

a little book of
Concrete

Why precast concrete?

A guide to one
hundred advantages

**If concrete
were to be
invented
now it
would be
hailed as
a miracle.**

It is the most commonly used building material in the world; yet we normally take what it does for granted – too often this means that much of what concrete can offer is overlooked.

Now it is time to take a fresh look at the new world of concrete.

This booklet re-examines what factory-made precast concrete can offer the architect, the designer, the engineer, the client, the financier, the insurer and the environmentalist.

Precast concrete covers all factory-made concrete products from mass produced blocks, paving and roof tiles, to massive customised bespoke units.

We hope you enjoy reading about the 100 advantages of precast.

If you wish to know more contact: info@britishprecast.org

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Precast fit for purpose



Withstands everyday use.

All structures and buildings are subject to everyday wear and tear and this is where the use of precast concrete really makes sense. Its hard, tough surface is extremely resistant to everyday dents and punctures.



Weather-proof.

Precast concrete is resistant to rain penetration and wind-blown debris. It can also withstand many winters of freeze-thaw cycles, unlike other materials which can deteriorate quickly with such regular exposure to expansion and cracking.

Quiet...

As a dense material, precast elements in a building make for a peaceful lifestyle. Privacy and effective sound reduction are ensured, which makes precast and masonry an ideal choice for residential buildings in particular.



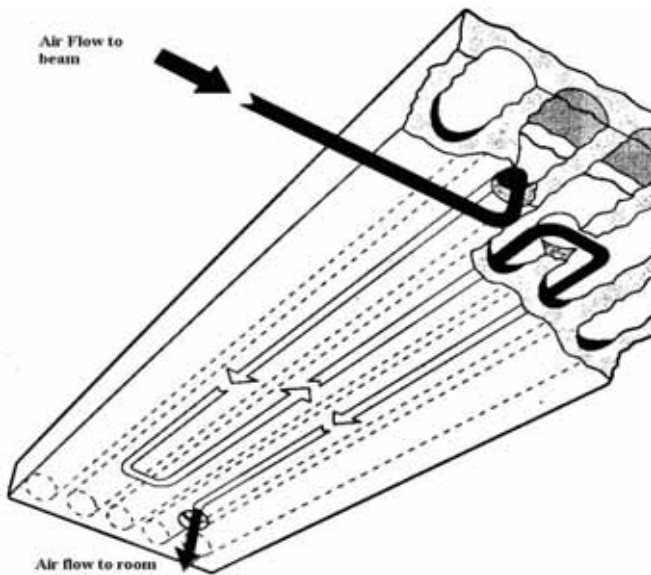


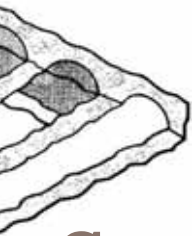
...yet acoustically versatile.

Because precast can be moulded to any shape, size and texture it can be used to deflect or absorb noise. This makes it a good acoustic host for music but also an effective sound barrier alongside busy roads.

Thermally efficient.

Concrete can be dense or lightweight and this choice affects its thermal behaviour. In either case, precast concrete can act as a thermal sink or as an insulator. In some buildings you can see precast doing both.





Comfortable.

The versatility of precast can be seen in its application as a carrying medium for heating or cooling, whether this is via air or fluids. The hollow cores in precast floors can be used or pipes can be cast into slabs. The concrete surface radiates very effectively, enables space to be used without the hindrance of radiators and protects the heating or cooling system within.

Plug and play.

Precast concrete can carry pre-installed services and fixtures, whether these are communications, plumbing or even windows! Services can be cast within a precast element or panels can include connection plates ready to receive heating and lighting fittings on site. This makes both construction and maintenance easy.





Wi-fi compatible.

With homes and offices increasingly designed for information technology, it is good news that precast concrete buildings do not interfere with radio signals, local wi-fi or internet networks. This makes precast the most technology friendly material for homes and places of work.



Protects against fire.

Precast is fireproof. It protects against the spread of fire between rooms or properties and it cannot catch fire, burn or drip molten particles. In tests, concrete performs consistently well in fire, often requiring only minor repairs to make good.





Does not melt.

Just like other concrete and masonry materials, precast concrete does not melt in high temperatures. This means that there is no need for protective paints or special insulation – and finishes can be viewed just as the designer intended.

Offers a safe haven...

The structural strength and dense nature of precast concrete makes it an ideal choice for safe or panic rooms in houses.

...and keeps buildings secure.

Whether for homes, businesses or increasingly for prisons, precast is secure against break-ins and break-outs; it can't be cut open and is extremely resistant to impact.



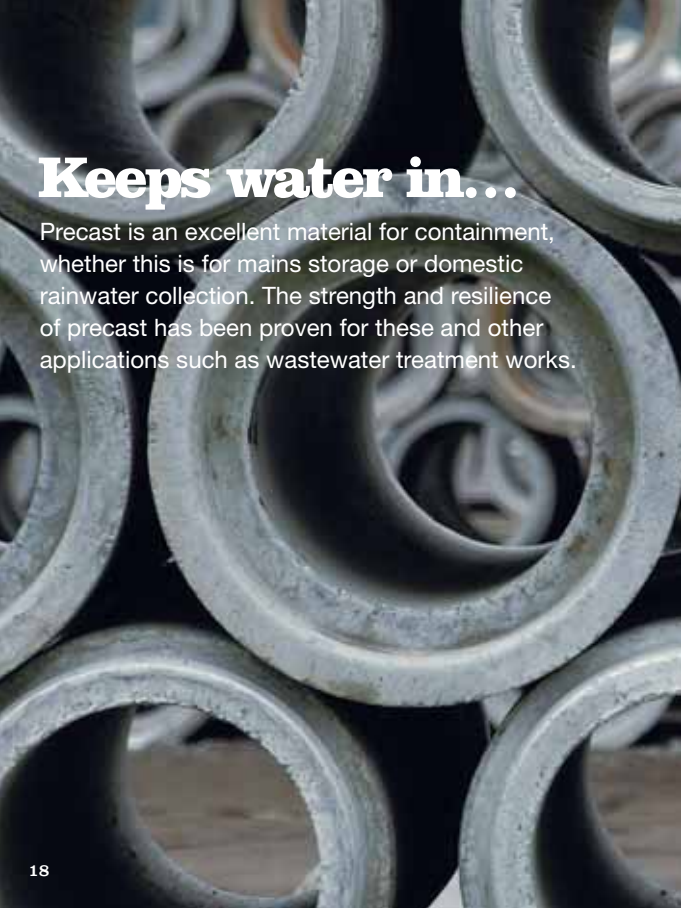
Rot proof, fungus proof and mildew resistant.

Precast is dense, tough and simply will not fall prey to these common enemies of organic materials. Specifying precast means having confidence that a structure won't rot away.



Inedible to termites and rodents.

Organic building materials make the best food for creatures like these and with climate change affecting the flora and fauna in Europe, termites are now threatening the UK. Precast concrete is resistant to attack from termites and other infestations such as rats and mice.



Keeps water in...

Precast is an excellent material for containment, whether this is for mains storage or domestic rainwater collection. The strength and resilience of precast has been proven for these and other applications such as wastewater treatment works.



...and out!

In other situations we need to keep water out; precast can be used for flood protection, river and coastal barriers to protect against inundation from high tides and storms. On a domestic scale, precast is also used for basements where below ground living needs robust and waterproof construction.

Structures for today and tomorrow

Durable...

Concrete buildings from hundred of years ago are still in use today. Some say concrete can last up to 2000 years and there are certainly many structures around that are well on their way to such a ripe old age...





...because it gets stronger every day.

Precast concrete goes on increasing its strength for hundreds of years after it is cast. What's more, during that time it won't shrink, warp, move or creep excessively so can be relied upon to perform consistently year after year.

Structurally efficient...

Quality in design and production means precast units are extremely structurally efficient; they have a high span/depth ratio and EC2 makes provision for reduced partial safety factors for precast, in acknowledgement of the controlled production environment.

A tall, curved glass skyscraper under construction. A crane is visible on the left side of the building. The building has a curved facade with many windows. The sky is blue with some clouds.

...which means it's easier to go high.

Tall buildings of up to 80 storeys can be built with precast because of its structural efficiency results in a lower storey height (reduced floor depth dimension for the same span as other materials) and so it becomes economically possible to add more floors.



High margins of design safety.

The strength and resilience of precast structures means that extra safety is always built in, often over and above what is required by design codes. In some cases, this benefit could be a life-saver.

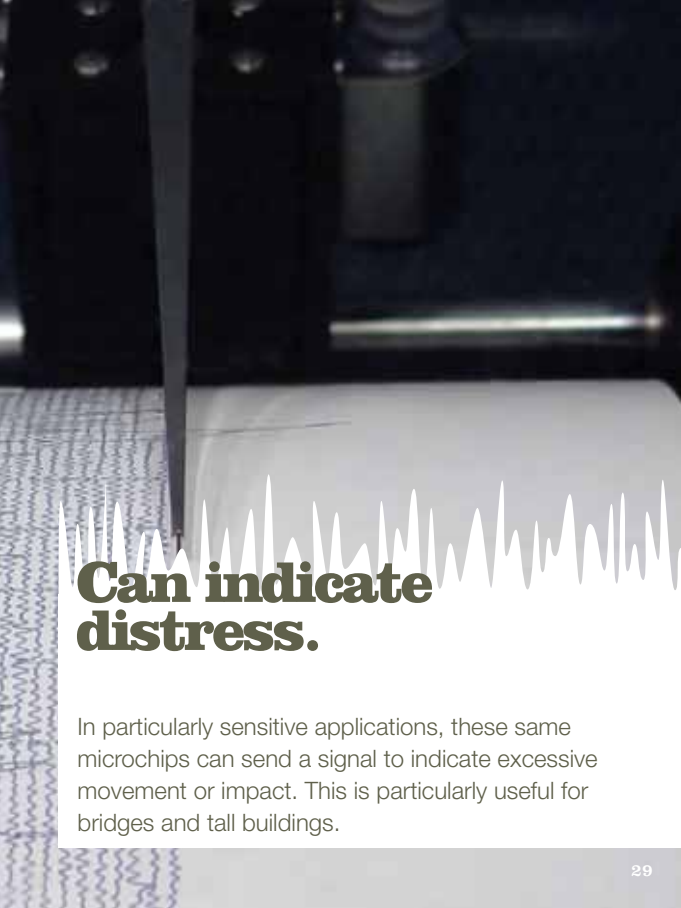
Dampens vibration.

Structures like sports stadia and concert halls are particularly susceptible to vibration from noise and crowd movements, which in some cases can be disturbing to people using the facility. Due to its mass, precast concrete can be used to dampen these vibrations and can be seen at all levels of sports grandstands and auditoriums.



Intelligent.

Sometimes it may be helpful to know how a structure is performing over time. Microchips can be embedded in precast concrete to log data on movement or stress. Engineers can easily 'read' the data on the chip by swiping a reading device across the surface of the element.



Can indicate distress.

In particularly sensitive applications, these same microchips can send a signal to indicate excessive movement or impact. This is particularly useful for bridges and tall buildings.

Can achieve high strengths.

In civil engineering applications high strength concrete is often desirable, and precast units can be cast to meet such demands. If high early strengths are needed, then this can be achieved through several means including self-compacting concrete.





Can support heavy loads.

Where point loads or high bearing stresses are likely then the dense, high quality concrete in a precast element is absolutely critical. Industrial applications, utilities and power generation all provide good examples of this.



Does not rust.

Precast concrete is corrosion resistant and can therefore be used with confidence in very aggressive environments. For example, precast concrete piers are resistant to the inter-tidal anaerobic attack experienced in some marine environments. Furthermore, tight quality controls in production mean that cover levels for rebar in any application are ensured.

Resists chemical attack.

For hard-standing, aprons and other paved areas, precast concrete blocks are an ideal choice because they are resistant to fuel and oil spills, they can also be replaced easily and are widely available.



Absorbs impacts.

Precast concrete can resist massive impacts, even from jet planes. So, it is also more than able to cope with day-to-day applications like traffic separation barriers – the precast units absorb the impact from vehicles and slow them down.





Protects against blasts.

In extreme applications, blast protection from explosions may be a necessary design criteria. Sufficiently reinforced and thickened precast units can perform a critical role here.



“Flies through the air with the greatest of ease”

Not all precast is heavy and tough; its ability to span clear distances without propping means that precast balconies and bridges can cantilever elegantly.

Less stress relaxation.

Keeping in shape is important and precast is no exception. Some materials 'relax' over time, which can be difficult to account for in design; precast maintains its shape, size and properties.





Can be thin...

The use of steel fibre reinforcement in the precast concrete mix can produce extremely slender elements. This means that precast can be used in some very structurally ambitious projects.

...can also be light or heavy or...

Precast concrete is made from a range of materials, which can be combined to produce different properties. This means that precast can be porous or impervious; it can float or sink, be heavy or light. The possibilities are endless!



Amazing architecture and finishes

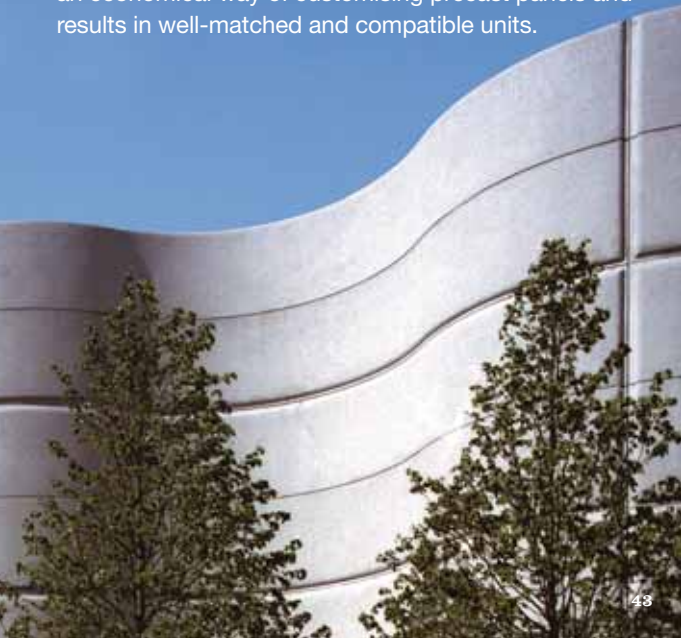


Has the potential to be made in any shape.

The casting process for precast concrete takes place in a controlled factory environment and uses the skills of mould-makers to create straightforward or unusual shapes. Manufacturers can offer helpful advice on how to achieve difficult architectural forms.

Customisation is simple.

Moulds can be designed to be customised – this means that parts of a mould can be added or removed to produce slightly different sized or shaped units. This is an economical way of customising precast panels and results in well-matched and compatible units.



Blends in with existing structures.

In areas of historic or architectural importance, it may be important to ensure that any new buildings match or are sympathetic to their older counterparts. Careful mix design in the precast factory and use of mock-ups can ensure that the match is satisfactory for all those involved.



Can replicate patterns, shapes or other materials.

Just like the previous advantage, the 'mouldability' of precast means that it is an excellent mimic, whether this entails copying classical details like keystones and capitals or matching the finish of materials like weathered stone.



Can be straight or curved...

For external walls or cladding panels, the shape of a precast unit is called its 'profile'. In these applications, being able to produce a variety of different profiles can be very important and this is an area in which precast concrete excels because of the flexibility and accuracy in the production process.

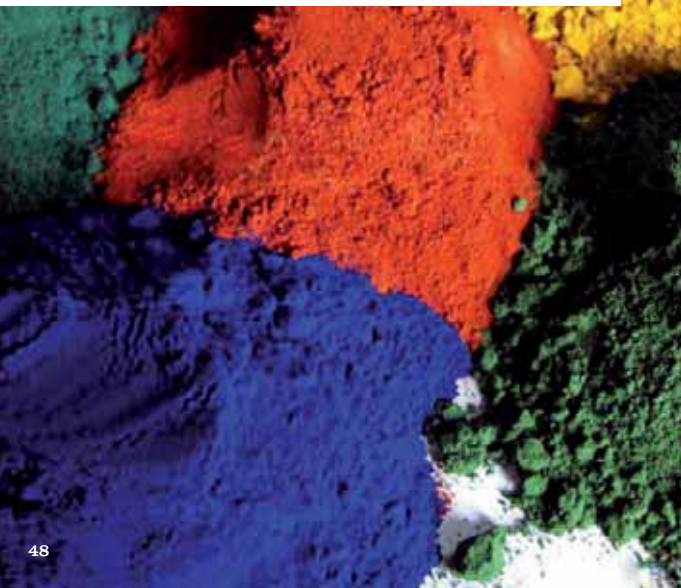


...or highly-detailed.

The level of detail on a wall or façade is often referred to as articulation - this term is used to describe the level of complexity on a surface. Casting precast concrete in carefully constructed moulds means that very highly articulated panels can be made.

Available in a wide range of colours...

There are many different aggregates and additions that can be incorporated into precast concrete elements, depending on what is required. This gives designers considerable scope to produce subtle or contrasting colour-ways.



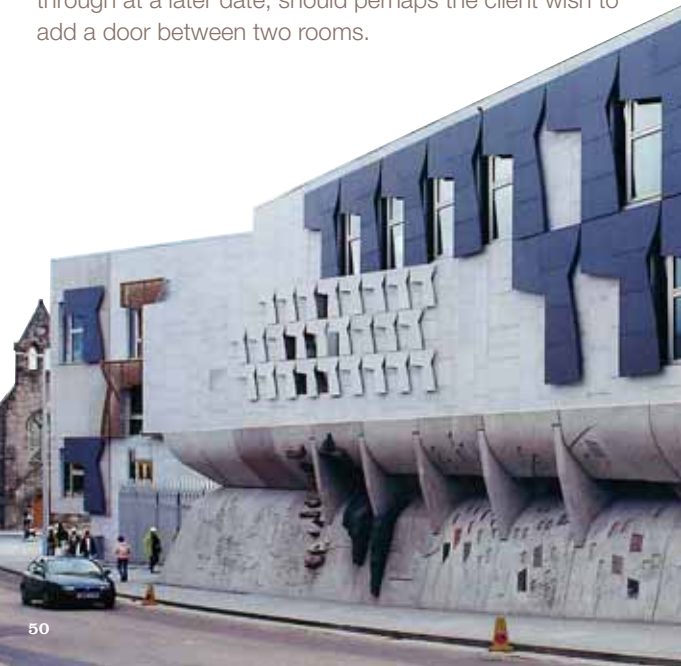


...including white and black.

Dramatic architectural projects call for dramatic colours, and precast can be used to provide white, off-white or black shades. Colours in precast are long lasting and manufacturers can always advise on suitable colours for particular applications.

Can be cut to suit.

Considerable flexibility can be built into precast concrete. Not only can window and door shapes be created, but there is scope to design elements so that they are more lightly reinforced in some areas – these can then be cut through at a later date, should perhaps the client wish to add a door between two rooms.





Perfectly precise.

The accuracy and factory controlled conditions in a precast factory are ideal for producing very precise, sharp details. This relies on the craft-based skills of mould makers and through their expertise, even minute details become feasible.



Can incorporate life-size images.

By using a process called photo-engraving, it is possible to turn precast concrete elements into huge photo albums! A dot matrix of the selected photo or graphic image is effectively reproduced in the surface of the precast element, so it will not fade or wash away over time. This technique is often used to dramatic effect.

Uses special effects!

When precast concrete is cast in the factory, there is an option to lay down different coloured layers of aggregates in the mould, so that when the surface is exposed to varying degrees the colours can really come alive, producing a spectrum of effects over a relatively small area.





Smooth.

In the same way that natural stone is prepared, precast concrete can be polished to a smooth and in some cases reflective finish. The inclusion of attractive aggregates or mica in the concrete mix can help the precast element to sparkle, adding that bit extra to the quality precast finish.

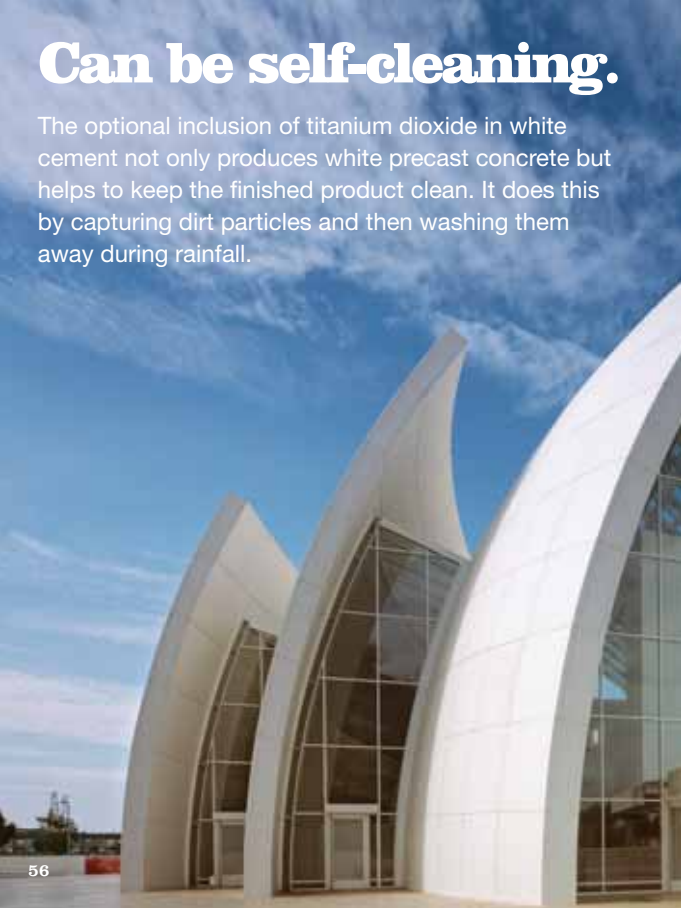


Easily painted.

For some structural precast concrete elements, it may be more desirable to opt for a painted finish. This makes maintenance easy and it means that colour-ways can be changed at any point. Precast units are smooth and so paint can be applied easily and directly onto the surface of the concrete itself.

Can be self-cleaning.

The optional inclusion of titanium dioxide in white cement not only produces white precast concrete but helps to keep the finished product clean. It does this by capturing dirt particles and then washing them away during rainfall.



Can be designed to change colour.

The inclusion of thermo-chromatic dyes in precast concrete will cause it to change colour when it reaches particular temperatures. This is a fun idea, but has serious applications too – for example, the concrete can indicate when it is too cold or too hot to touch.



Acts as an aid to visually impaired people...

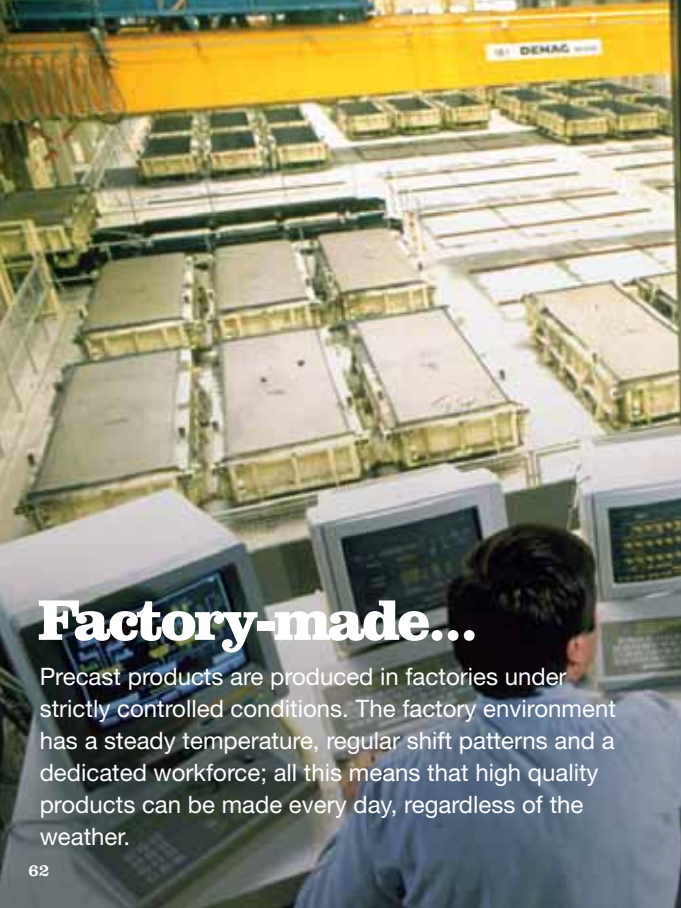
It is common to see textured, knobbly paving slabs near pedestrian crossings and this is a good example of how precast can be made to include textures or profiles. Tactile paving helps visually impaired people to recognise changes in level and possible dangers from passing traffic or other hazards.

...and to others.

The same techniques of casting in textures can be used to increase the skid resistance of the surface of a precast concrete unit. This can be particularly useful in highly-trafficked paved areas, steps and ramps where, for example in winter, icy patches could cause slips and falls.



Quality in production and construction



Factory-made...

Precast products are produced in factories under strictly controlled conditions. The factory environment has a steady temperature, regular shift patterns and a dedicated workforce; all this means that high quality products can be made every day, regardless of the weather.

...and built to precise specification.

Precast companies work with specialist fixing teams to install their products. This guarantees precise, reliable workmanship ensuring that the quality of service from precast is maintained after the products leave the factory.





Covered by BS and EN standards.

The precast industry keeps a keen eye on national and international standards – this ensures that customers receive the best quality products which are compliant to all relevant standards. As well as specific product standards, many manufacturers also comply with ISO 9001 and ISO 14001.

Guaranteed durability.

The factory-controlled production process means that cover to rebar is consistent and correct, as are strength and concrete quality . Hence the inherent durability of the delivered product is assured.



Products can be seen in advance...

Manufacturers often have vast libraries of samples and most are able to produce a full-size mock up for the client and professional team to view. This is a valuable way for all involved to agree which finishes are to be used.



...and buildings too.

Many precast products are available to see every day – buildings, bridges and other structures act as showcases for prospective customers. Precast concrete features on award-winning buildings every year and these provide some exceptional examples of what can be achieved.



Great results every time...

Having decided to specify precast, it's important to have confidence in the solution and this is where factory-controlled procedures really become valuable. Repetition of individual units can be achieved with confidence whether there are one, ten or 100.



...with long-lasting moulds.

Precast concrete moulds can be stored to allow later replication, whether additional units are required one day, one week or one year later.



Rapid erection on site.

Precast products arrive ready for installation and can be scheduled to arrive 'just-in-time' so they can be lifted directly into place. This avoids the need for storage space and unnecessary handling.





Bar-codes or e-tags speed up construction.

The addition of bar coding strips or embedded micro chips on precast products help distribution managers identify individual elements, making sure each reaches its correct destination at the correct time. This technology also helps managers on site speed up the construction process while at the same time ensuring accuracy.

Highly compatible.

Because precast is made ahead of time, there's scope for designers and those involved with construction to ensure that connection details and joints are thoroughly investigated. This can help on site because precast makes for simple, easy to use connections that speed up construction and reduce the risk of errors.





Has a key role to play in hybrid concrete construction.

The combination of precast and other materials like in-situ concrete and steel in hybrid concrete construction can yield cost and programme benefits. Precast concrete brings accuracy, high quality finishes and speed of erection to any hybrid concrete construction project.

Protects workforce on roads.

It is typical to see precast concrete barriers in place alongside roadworks. These provide workers with safe separation from the fast-flowing traffic and act as crash barriers should any vehicles stray off the carriageway.





Provides an instant work platform.

Precast structures and in particular floors and staircases provide an early, secure and broad platform from which subsequent site activities can be undertaken. This solid footing helps speed up construction and gives managers confidence that operatives can go about their work safely.



Reduces noise from building sites.

No vibration, no sawing and no other noise-generating processes need be used to install a precast concrete structure. This results in substantially quieter construction sites, which is a genuine benefit to local residents and workers alike.

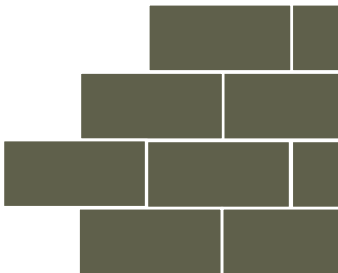
Improves safety on site.

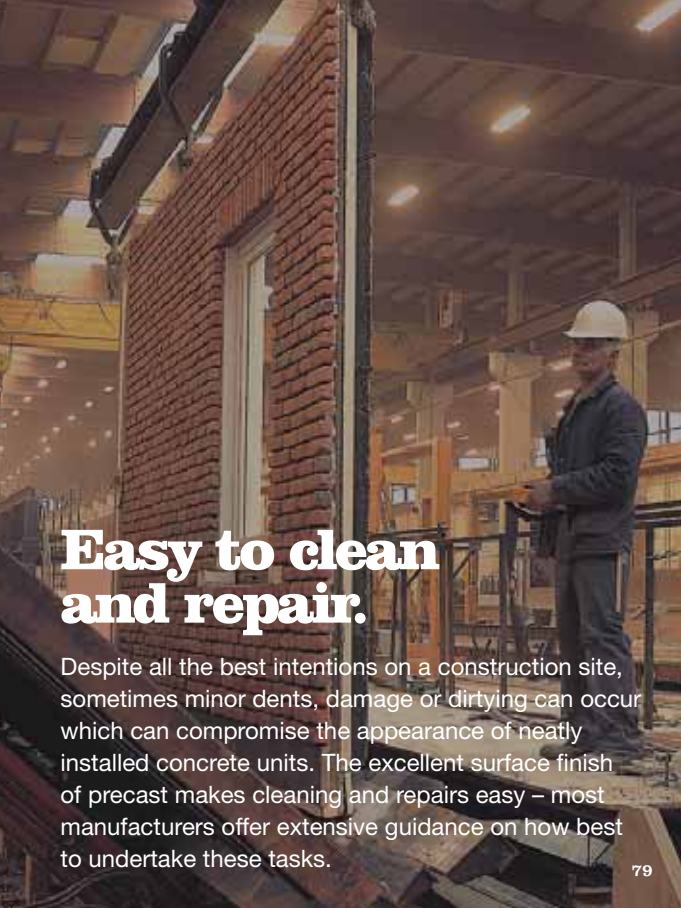
Innovations to make the use of precast concrete even safer include air-inflated crash bags, nets and mats. These are used in an area under construction until such time as the precast units are securely installed. In the event of an accident, these break the fall of a worker or even a whole precast unit.



Less prone to disruptions caused by inclement weather.

With almost all precast production activities taking place within the factory, it is only really fixing that needs to be done on the construction site. This means that precast is significantly less vulnerable to disruption caused by wet, cold or very hot weather; whatever happens, precast can continue.





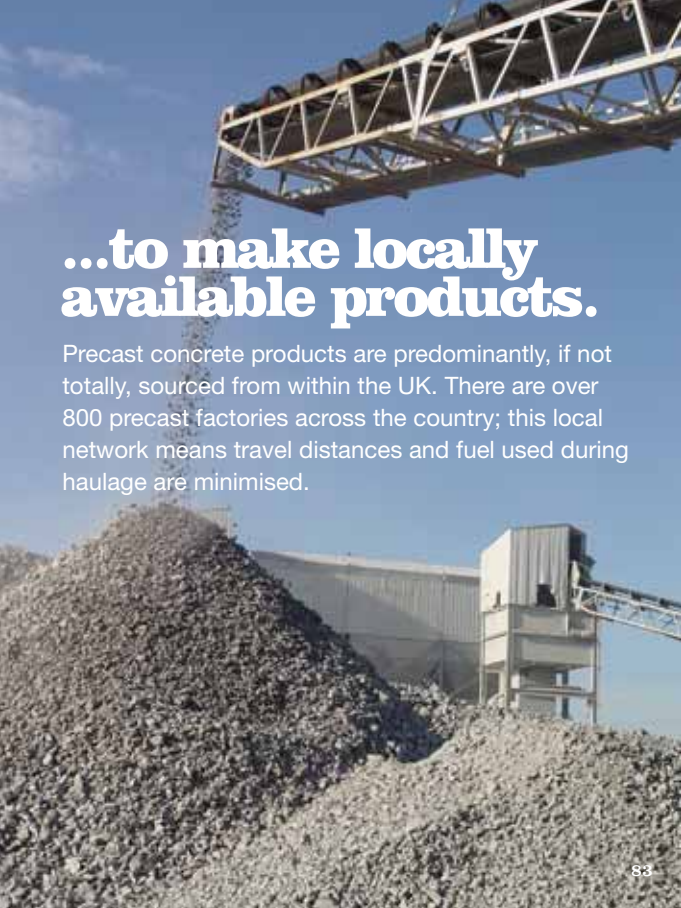
Easy to clean and repair.

Despite all the best intentions on a construction site, sometimes minor dents, damage or dirtying can occur which can compromise the appearance of neatly installed concrete units. The excellent surface finish of precast makes cleaning and repairs easy – most manufacturers offer extensive guidance on how best to undertake these tasks.

Protecting people and the environment

Uses plentiful, local, natural materials...

All the materials that go into precast concrete products come from natural and recycled sources. Aggregates from rocks or river gravels, and water are all widely available and in plentiful supply. With precast there's simply no need to import materials from thousands of miles away.



...to make locally available products.

Precast concrete products are predominantly, if not totally, sourced from within the UK. There are over 800 precast factories across the country; this local network means travel distances and fuel used during haulage are minimised.



Uses by-products from other industries.

Precast products can safely incorporate materials such as blast furnace slag (from the iron and steel industry) and fuel ash (from coal-fired power stations) that might otherwise go to waste. These materials can improve the performance of precast concrete and can be used as partial replacements for Portland cement.



reak

Not reliant on oil-based products.

A good quality finish relies on achieving a clean break between precast concrete and its casting mould or bed; vegetable-based release agents can be used as a substitute for oil-based chemicals, thereby reducing the overall environmental impact. In addition concrete is not as vulnerable to increases in oil and gas prices as plastics and asphalt.



Made in an efficient factory environment.

Today's precast factories are clean, efficient and many use computer-controlled processes for batching, mixing and casting. Working in a factory means excellent resource efficiency.

Minimum off-factory site waste exported.

Even small amounts of scrap or waste in the process can be recycled; cement, slurry and process water are recycled and off-cuts are often crushed and re-used.



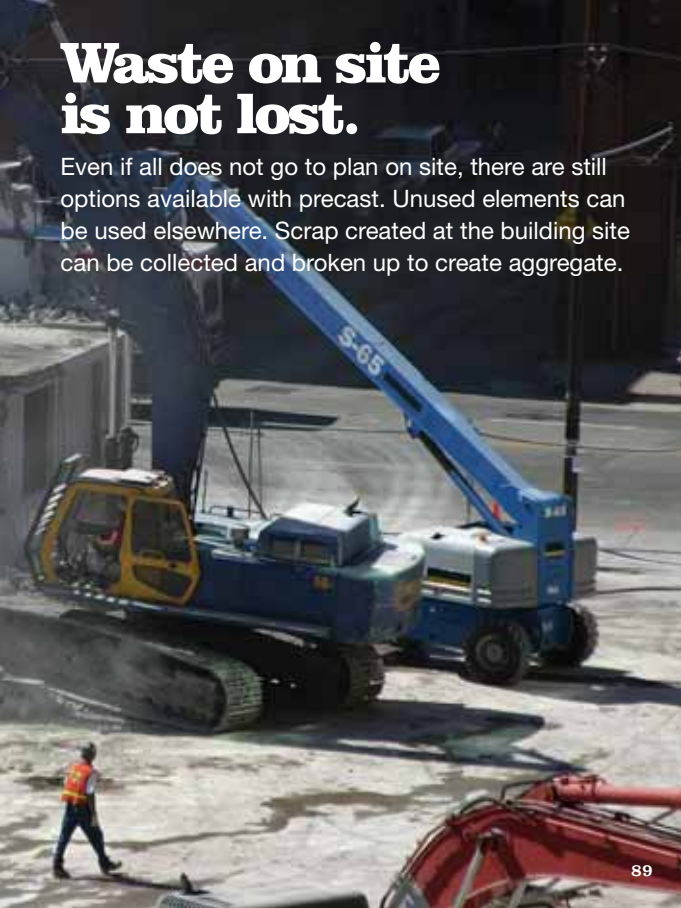


Avoids expensive environmental disposal costs.

Making better use of natural resources makes good business sense; the Landfill Tax penalises poor use of materials. Using ready-made precast products prevents the incurring of waste disposal costs.

Waste on site is not lost.

Even if all does not go to plan on site, there are still options available with precast. Unused elements can be used elsewhere. Scrap created at the building site can be collected and broken up to create aggregate.





Can be re-used...

At the end of a structure's life, precast units can be re-used in their entirety, for example reclaimed as whole elements such as floor slabs. These could be re-installed in the same building or even transported a short distance and used in a comparable structure elsewhere.

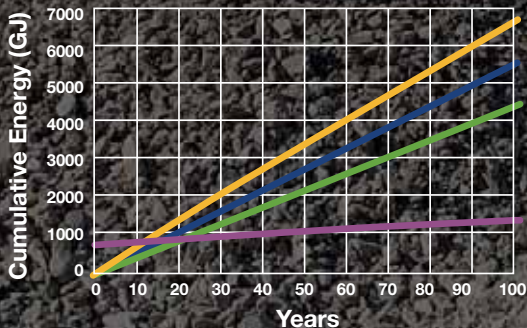
...or recycled.

As with many concrete products, precast is easy to crush and recycle as aggregate. Demand for 'previously enjoyed' materials like this is growing every year in the UK – and the government is encouraging its use through networks for suppliers and customers.



Low embodied energy...

Like all concrete, during its lifetime precast concrete will effectively re-absorb the equivalent amount of energy (carbon dioxide) that was used to create it in the first place! What's more, using precast doesn't require any re-mineralisation (the process of rejuvenating barren soils after they have been intensely forested).



High Operating Normal Operating Low Operating Embodied

...and reduced in-use energy consumption.

The thermal mass properties of concrete help even out daily and seasonal temperature swings, making indoor spaces more comfortable without having to resort to air conditioning. This saves both energy and money, not to mention maintenance bills.



Reduces the risk of flooding.

Permeable precast paving, pipes and soakaways are used in sustainable urban drainage systems (SUDS). These help prevent rapid run-off of rainwater from roads and pavements by allowing water to permeate more naturally. Precast concrete flood mats and barriers protect river banks and livelihoods.

Does not leach.

Precast concrete is an inert family of products, so it does not leach out any harmful chemicals in use. This means it is safe to use in applications like distribution of drinking water. It also means that when precast concrete is used to store or transport potentially harmful fluids, these will be contained securely.



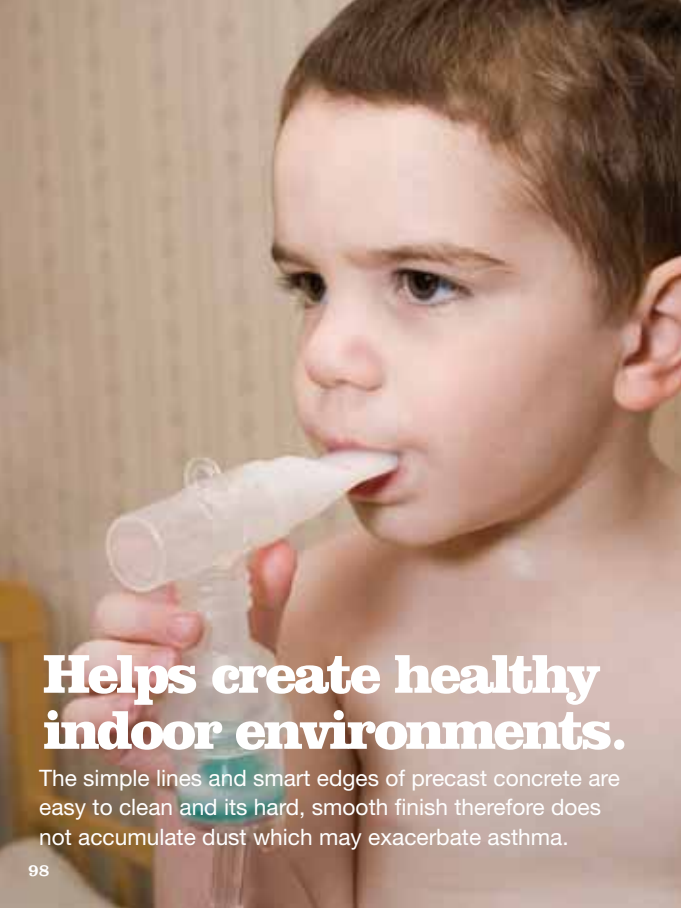
Reduces urban energy use.

The pale colours that can be achieved with precast concrete finishes help to reflect light, so at night the streets are brighter and safer. On a hot day, these same finishes reflect sunlight, so keeping buildings cooler and preventing the 'urban heat island' effect.



Can reduce traffic fumes.

Using an ingenious materials innovation, precast concrete coated with a special layer can absorb the harmful emissions from traffic fumes. A process called photocatalysis occurs which entraps Sox and Nox particles, which are then dispersed harmlessly when rain falls.

A close-up photograph of a young child with short brown hair, looking slightly to the left. The child is holding a clear plastic nebulizer mask in their mouth. The background is a plain, light-colored wall.

Helps create healthy indoor environments.

The simple lines and smart edges of precast concrete are easy to clean and its hard, smooth finish therefore does not accumulate dust which may exacerbate asthma.

Precast is emission free.

In its daily use, precast concrete is a totally inert substance, so it doesn't emit or give off any gases, toxic compounds or VOCs (volatile organic compounds). This means allergy sufferers can breathe easy because precast does not contribute to the symptoms of 'sick building syndrome'.

**The best
value
solution**

A photograph of a modern building with a curved facade and a glass-enclosed spiral staircase. The building has a dark, curved roof and large windows. The spiral staircase is made of glass and metal, winding around a central core. The building is situated near a body of water, and the sky is overcast.

Appeals to investors.

The longevity of precast structures and their resistance to both everyday and extreme events means that institutional investors and other funding bodies tend to look favourably upon the precast option. This is particularly well-matched in city locations where the solidity and sympathetic appearance of precast structures reflects the commercial businesses inside.

Easy to let.

The issues mentioned above attract occupiers as well as investors, so the attractive appearance and robustness of precast concrete produce a reliable return. The architecture and performance qualities of precast mean that units can be leased easily.



Lower insurance costs.

With amazing structural properties and functional benefits, precast concrete buildings tend to attract lower insurance premiums than those built from other construction materials. This can become particularly apparent in high risk areas such as those at risk from floods, fire and burglary.





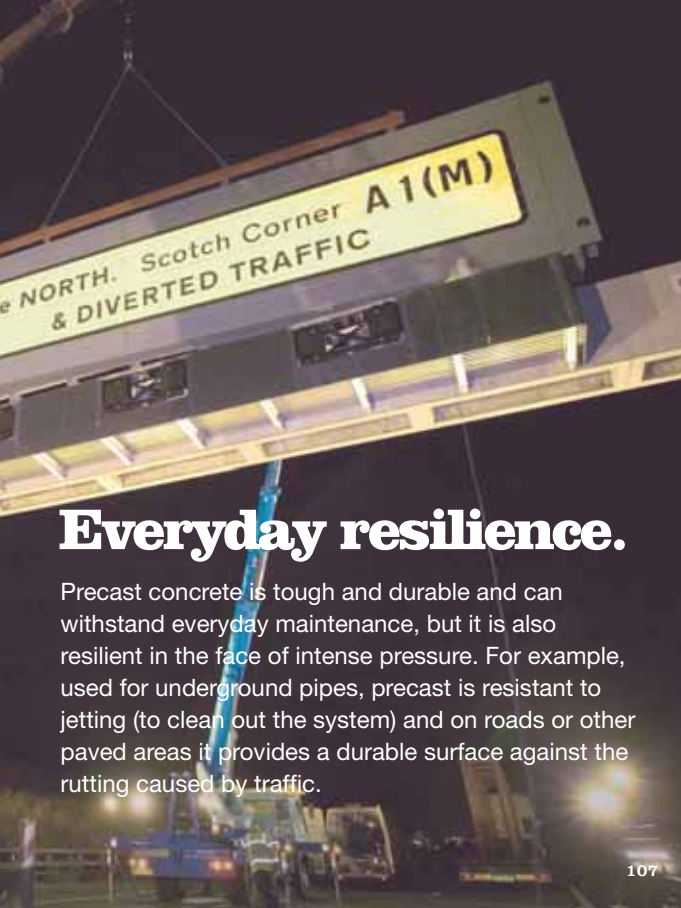
Easy to extend.

The fact that precast elements can be dismantled (or deconstructed) means that it is easy to add extensions or new wings to precast structures. Simply remove end panels and continue building – the end panels can be re-installed on completion.

Lower maintenance costs.

In exposed locations, some structures will need regular painting to protect against corrosion and enhance their aesthetic appearance. This is not the case with precast concrete, which does not require such treatment. This advantage is particularly relevant for roads, bridges and motorway gantries that cannot be accessed easily.





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& DIVERTED TRAFFIC

Everyday resilience.

Precast concrete is tough and durable and can withstand everyday maintenance, but it is also resilient in the face of intense pressure. For example, used for underground pipes, precast is resistant to jetting (to clean out the system) and on roads or other paved areas it provides a durable surface against the rutting caused by traffic.



Lower refurbishment costs after a fire...

Concrete typically needs very little remedial treatment following exposure to the high temperatures of a fire. In many cases, some minor patching and a coat of paint may be all that is required to make good.

...or a flood.

The high quality of precast and the fact that it does not erode or rot make the task of clearing up after a flood very straightforward. This can be a difficult time for people struggling to come to terms with the devastation that floods can bring, so precast brings a welcome respite.





Impressive whole life value.

There's no doubt that all of the previous 96 advantages add up to a significant package – and it is exactly this idea that convinces people to use precast. The argument is compelling, precast offers value through attractive finishes, robust structures and major performance advantages such as fire-proofing and thermal mass throughout its life.

Peace of mind.

The technology behind precast production, design and construction stretches back hundreds of years, so customers can be assured of peace of mind when specifying precast products. Precast is a proven technology.



Product developments...

Manufacturers of precast concrete products invest heavily in research and development to make their products and services even better. New products, new information technology and new factories demonstrate this forward-thinking attitude.

...and innovation.

This brochure shows that innovation is an everyday part of the precast world, but we think there's still more to come. We're keen to hear of new benefits of using precast – please send in your suggestions for the next 100 reasons to info@britishprecast.org



Requirements for sustainable products are increasingly being adopted by construction industry clients. To achieve CARES sustainability certification, the reinforcing steel product as well as the quality and environmental management system must be positively assessed by CARES. This includes assessment to the relevant product standard and to environmental issues such as greenhouse gas emissions and raw material use, as well as the social and economic issues.

CARES Product Certification

- Quality Management System to ISO 9001
- Verified compliance with Product Standards
- Full product traceability
- Monitoring of scheme performance
- Avoidance of unnecessary site delays
- No need for product test data certificates

CARES Sustainable Reinforcing Steel

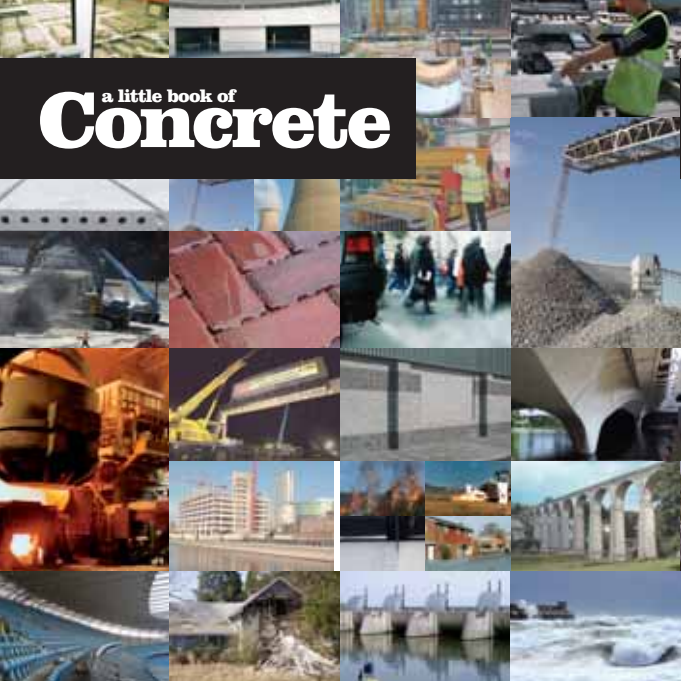
- Environmental Management System to ISO14001
- Compliance with regulatory requirements
- Energy efficiency and waste management systems
- Independently validated product carbon footprint data
- Product traceability (chain of custody) to production source and manufacturing process
- Social and economic issues required by BS 8902

For further information about CARES and an up-to-date list of firms holding CARES certification please consult the CARES website: www.ukcares.com

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