



Track-side building by BXL for British Railways (Arthur Quarmby, 1961). The use of phenolic foam sandwiched between reinforced laminates made it light in weight and fire-retardant

## Moulding the future

*Alexander Davidson* charts the use of plastics in architecture, from early laminates to the fibreglass houses of the 60s and 70s

In 1931, three men were commissioned to design radio studios for the BBC's new Broadcasting House in Portland Place, London. The three, Wells Coates, Raymond McGrath and Serge Chermeyeff, initially proposed a German cellulose material called 'Trolit' as a surface for the studio walls and doors. Trolit had been shown by Walter Gropius, Marcel Breuer and Lázló Moholy-Nagy at the 1930 Werkbund exhibition in Paris, and a review by Siegfried Giedion had helped to spark interest in the new material's potential.

The BBC, however, insisted that everything used in the studios' construction had to be British, so, instead, sheets made from paper and urea formaldehyde resin, tinted light yellow, were used to clad the walls and doors. Urea formaldehyde had been produced in Britain under the trade name Beetle since 1924, but this was the first time it had been used in this way. Both Trolit and Beetle are typical of early plastics that were made at least partly from natural materials. »



Above: the Bakelite exhibition at the 1939 New York World's Fair. Below: Rondo house by the Swiss architects Casoni & Casoni (late 1960s)



The first fully synthetic plastic is thought to be Bakelite, a trade name for phenol formaldehyde resin, first developed by Leo Baekeland in New York in 1907 and produced on a large scale in Britain from around 1927. It could be dyed and moulded and was widely used for electrical parts, architectural fittings, domestic accessories and even jewellery. The Bakelite radio cabinets designed by Wells Coates for the Ekco company from 1932 are now design classics.

Many of these early plastics could be worked into laminate sheets and in the 1930s were used in increasing variety for architectural surfaces from doors to counter-tops. Though Formica laminate is strongly associated with the 1950s and 60s, it was first developed as early as 1912 from resin-impregnated paper or fabric, and used as an electrical insulator. The introduction of melamine resin in 1938 allowed a particularly durable surface which could be printed with the wide range of colours and patterns that became synonymous with the trade name in the post-war period.

Many new polymers were developed from the late 1920s onwards, and were promoted by modernist architects such as Maxwell Fry or F R S Yorke. Some of these plastics came into their own during World War II; for example polymethyl methacrylate, or acrylic, a lightweight and easily worked material, was introduced in Germany in 1933 as Plexiglas, by ICI in 1936 as Perspex, and in the USA by Du Pont in 1937 as Lucite. Clear as glass but much safer, it was widely used for windshields and aircraft canopies. The production of another new plastic, PVC, by ICI was spurred by the wartime loss of rubber production in Malaya. Nylon, too, would move from military uses during the war to widespread consumer use afterwards. Glass-fibre laminates had the advantage of being invisible to radar, and glass-fibre reinforcement and injection moulding processes advanced rapidly. By the mid-1950s it was possible to fabricate complete habitable units made from glass-reinforced plastic (GRP), commonly known as 'fibreglass.'

At the 1956 Paris Exhibition, the architect Ionel Schein – with assistance from R A Coulon and Yves Magnant – demonstrated his 'maison tout en plastiques,' the ground-plan an outwardly extruding snail's shell of stepped, circular segments. Schein suggested that the new materials challenged the basic necessity of the right-angle in building, citing other shell constructions by Roberto Menghi from the 1957 Milan Triennale, as well as later works by the French trio, such as fibreglass mobile tourist cabins and library units. Alison and Peter Smithson's 'House of the Future' at the 1956 Ideal Home Exhibition featured GRP 'shell chairs' which were widely influential in formalising an aesthetic for the use of plastics in interior design.

By the early 1960s a number of British firms had begun producing GRP structures. A tobacco and confectionery kiosk for Newcastle-upon-Tyne railway station was produced as a 10ft high one-piece moulding, fully-fitted so that just two hours of site work was required before it was ready to open. Fibreglass and phenolic foam were »



Above: vaudeville studio (Raymond McGrath, 1932) at BBC Broadcasting House, using coloured urea formaldehyde panels. Overleaf: Ionel Schein's 'maison tout en plastiques' at the Salon des Arts Ménagers in Paris, 1956

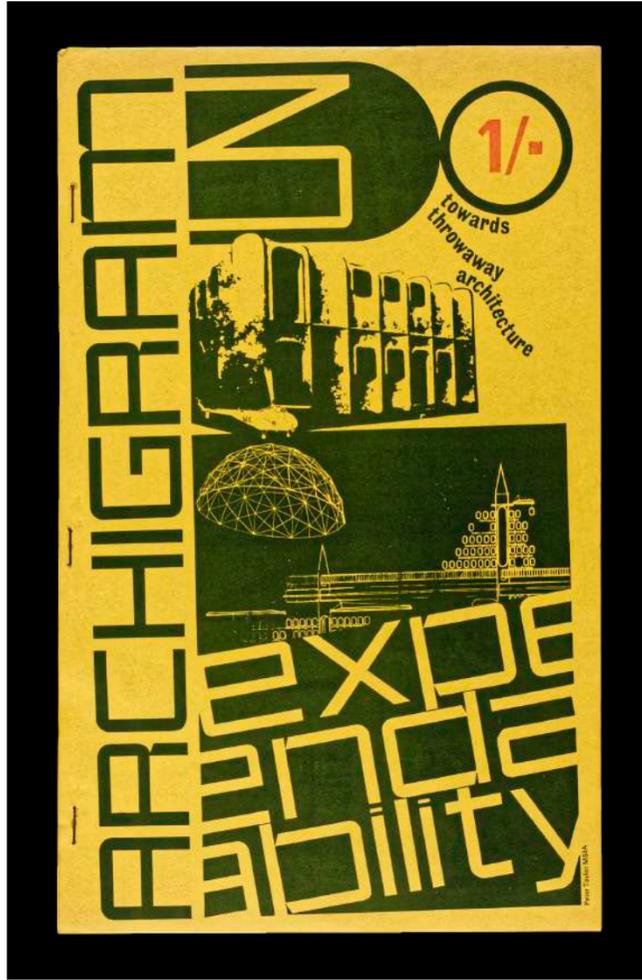


LA MAISON DE ELLE TOUT EN PLASTIQUES

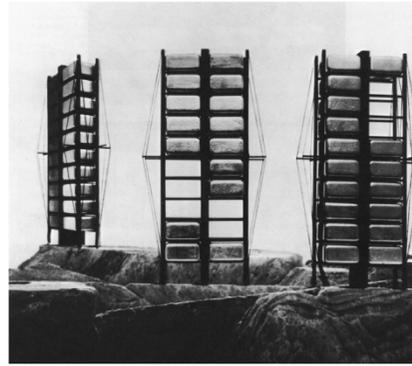
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CARBON

LA MAISON DE ELLE TOUT EN PLASTIQUES



The cover of Archigram's 1963 'expendability' issue and, below, David Greene's inflatable 'suit-home', based on Michael Webb's 'Suitaloon' project for Archigram (1968)



Wolfgang Döring's Stapelhaus design (c.1967) explored the possibilities of stackable modularity

also used in 1961 to make enclosures for new automatic signalling equipment. These were later repurposed to serve as electricity sub-stations and, after the addition of a second floor, as research laboratories for the British Antarctic Survey and a telephone exchange for Bakelite Ltd in Birmingham. A photograph of the exchange featured on the cover of *Archigram 3* in 1963, in a collage by Peter Taylor and Peter Cook. 'Expendability' was the theme, the exchange appearing alongside various disposable consumer products and construction systems and a moulded bathroom by H Buckminster Fuller. Such plastic ephemera were, said *Archigram*, 'an encouragement to designers who have to follow on to produce these sort of things in quantity'.

These experiments did indeed encourage a whole generation of designers, as documented in Reyner Banham's *Megastructure: Urban Futures of the Recent Past* (1976) and Arthur Quarmby's *The Plastics Architect* (1974). Archigram, Banham suggested, fully embraced poly-plastics when they began working at a smaller scale. David Greene's Living Pod (1966) and Michael Webb's Cushicle (1964) and Suitaloon (1968) were single-occupant inflatables, enveloped by skins of synthetic fibre or film. Greene also used GRP for the heavier work. Quarmby, a designer of pneumatic PVC domes in the mid-1960s, now noted a growing interest in stackable fibreglass capsules. From 1969 to 1973, Wolfgang Döring's Stapelhaus, Pascal Häusermann's Domobiles, and Casoni and Casoni's Rondo all used GRP shells to achieve modularity, the last, consciously or not, transforming Matti Suuronen's Futuro (1968-73) into a component of a towering, triform assembly, or 'corn-cob' in Quarmby's words. »

Previous pages, RIBA collections. This page, Archigram Archives, Dennis Crompton (2). Opposite, Architectural Press/Archive RIBA collections



The enclosed approach bridge to Bletchley Leisure Centre, Milton Keynes (Faulkner-Brown, 1974). The steel and acrylic pyramid above the swimming pool can be seen at rear left



Courtesy Daniela Hettrich, Familie Feierbach (2)

Opposite: Wolfgang Feierbach in front of his fg2000 system-built fibreglass house (1970) and above, the colourful interior with a 'ceiling carpet' of Dralon, a spun acrylic fibre. See [feierbach.com](http://feierbach.com) for more about his work



IONEL SCHEIN SUGGESTED THAT THE NEW MATERIALS CHALLENGED THE BASIC NECESSITY OF THE RIGHT-ANGLE IN BUILDING



A Futuro prefab GRP house (Matti Suuronen) in 1969. About 8m diameter by 4.3m high, it was made in 16 main pieces erected on a steel frame



Extending with GRP: top, James Stirling's Olivetti International Education Centre in Haslemere (1972, Grade II\*) and above, plastic classroom extension at Fulwood primary school near Preston (1973)

This page, Richard Brook/NDSU Dept of Architecture & Landscape Architecture. Opposite, Getty Images

Many of the living capsules were demonstrated at the Internationale Kunststoffausstellung der Welt in West Germany from 1971-73. Such architecture may now have a cult following for its kitsch qualities, but both Wolfgang Feuerbach's 'Kunststoffhaus fg 2000' and Häusermann's 'assemblage', for example, received state funding, and were presumably seen as possible approaches to large-scale housing provision. Although it has been said that the 1973 oil crisis made the wider adoption of such structures less feasible, later fibreglass housing projects in the UK by the Milton Keynes Development Corporation (1976) and James Stirling's Southgate Estate (1977, demolished 1990) suggest that this was not always the case.

Stirling's name could not ensure the survival of the Southgate Estate, but when his 1971-72 extension for the Olivetti International Education Centre at Haslemere – enveloped in alternating beige and cream fibreglass panels with punched

windows – was listed Grade II\* in 1977, it was said to be 'the major building by a major architect to be built in GRP in Britain.'

The major use of plastics was not enough to save Faulkner-Brown's Bletchley Leisure Centre (1974, demolished 2010). Visitors to the centre emerged from the car park via an enclosed fibreglass walkway. Drawing on work by Renzo Piano and Yves Chaperot, the swimming pool was covered by a pyramidal steel frame in-filled with bronze acrylic sheeting. Despite calls for restoration from C20 Society and CABE, Milton Keynes Council argued that the pool was 'visually unappealing', with issues of functionality and maintenance.

Although stand-alone plastic structures are better known, they have sometimes been used in combination with traditional materials such as brick. Ben Stephenson and Mike Bracewell of the Lancashire County Architects Department designed a plastic classroom to be attached to an existing primary school building at Fulwood

near Preston in 1973. Synthetic Resins Ltd supplied the GRP and phenolic foam which became the panels of a 4.8m tall twenty-sided polyhedron. The classroom is still in use, and is being considered for listing.

As Anthony Walker noted in the IHBC magazine *Context* in 1996, many post-war buildings being assessed for listing incorporated a substantial proportion of plastics, and approaches to conservation require an understanding of the materials, their historic significance, their durability and the processes of degradation. Many plastics are difficult to repair, or have later been found to be hazardous materials which need to be replaced. How important is it, he asks, to retain original fabric when – unlike stone, for example – it is made from a polymer which can quite easily be replicated? Recording, rather than retaining, may be the appropriate response in some cases. These are questions which will be of increasing importance to building conservationists and historians. ●