British Plastics Federation

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Plastics Timeline

Pre 1900 - 2010 +

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ColorMatrix
Advancing plastic's potential

Knowledge Transfer Network
Materials

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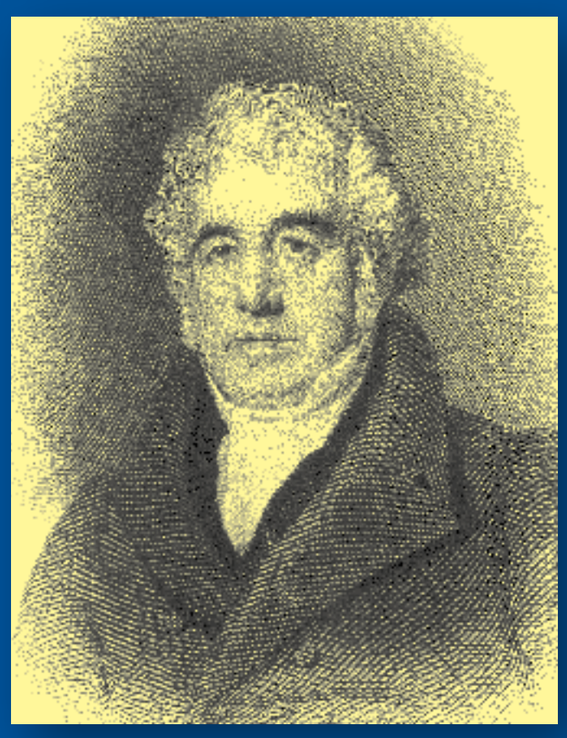
Pre-1900

The Worshipful Company of Horners

1284
First recorded mention of The Horners Company of London, with horn and tortoiseshell as the predominant early natural plastics

1823
Macintosh uses rubber gum to waterproof cotton and the 'mac' is born



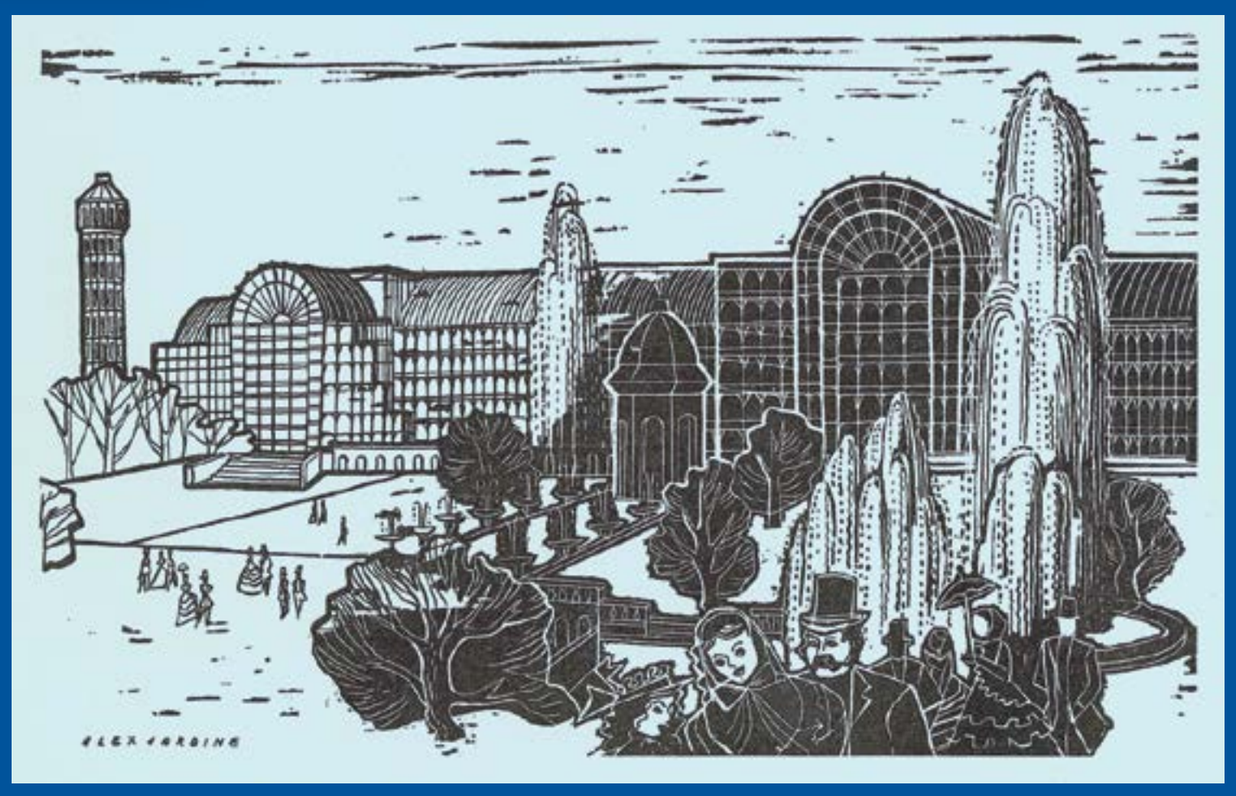
1845
Bewley designs extruder for gutta percha

1850
First submarine telegraph cable in gutta percha laid between Dover and Calais

1872
Hyatt brothers patented first plastics injection moulding machine

1885
George Eastman Kodak patents machine for producing continuous photographic film based on cellulose nitrate

1862
Display of Parkesine, predecessor of celluloid (cellulose nitrate), at the 1862 Great International Exhibition in London



1880
Fashion for long hair leads to cellulose nitrate replacing horn as the preferred material for combs

1890
Thermoforming introduced and used to make babies rattles from cellulose nitrate

1892
Viscose silk (rayon) developed by Cross and Bevan (Chardonnet Silk)

1898
Beginning of mass production of rpm gramophone records from shellac

1899
Krische and Spittler in Germany awarded patent for Casein plastic from milk. Artefacts introduced at the Plastics Universal Exhibition in 1900

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1900-1929

1909
Casein plastics, derived from milk, developed by Erinoid

1910
Stockings made of viscose (CA) begin to be manufactured in Germany

1915
Queen Mary sees casein products at the British Industries Fair and orders several pieces of jewellery made from it

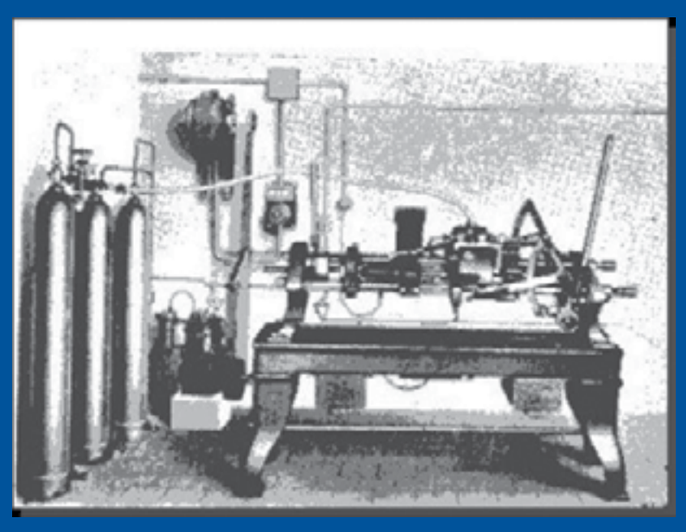
1916
Rolls Royce begins to use phenol formaldehyde in its car interiors and boasts about it

1919
Eichengrun produce first cellulose acetate moulding powder

1921
Beginning of rapid growth of phenolic mouldings especially for electrical insulation, with addition of phenolic laminates in 1930

1922
Staudinger published his work recognising that plastics are composed of long chain molecules leading to a Nobel prize in 1935

1924
Rossiter at British Cyanide develops urea-thiourea formaldehyde resins, subsequently commercialised as the first water white transparent thermosetting moulding powder



1926
Eckert and Ziegler patent first commercial modern plastics injection moulding machine

1926
Harrods host first display of coloured thermosetting plastics tableware produced by Brookes and Adams, The Streetly Manufacturing Company and Thomas De La Rue and Co.

1929
Bakelite Ltd receives its largest ever order for phenolic moulding powder for the casing of the Siemens telephone

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1930s

1930
'Scotch' tape, the first transparent sticky tape invented in US by 3M Company

1932
Screw pre-plasticisation in injection moulding patented

1933
BPF founded on the 21st December 1933. First Chairman, Charles Waghorne of Insulators Limited

1933
Fawcett and Gibson at ICI discover polyethylene

1933
Crawford at ICI develops first commercial synthesis of poly(methyl methacrylate)

1935
Troester in Germany produce first extruder designed for thermoplastics

1937
First commercial production of polystyrene by IG Farben, Germany

1935
Carothers and DuPont patent nylon

1936
First production of aircraft canopies made from 'Perspex'

1937
Columbo and Pasquetti in Italy produce first twin-screw extruder machine

1938
First toothbrush with nylon tufts manufactured

1938
Full scale production of nylon 6 fibre begins in United States

1938
Plunkett (DuPont) discovers PTFE

1939
first commercial production of polyethylene in UK by ICI

1939
outbreak of war – strategic stockpiles of materials

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1940s

1940
First production of PVC in UK

1940s
Polyethelene used as radar cable insulation

1940
DuPont introduces polyacrylonitrile (PAN), an early engineering product

1941
Whinfield and Dickson, of the Calico Printer's Association of Manchester, patent polyethylene terephthalate (PET); followed by the creation of the first polyester fiber called 'Terylene'

1944
Bakelite Handgrenade widely used by British Troops in Normandy

1943
First pilot plant for polytetrafluoroethylene (PTFE) ; to be marketed under trade mark 'Teflon'

1942
'Super Glue' (methyl cyanoacrylate) first discovered by Dr Harry Coover, Eastman Kodak

1945
The production of the LDPE Sqezy bottle by Monsanto caused a rapid expansion of the industry with containers produced to replace glass bottles for shampoos and liquid soaps.

1947
Formica melamine faced decorative laminates introduced into the UK

1948
George de Mestral invents Velcro, patented in 1955

1948
Acrylonitrile-butadiene-styrene (ABS) produced

1949
High impact polystyrene introduced as a commercial plastic

1949
First Airfix self-assembly model produced (Ferguson Tractor) initially made of cellulose acetate and later polystyrene

1949
Launch in US of Tupperware made from low density polyethylene

1949
'Lycra' based on polyurethane, invented by DuPont

1948
Introduction of 12" long playing records made from PolyVinyl Chloride (PVC)

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1950s

1950s
The polyethylene bag makes its first appearance

1950
ICI opens new factory at Redcar to produce 'Terylene'

1950s
Introduction of acrylonitrile-butadiene-styrene (ABS) copolymers

1951
Festival of Britain

1953
Commercialisation of polyester fibres introduces the concept of 'drip dry' and 'non-iron'

1954
Polystyrene foam introduced by Dow Chemical Co.

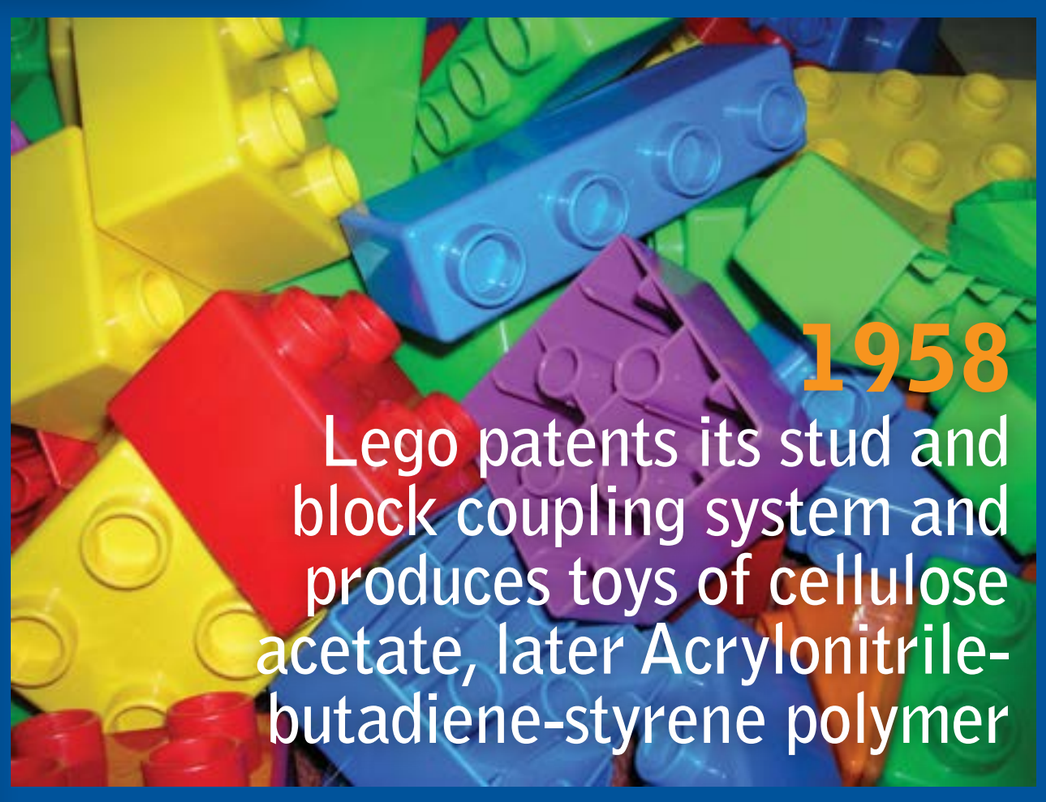
1955
First production of high density polyethylene in UK

1956
DuPont files patents for first acetals (POM)

1956
Reliant Regal 111, first commercially successful all glass-reinforced-plastic bodied car goes on sale

1956
Eero Saarinen's 'Tulip Chair' launched, consisting of a seat made of glass-fibre-reinforced plastic

1957
The hoop is reinvented as the 'Hula Hoop' by Knerr & Medlin, Wham-O Toy Company



1958
Lego patents its stud and block coupling system and produces toys of cellulose acetate, later Acrylonitrile-butadiene-styrene polymer

1957
First production of polypropylene by Montecatini using Ziegler-Natta catalysts

1958
First production of polycarbonates (Bayer and General Electric)

1959
Barbie Doll unveiled by Mattel at American International Toy Fair

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1960s-70s

Early 1960s introduction of water-based acrylic paints

1960
Ethylene-vinyl acetate co-polymers launched by DuPont

1962
DuPont launches polyimide films and varnishes

1962
Silicone gel breast implants pioneered successfully

1965
'Kevlar' is first developed by DuPont and used in tyres

1966
Blow moulded fuel tanks introduced

1970
First Yellow HDPE pressure pipes for gas introduced into UK by Wavin/British Gas

1967
Polyvinyl Chloride (PVC) 'Blow' chair designed by Scolaria, De Pas and Lomazzi, manufactured by Zanotta

1969
Neil Armstrong plants a nylon flag on the moon

1973
Martin Cooper, a Motorola researcher and executive, designs the first ever mobile phone

1973
Polyethylene terephthalate beverage bottles introduced

1976
Plastics in its great variety of forms becomes the most used type of material in the world

1977
Polyaryletheretherketone (PEEK) was first prepared by ICI

1979
First PVC-U double glazed windows installed in the UK

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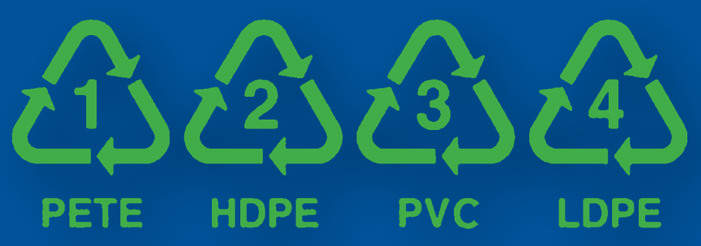
1980s-90s

1980
First production of linear low density polyethylene

1980
First Blue HDPE pressure pipes for potable water introduced into UK

1983
The slim plastics Swatch watch made of 51 components, mainly plastics



1988
Introduction of triangular recycling symbols relating to plastics

1982
First artificial heart made mainly of polyurethane, implanted in a human

1983
ICI and Bayer launch PEEK, PPS (polyphenyene sulphide), and PES (polyether sulphone)

1987
BASF in Germany produces a polyacetylene that has twice the electrical conductivity of copper

1989
first light-emitting polymers (poly-ethyne) discovered in Cambridge

1989
The Gravimetric Batch Blender is invented by Steve Maguire revolutionising the industry and bringing affordable gravimetric blending to processors.

1990
ICI launches 'Biopol', the first commercially available biodegradable plastic

1991
Dyson's vacuum cleaner launched in Japan

1994
'Smart car' with lightweight flexible integrally coloured polycarbonate panels introduced

1998
Free standing Zanussi 'Oz' fridge, with insulation and outer skins made in one process from polyurethane foam, introduced

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2000-10

2000s
Nano-Technology applied to polymer and composite applications

2000
First commercial metallocene catalysed polyolefins introduced

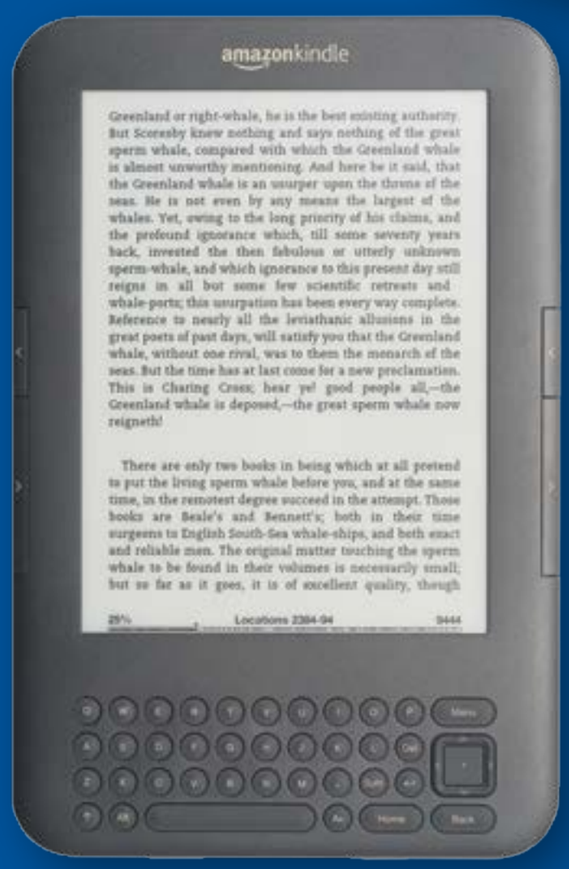
2005
Polycond project established to look at the potential of conductive polymers

2001
iPod dreamed up by Tony Fadell, an independent inventor, developed by Apple

2008
Airbus 380, comprising 22% carbon-fibre reinforced plastics, flies into Heathrow

2009
Boeing 787 (nicknamed 'Boeing's Plastic Dream') comes into service, its skin is made up of 100% Plastic composites with plastic making up 50% of all materials in the plane

2005
NASA explores the advantages of a polyethylene based material RFX1, as the material, for the spaceship that will send man to Mars



2010
The Amazon Kindle is an e-reader made with a resilient plastic outer body case. Kindle is used to read e-books newspapers, magazines, blogs and other digital media

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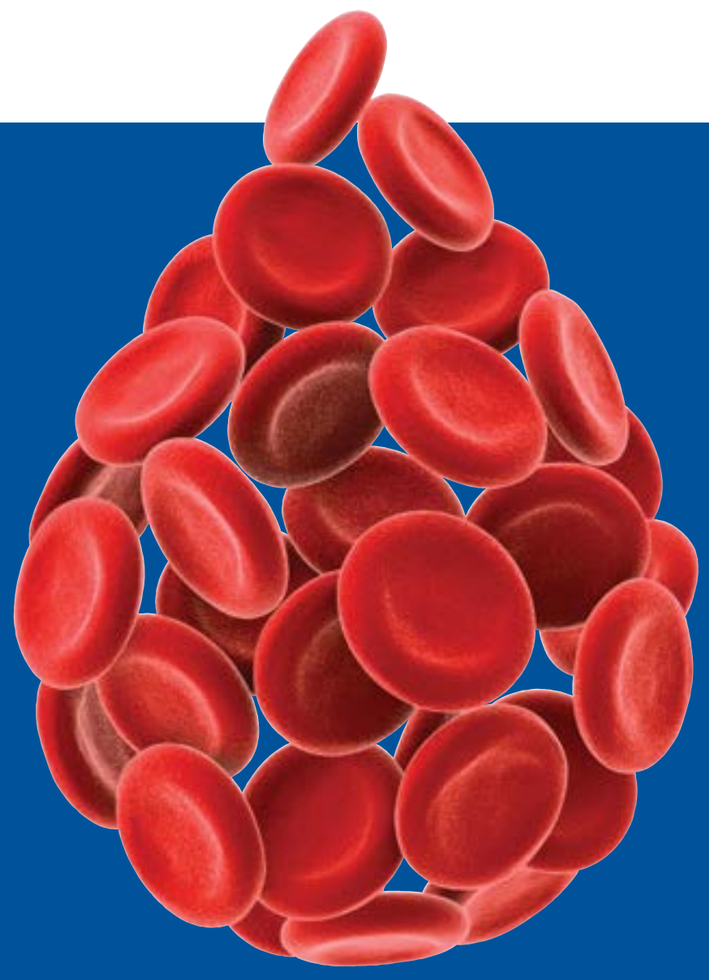
2010+



Plastics Blood
Developed by the University of Sheffield to mimic haemoglobin, for use in trauma situations where blood is needed quickly

Plastic Solar Cells
A polymer solar cell that can produce electricity from sunlight by the photovoltaic effect provides a lightweight, disposable and inexpensive alternative to traditional solar panels

Bullet Proof Polymer
Scientists at Rice University, Texas have created a new super polymer material that can stop a 9mm bullet and seal the hole behind it

Solar Powered Flight

The Solar Impulse plane's structure, made from roughly 90% polymer-matrix-composite materials, achieved the first solar-powered intercontinental flight in 2012

Implantable Polymers
Medical grade and implantable biomaterials such as PEEK will be used in neurological applications to help control epilepsy, Parkinson's disease and brain trauma

Commercial Space Flights
Lightweight carbon composite materials will be crucial in the realisation of sub-orbital tourist spaceflights

3D Printed Body Parts
Using plastic materials such as PMMA car parts can be printed at home and doctors can produce replica livers or kidneys for transplant patients

Flexible Plastic Screens
Organic light-emitting diodes are placed on plastic foil to create electronic devices with flexible displays

Photography courtesy of Plastic Logic

Driverless Cars
In the future all driverless vehicles will be almost entirely constructed from plastic parts due to the light weighting properties they provide

CONTRIBUTIONS BY:
PHS, Science Museum, Sylvia Katz, Colin Williamson, Colin Richardson, Susan Mossman, John Russel, Ralph Kay, Deborah Jaffe

FURTHER INFORMATION:
BPF, PHS, Science Museum, Victoria and Albert Museum, Design Museum, Cornelius Collection of Toys, Bletchley Park, Bakelite Museum

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THE STORY OF POLYVINYL CHLORIDE (PVC)

Origin of PVC

1913 German inventor Friedrich Klatte patented a polymerisation process to manufacture PVC

1920s-1950s

1930 RCA Victor launched first commercially available Vinyl long-playing record

1926
Waldo Semon, working for BF Goodrich in the US, invented plasticised PVC providing a synthetic replacement for increasingly costly natural rubber

1947
The first vinyl floor covering was manufactured by the Swedish company Limhams

1950
PVC blood bags replace glass bottles enabling blood to be safely transported

1960s-1990s

1966
Development of vinyl wall coverings for better interior hygiene

1979
First PVC-U double glazed windows installed in the UK

1995
The UK's first solar-powered office block – sponsored by the EU, DTI and Greenpeace at Northumbria University, Newcastle on Tyne features 21,000 solar cells and 646 PVC-U windows to assist thermal efficiency throughout the building

2000s

2000
European PVC industry establishes Vinyl 2010, a ten year voluntary commitment to improve the environmental performance of PVC

VINYL 2010
meeting the challenge of sustainable development

2003
A sustainable European PVC recycling system, Recovinyl, was established

2004
First window manufactured from 100% post-consumer recycled PVC

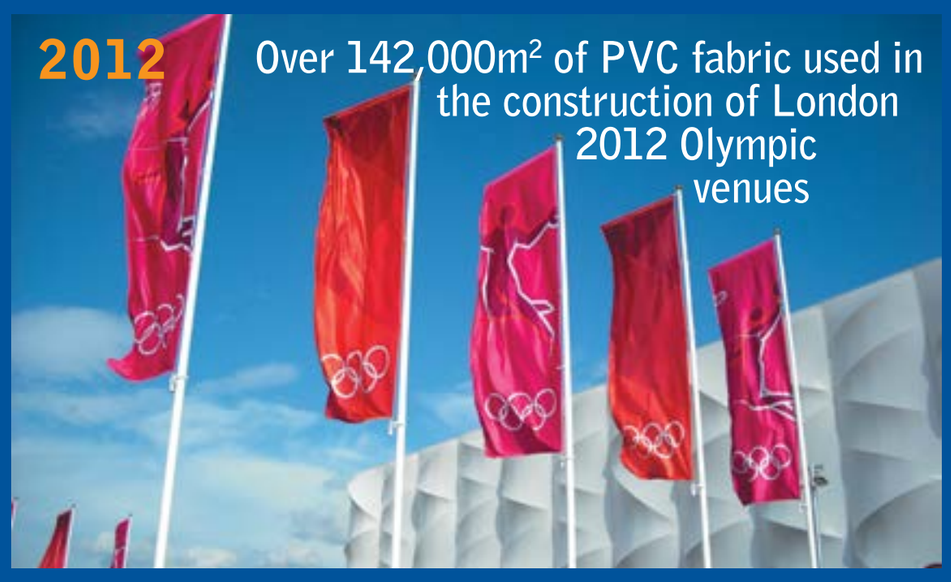
2010s

2011
VinylPlus, a new European industry sustainability programme, established

vinyl plus

2013
Recovinyl recycles more than one million PVC-U windows frames per year in the UK

recovinyl plus



2012
Over 142,000m² of PVC fabric used in the construction of London 2012 Olympic venues

The future

2020
Over 800,000 tonnes of PVC products will be recycled per year across Europe by 2020

2022
The 2022 FIFA World Cup Qatar Showcase Stadium has been designed to use super-reflective, triangulated PVC fabric to create a zero carbon, sustainable stadium providing comfortable playing conditions.

vinyls group

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vinyl plus

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