and Syed Haseeb Amjad; fabrication by Àrea Cúbica <https://www.arch.columbia.edu/news/cloud-pavilion>.

Figure 19. *Cloud*, (2024), GSAPP students and faculty. Photograph courtesy of Nicholas Knight.

Figure 20. *ORB* (2018), designed and overseen by Bjarke Ingels, Iacob Lange and Laurent de Carniere, Burning Man. Photograph courtesy of Laurian Ghinitoiu.

Within the present conjuncture, *Cloud* reinscribes the centrality of technical, bureaucratic, and compositional virtuosity over trespassing, insurrection, cribbing the familiar morphologies of the historical avant-garde while occluding the insurrectionary intent. It reflects the appearance of 1960s avant-garde work while eliding its disruptive effect. While suggesting the nomadic and deployable, *Cloud* excises any sense of destructive irreverence from collective play. Ostensibly a collective effort, its cooperative design belies what lies ahead for most students: competition, strict workplace hierarchies, and compulsory self-image styling. (The self, after all, like the *interesting*, is meant to stand out like a branded skyscraper.) However impermanent, *Cloud* asserts the continued centrality of form, novelty, and specularity to architectural pedagogy at Columbia and elite schools like it, irrespective of what may be their explicitly earnest pivot to social, political, and environmental concerns.

Plastic and everyday practice: petrochemical lock-in

Such is the inheritance of typical building industry workers: architects, designers, builders, procurement agents, construction workers, building product fabricators, and purveyors. At the wide base of the prestige pyramid — invisible to architectural pedagogy — plastic is confronted on a day-to-day basis, less glamorously, by typical practitioners working throughout the circuits of building material production and consumption. Behind them lie vast, pre-existing social, financial, and legislative networks ('flows', if you will) that define and limit what gets built, and how, over which they wield little control, but are compelled to navigate.

The consolidation of design technology and product specification contributes to petrochemical lock-in, fostering path dependency, erecting high barriers to the entry for alternative products and materials. Enmeshed within these flows and networks, architects and designers are coerced into specifying synthetic polymer-based products to satisfy project requirements based on cost, performance, appearance, and availability, in turn, having the effect of normalising and legitimising their continued use. Meanwhile, architecture maintains and reproduces its disciplinary autonomy and identity by policing the boundaries of what does and does not constitute legitimate architectural speech. Plastic's bifurcation posits architects as passive downstream recipients of technology-based reforms, a limitation that meshes well with petrochemical-industry strategies meant to deflect and delay system-level change.[72]

Such reactivity has typified the architecture industry's broader responses to the plastic crisis. Averse to systemic political-economic critique, it has adopted an ad hoc collection of reforms, some downstream and ameliorative (circularity, recycling, carbon capture, and sequestration (CCS), energy recapture and chemical recycling), others upstream and demand-side (boycotting, material substitution, enhanced product data transparency, and carbon and lifecycle accounting) — certain of which inadvertently amplify and legitimise fossil industry disinformation. Increasingly well-understood are the methods by which industry selectively promotes non-transformative reforms to foster the perception of a transition away from carbon-based plastic while deflecting calls for restricting plastic production.[73] Set against the inertial power of lock-in, systemic planned obsolescence, and overproduction, such non-transformative reforms pose little threat to fossil-chemical incumbents and their backers.

The building product industry provides a reliable market for petroleum products in the face of their declining use for energy and transportation.[74] Consequently, the global petroleum industry has, in recent decades, shifted enormous resources towards

72. One industry analyst judges the present threat to construction chemical markets to be 'very low as there is no alternative available in construction chemicals in industry'. See Research Dive, 'Construction Chemicals Market Report' <https://www.researchdive.com/constr-chem-mkt.com>.

73. For the petrochemical industry's appropriation of selective decarbonisation strategies, see Joachim Peter Tilsted and others, 'Petrochemical transition narratives: Selling fossil fuel solutions in a decarbonizing world', *Energy Research and Social Science*, 94 (2022), pp. 1–13. For the fossil industry's disinformation campaigns around recycling, chemical recycling, and energy recovery, see Davis Allen and others, *The Fraud of Plastic Recycling* (Center for Climate Integrity, 2024).

74. Because plastics tend to be present in the types of building components needing periodic replacement (roofs, floors, cladding) the market for petrochemical-based building products resists the wide cyclical swings experienced by both the oil and real estate industries—adding stability and diversity to oil companies' portfolios. See 'Annual Energy Outlook 2026', *US Energy Information Administration*, April 8 2026.

increasing petrochemical production — in an all-out bid to maximise the realisation of massive sunk petroleum assets.[75] With the building industry's consumption of petrochemicals expected to increase to twenty-two per cent of global totals by 2040, petro-plastic companies have deployed a barrage of promotional material meant to persuade designers and architects of the sustainability benefits of petroleum-based products. This comes as little surprise yet signals a direction for architectural activists.[76]

For Hanieh, the problems of petrochemicalisation will not be solved by 'substituting one material substrate for another', nor by 'focus[ing] on recycling and waste disposal':

> Our synthetic world arose due to the place of petrochemicals in the wider logics of capital accumulation […] Any shift away from the use of petrochemicals requires a break with this underlying logic.
>
> To do so […] demands a massive programme […] that prioritises social and ecological concerns rather than private profit.[77]

Overcoming petrochemicalisation requires accepting that building industry reforms alone, whether ameliorative or adaptive, stand little chance of disrupting the inertial power of lock-in, strategic overproduction, planned obsolescence, and the recalcitrance of the staggeringly well-funded fossil-petrochemical-plastic regime. Rather, it requires an escalated strategy — not merely one of encouraging plastic's responsible use, but demanding it. While the democratic expropriation of the global fossil fuel, petrochemical, and plastics industries — and their just decommissioning — may seem an outrageously ambitious, if not hopeless, goal (much less overturning the entire value proposition upon which the production of plastic rests), it is neither an unthinkable nor unutterable one. Nor, if architecture's discursive boundaries are understood to be contingent and malleable, need it be pre-emptively rejected as outside architecture; nor — as workers wielding economic leverage — beyond our capability and responsibility to demand.

CONCLUSION: ESCAPE THE MALAISE, EMBRACE THE BANAL!

> Surplus matter circulates differently than commodities; it accumulates in inverse patterns to wealth.[78]

Future historians may boggle at how architects — presumptive custodians of the built environment — could have missed unquestionably the greatest material transformation of all time: a global pandemic of plastic waste of nearly unimaginable proportion, dispersed throughout what appears to be the entirety of terrestrial existence, under their noses and on their watch.[79]

Denigrated from birth, plastic nevertheless reigns supreme. How did it do it? Plastic is of course indifferent to authenticity, transparency, phenomenological immediacy, or human values of any kind. Deaf, dumb and blind, plastic seems to wish only to degrade and disperse.

In truth, plastic owes its resiliency to its ability to absorb an ever-greater range and depth of historical information which provided it with multiple evolutionary pathways to further its expansion, each emergent within complex sets of affordances, productive forces, and networks of meaning (non-degradability, mimicry, transformability, infiltration, disposability, recyclability) — force fields that are social as much as they are physical. From plastic's perspective, infiltration into building materials

75. For 'declining demand', see International Energy Agency (IEA), Oil 2025: *Analysis and Forecast to 2030* (2025), p. 7. For 'shifted enormous resources' see Carbon Tracker Initiative, 'Oil majors gamble on petrochems to shore up demand', *Carbon Tracker,* 5 December 2024 <https://carbontracker.org/petchem-pr/>. For the scale of the recent petrochemical build-out in the US, see Center for International Environmental Law, 'Emissions Unleashed The Climate Crisis and America's Petrochemical Boom' (CIEL, 2024), p. 11.

76. OECD, *Policy Scenarios for Eliminating Plastic Pollution by 2040*, (OECD, 2024), p. 44. I discuss greenwashing in the building product industry in more depth in Martin Weiner, 'The Petrocracy Underfoot', *Failed Architecture,* 2023 <https://failedarchitecture.com/the-petrocracy-underfoot/>.

77. Adam Hanieh, *Crude Capitalism,* p. 305

78. Alyssa Battistoni, 'Injury to Buildings and Vegetables', *n+1*, 4 September 2025 <https://www.nplusonemag.com/online-only/online-only/injury-to-buildings-and-vegetables/>

79. See 'Plastic pollution' *UNEP - UN Environment Programme* <https://www.unep.org/interactives/beat-plastic-pollution>.

represents the emergence of a new expansionary strategy. Having reached an apotheosis, may it eventually fail catastrophically, ultimately killing off its host, or establish as yet unclear alternate pathways? In what little time is left, can plastic be guided towards beneficial and liberational goals from within the institutional walls where the *interesting* prevails?

What, after all, does architecture have left to offer besides the *interesting*? Having exhausted all frisson of dissent or delight with which to reinvigorate itself, would coming face-to-face with its negation, the banal — like matter encountering anti-matter — annihilate what hollowed-out disciplinary identity architecture clings to once and for all? What would be left in its place? Might a new building practice emerge, more open, more tragic, more playful, less obedient?

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