



a little book of
Concrete

a little book of
Concrete



www.nationalprecast.com.au

Why precast concrete?

A guide to one
hundred advantages

National Precast is grateful to British Precast for the Australian rights to produce this book.

© National Precast Concrete Association Australia

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

Precast concrete: the sustainable choice

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

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

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

Precast concrete covers all factory-made concrete products both mass produced and custom - including walling, flooring, structural elements and civil products.

This amazing portfolio

of products serves the needs of society every day, and supports economic growth. Together they provide:

- Shelter and protection against the forces of nature
- Drinking water, drainage and sanitation systems
- Communication and transport infrastructures
- Energy supply systems
- Commercial, educational and healthcare facilities.

As well as these functions, precast concrete products also have very positive inbuilt sustainability advantages with environmental profiles. In use they help to combat some of the direct effects of climate changes such as hotter summers, high winds, flash flooding and urban heat islands.

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

If you wish to know more contact us at:
admin@npcaa.com.au



Any product...

From walling to flooring, from stairs to beams, from columns to bridges and even to one-off sculptures... the list is endless.



4

...in any application

Evidence of precast is all around us... in our hospitals, our shops, our offices, our housing, our stadiums, our libraries, our museums, our prisons, our warehouses and our zoos. And it's everywhere on our roads, our rail and our waterways.

5

Contents

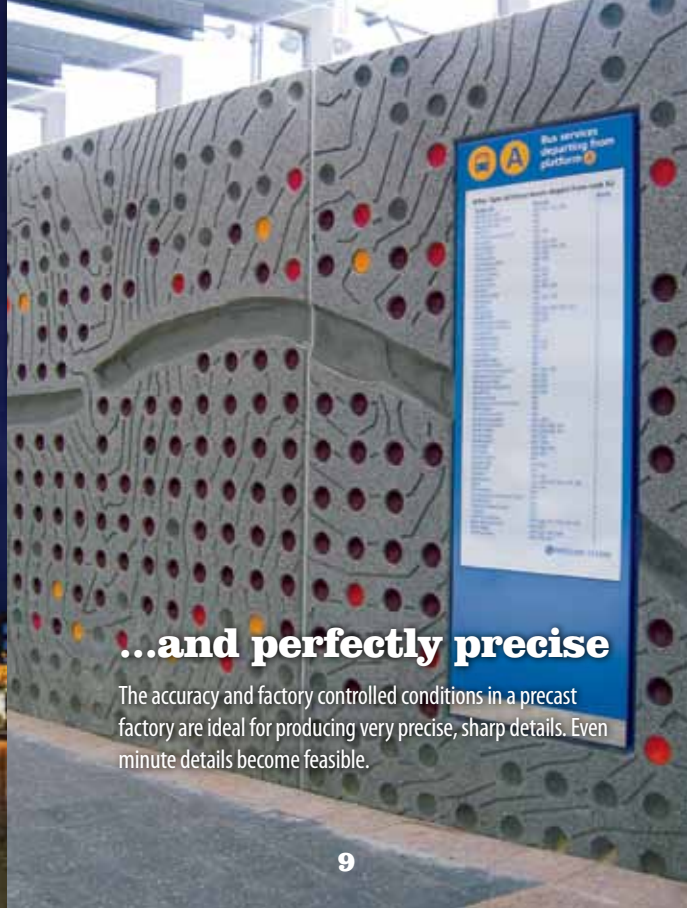
| | |
|------------------------------------|-----|
| Inspiring and amazing architecture | 7 |
| Mitigating construction risk | 24 |
| Minimising investment risk | 41 |
| Structures for today and tomorrow | 60 |
| Fit for people | 71 |
| Nurturing the environment | 84 |
| Precast is proven | 111 |

Inspiring and amazing architecture

Precast is prestigious...

Every year, both in Australia and internationally, peak bodies of architecture recognise the timeless form and function of precast buildings in their awards.

8



...and perfectly precise

The accuracy and factory controlled conditions in a precast factory are ideal for producing very precise, sharp details. Even minute details become feasible.

9

Customisation is simple

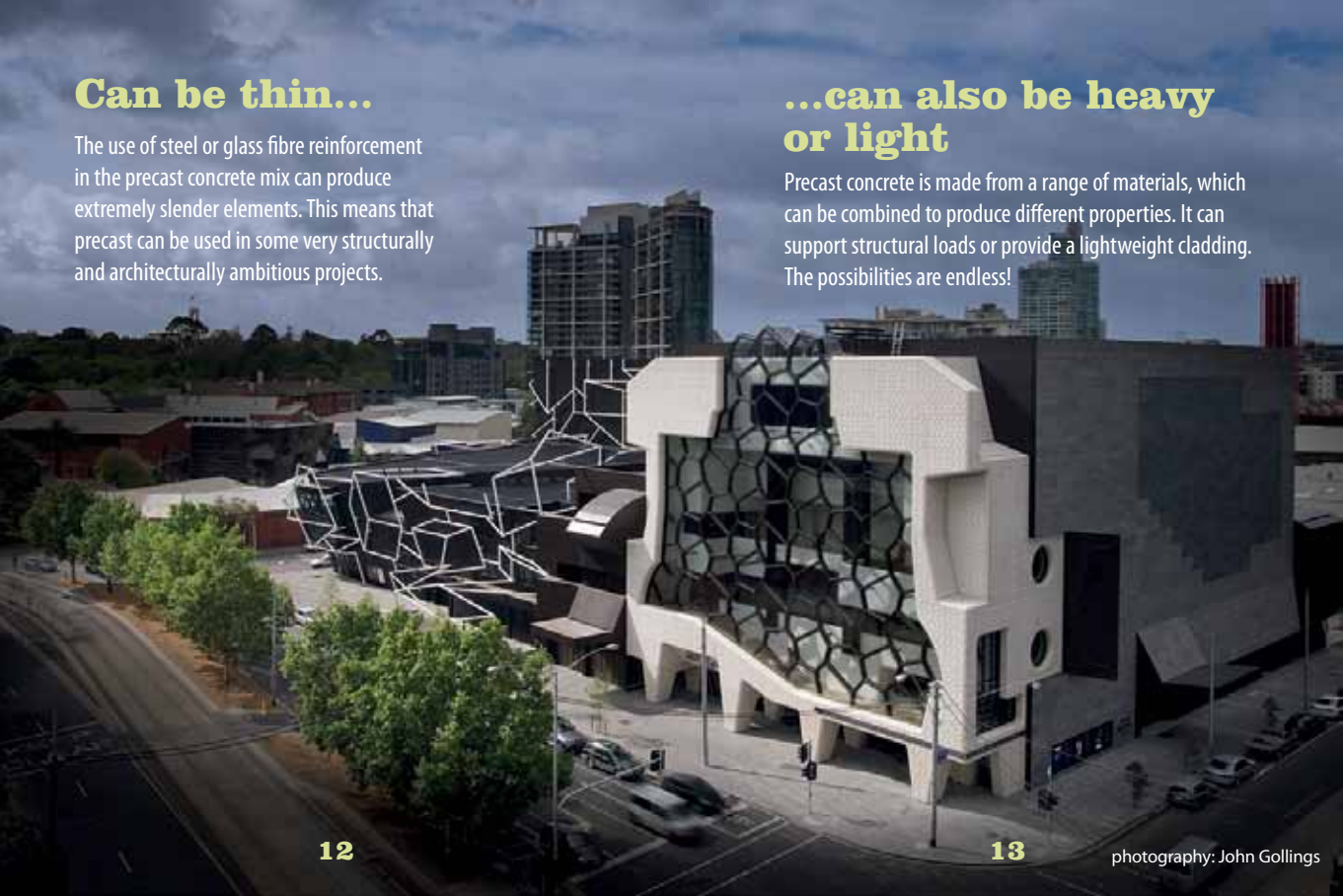
Moulds can be designed to be customised – this means that parts of a mould can be added or removed to produce slightly different sized or shaped units. This is an economical way of customising precast panels and results in well-matched and compatible units.

Can be thin...

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

...can also be heavy or light

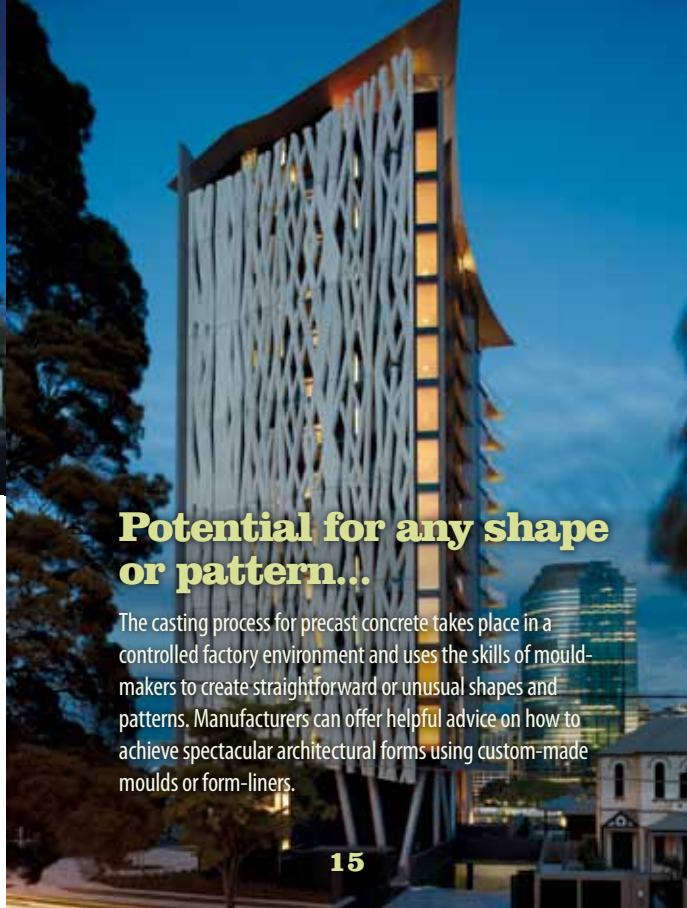
Precast concrete is made from a range of materials, which can be combined to produce different properties. It can support structural loads or provide a lightweight cladding. The possibilities are endless!





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.



Potential for any shape or pattern...

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 and patterns. Manufacturers can offer helpful advice on how to achieve spectacular architectural forms using custom-made moulds or form-liners.

...and keeps its form

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.



16

Can be straight or curved

Being able to produce a variety of different profiles is an area in which precast concrete excels because of the flexibility and accuracy in the production process.



17

Blends in with existing structures...

In areas of historic or architectural significance, 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 prototypes can ensure that the match is satisfactory for all those involved. Aesthetics and long life are important but often overlooked aspects of sustainable design.



A close-up photograph of a brick wall. A large, rectangular, light-colored precast concrete panel is mounted on the wall, partially overlapping the bricks. The panel has a smooth, slightly textured surface. The bricks are a reddish-brown color with visible mortar lines.

...or can replicate patterns, shapes or other materials

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 or even bricks.

A tall, white, wavy skyscraper with a unique, undulating facade. The building is set against a bright blue sky with scattered white clouds. In the foreground, there are palm trees and a street with some buildings and cars. The overall scene is a modern urban environment.

Available in a wide range of colours including black and white

There is a multitude of different aggregates and colour pigments that can be incorporated into precast concrete elements. Precast can also be stained or painted to give designers considerable freedom to produce subtle or contrasting colours.



Can be smooth or textured...

Precast elements are smooth and have an inherently high quality finish due to the specialised moulds which are used in the factory.

The array of textures such as etched, exposed aggregate, grit (sand) blasted or honed can create spectacular façades.

... or polished to perfection

In the same way that natural stone is prepared, precast concrete can be polished to a shiny, reflective finish. With an infinite combination of colour pigments and attractive aggregates in the concrete mix, the designer can create buildings that create vision without compromise.



Mitigating construction risk

24



Safe design, manufacture and build

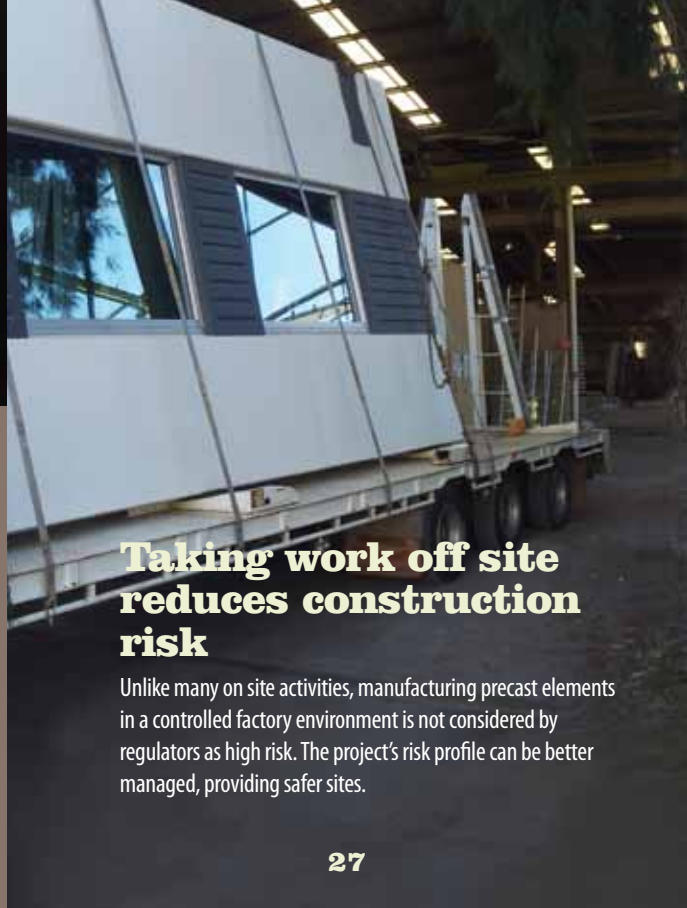
Precast structures offer the designer a safer way to construct buildings, making it easy to comply with health and safety regulations. In some cases, this benefit could be a life-saver.

25



Covered by Australian Standards

The precast industry is involved with the development and review of both Australian 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 Quality Management Systems, ISO 14001 Environmental Management Systems and AS 4801 OH&S Management Systems.



Taking work off site reduces construction risk

Unlike many on site activities, manufacturing precast elements in a controlled factory environment is not considered by regulators as high risk. The project's risk profile can be better managed, providing safer sites.

Made in an efficient factory environment...

Precast is produced in factories under strictly controlled conditions which means excellent resource efficiency for materials, labour, energy and processes. Today's precast factories are clean and productive, and many use computer controlled processes for moulding, concrete batching, casting and finishing.

Major efficiency programmes are also helping reduce factories' energy consumption.

...which is getting better all the time

Innovations like the use of self-compacting concrete (SCC) in precast factories mean that vibration is no longer needed to ensure compaction. This makes the factory much quieter, safer and significantly reduces its electricity consumption.

Great quality, over and over again

Having decided to specify precast, it's important to have confidence in the solution and this is where factory-controlled procedures are critical. Repetition of individual elements can be achieved with confidence whether 1, 10 or 100 are required. Re-using a mould makes both environmental and economic sense – every additional cast saves materials, energy and time, and prevents moulds going to recycling or to disposal prematurely.



with long lasting moulds

Moulds for precast concrete can be stored to allow later replication, whether additional elements are required one day, one week or one year later.

Less weather disruptions

With all precast production activities taking place within the factory, it is only erection 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.



32



A reliable supply...

The combination of large weatherproof factories, dedicated workforces with regular shift patterns and good quality control... enables the production and delivery of quality product, day after day for any size project.

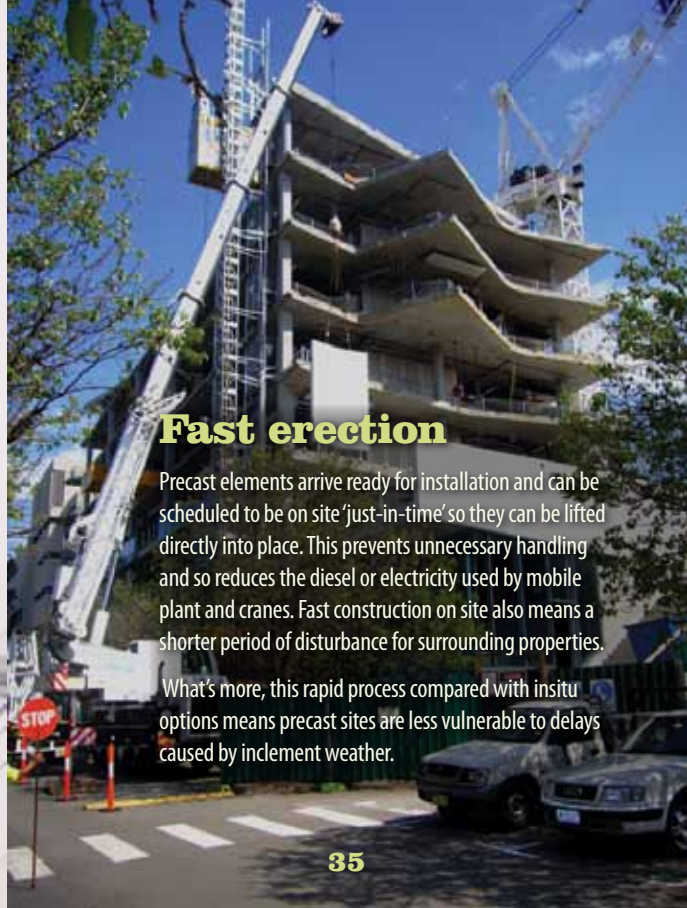
33

...means you can plan ahead

By building totally with precast elements, the specifier can improve efficiency, design out waste and work ahead of time.



34



Fast erection

Precast elements arrive ready for installation and can be scheduled to be on site 'just-in-time' so they can be lifted directly into place. This prevents unnecessary handling and so reduces the diesel or electricity used by mobile plant and cranes. Fast construction on site also means a shorter period of disturbance for surrounding properties.

What's more, this rapid process compared with insitu options means precast sites are less vulnerable to delays caused by inclement weather.

35



... and below

Precast construction requires minimal propping and bracing and reduces the need for scaffolding, to provide an immediate clear work area for following trades.

Provides an instant work platform above...

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 trades can go about their work safely – allowing safe access and egress, even in an emergency.

36



37

Fast construction saves site costs

By maximising the use of precast elements in a structure, time savings of 35% can be easily realised.

Shorter durations for site facilities, supervision of trades and equipment hire all equate to cost savings.



Improved safety on site...

As well as having established codes of practice for safe delivery and erection, delivery of exact precast elements to site reduces site clutter and improves safety.



...and lower site noise levels

No vibration, no sawing and no other noise-generating processes are needed to install most precast concrete products, whatever their size. This results in substantially quieter construction sites which has benefits for workers and neighbours alike.

Minimising investment risk



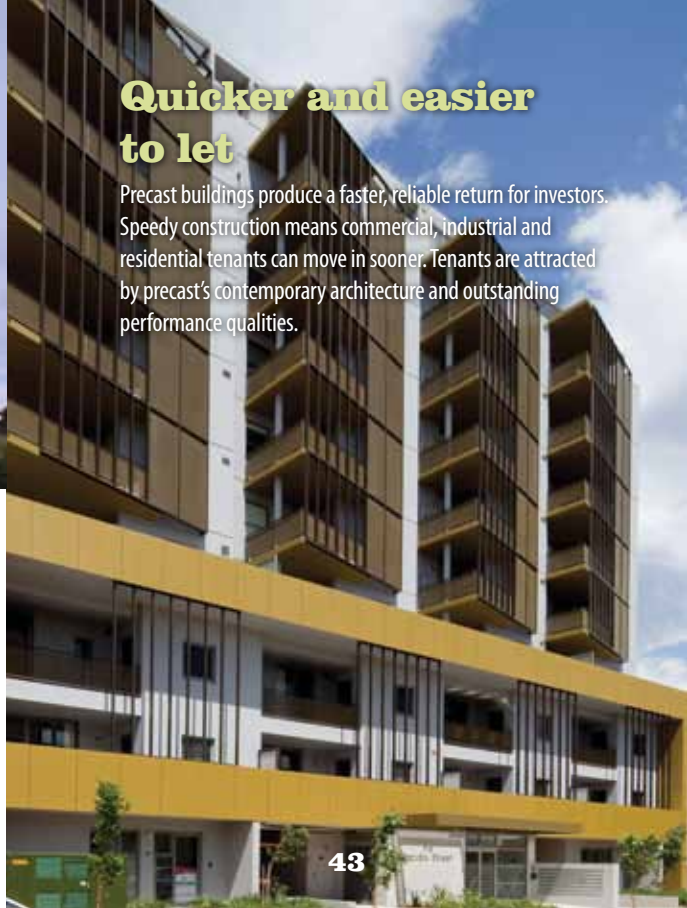
Appeals to investors

The longevity of precast structures and their resistance to both everyday and extreme events mean 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 reflect the commercial businesses inside.

Quicker and easier to let

Precast buildings produce a faster, reliable return for investors. Speedy construction means commercial, industrial and residential tenants can move in sooner. Tenants are attracted by precast's contemporary architecture and outstanding performance qualities.





Photography: Nic Bailey

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.

This might sound like a minor consideration, but the inherent benefit of concrete structures is that they are resilient and long-lasting from top to toe, offering an absolute maximum service life.

Lower insurance costs

With amazing structural properties and functional benefits, precast concrete buildings can 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.



Keeps buildings secure

Preventing the fear of crime and disorder is a major issue within social sustainability, but security also has a massive impact on people's livelihoods.

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



46



Does not rust

Precast concrete is corrosion-resistant and can therefore be used with confidence, even 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 factory production mean that cover levels for reinforcement are guaranteed in any application, providing an aesthetically pleasing surface which is free from rust.

47

Rot proof, fungus proof and mildew resistant

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

Damage is often done within or behind lightweight walls and on discovery, it is often too late to resolve easily; such repairs cost millions of dollars every year in Australia.

48

Inedible to termites and rodents

Organic building materials make the best food for these pests that threaten our buildings.

Precast concrete is resistant to attack from termites and other infestations such as rats and mice, so buildings made with concrete will be less susceptible to such damage.

49



Protects against fire

Precast is fireproof. It does not catch fire or burn. It protects against the spread of fire between rooms or properties – fewer fire-related deaths are recorded proportionately in concrete buildings.

International studies have indicated that a major fire is more than 10 times less likely to develop in buildings which are built from concrete. Furthermore, there is a clear link between construction materials and fire safety.



Lower refurbishment costs after a fire...

Precast 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 cleaning 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.



52

Weather-proof

Precast concrete stands up well to rain, storms, windblown debris and cyclones.

It can also withstand significant temperature variation, unlike other materials that can deteriorate quickly with such regular exposure to climatic changes. In damp, exposed or harsh environments, other materials struggle to match the performance of concrete.



53

photography: John Gollings

Resistant to the effects of a changing climate

Predictions of higher winds, more driving rain, tropical-style deluges and flash floods, and more incidences of localised severe weather events are of concern for homeowners and businesses.

Precast concrete offers better protection because it is robust, durable and has structural integrity.



54

Keeps water in...

Precast is an excellent material for containment, whether this is for mains water storage, domestic rainwater, stormwater or grey water collection.

The strength and resilience of precast concrete has been proven for these and other applications such as wastewater treatment works and desalination plants. Concrete pipeline systems play a key role in taking sewerage flows for treatment. Rigid pipes mean no leakage and centuries of performance.



55



...and out

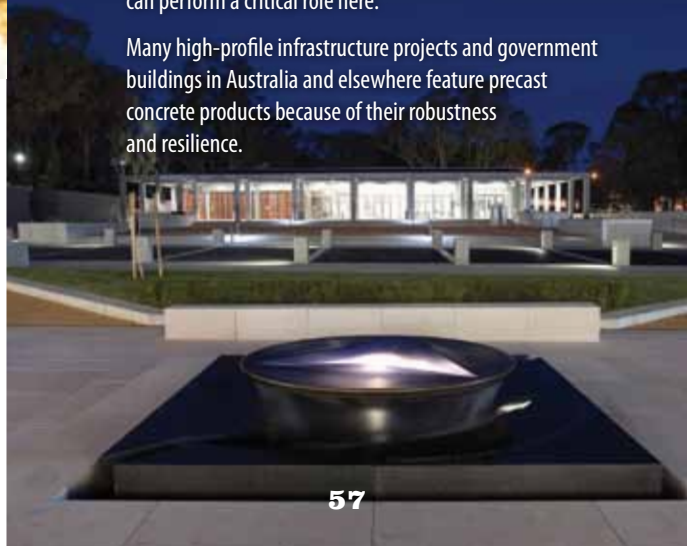
In other situations where we need to keep water out, precast can be used for flood protection, and river and coastal barriers to protect against inundation from high tides and storms.

Precast concrete flood mats and barriers can protect river banks and livelihoods – and with the effects of a changing climate, such flooding could become more frequent and widespread. The use of similar precast elements can also be used to create breakwaters and artificial reefs out to sea.

Absorbs impacts and offers protection

Precast concrete can resist massive impacts. There is a growing need for built structures to be more resilient to threats from flood and fire. 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.

Many high-profile infrastructure projects and government buildings in Australia and elsewhere feature precast concrete products because of their robustness and resilience.

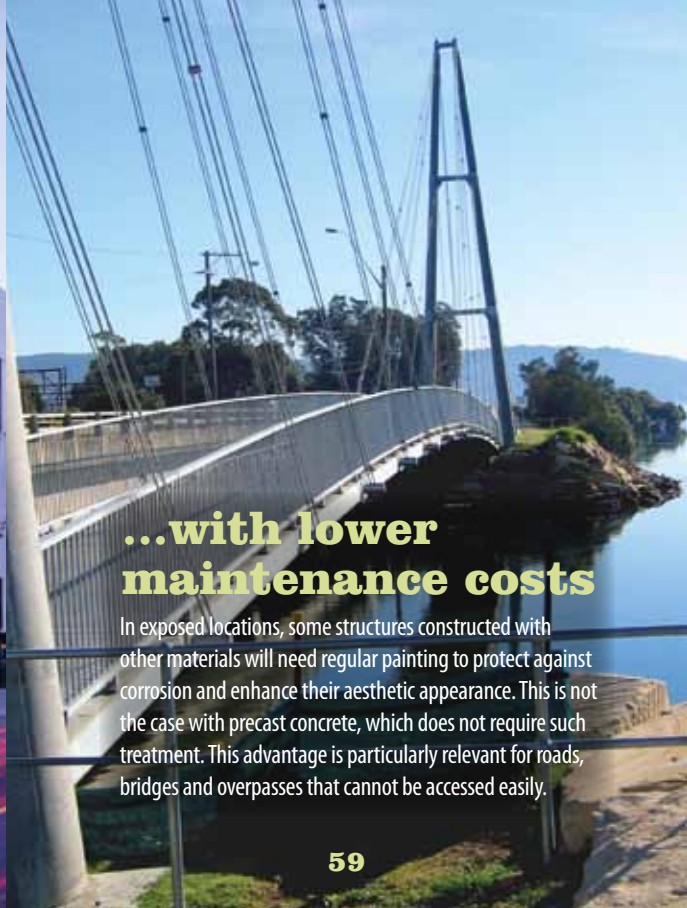




Easy to clean and repair...

Despite all the best intentions on a construction site, sometimes minor dents, damage or site grime can compromise the appearance of neatly installed concrete elements.

The excellent surface finish of precast makes cleaning and repairs easy – most manufacturers offer extensive guidance on how best to undertake these tasks.



...with lower maintenance costs

In exposed locations, some structures constructed with other materials 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 overpasses that cannot be accessed easily.

Structures for today and tomorrow

60

Guaranteed durability and built to precise specifications

Precast's lower water:cement ratio, combined with consistently correct cover to reinforcement and use of admixtures ensure high strength, high quality and durable products. This guarantees precise, reliable workmanship ensuring that the quality of service from precast is maintained long after the products leave the factory.



61


Durable...

Concrete buildings and structures from hundreds of years ago are still in use today. Some say concrete can last up to 2000 years. At least two recent European precast projects were built to a 1000-year minimum design life. Effective design detailing helps to lengthen the life of a concrete building; precast manufacturers can offer guidance on designing for durability.

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

Quality in design and production means precast units are extremely structurally efficient.

Tall buildings can be built with precast because of its structural efficiency, which 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.

64



Long clear spans

Precast's inherent strength provides the ability to create long clear spans without any additional structural support. This provides the designer maximum flexibility to create spacious interiors and column free offices and car-parks.

65



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. Civil structures, industrial applications, utilities and power generation all provide good examples.

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 accelerated curing and concrete additives.

Essential for sustainable infrastructure

Improved infrastructure projects are being built throughout Australia, and precast concrete is at the heart of many schemes.

68

Reduced infrastructure maintenance

Modern roads, railways, desalination plants and water storage facilities commonly include precast elements because they are long-lasting, durable, robust and can also have a very attractive surface finish.

69





Everyday resilience

On a domestic scale, precast and masonry are also used for basements where below ground living needs robust and waterproof construction.

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).

Fit for people

Built for generations

Precast structures last for generations. Buildings can simply be refitted rather than demolished or even dismantled and reconstructed.

Precast structures can be designed for future generations by specifying them to withstand greater loads than are needed today.



Comfortable now

When combined with double glazing, 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. With operational energy accounting for about 90% of the energy consumption over a 100 year life of a building, this ability to moderate extremes in temperature is important.

Thermally efficient, tailored to requirements...

The high density of precast concrete can act as a thermal sink to provide year-round comfort and reductions in energy use.

When insulation is combined into a precast concrete sandwich panel, the best of both worlds is achieved. The combination of high thermal mass and insulation results in significant energy-saving benefits in all climates.

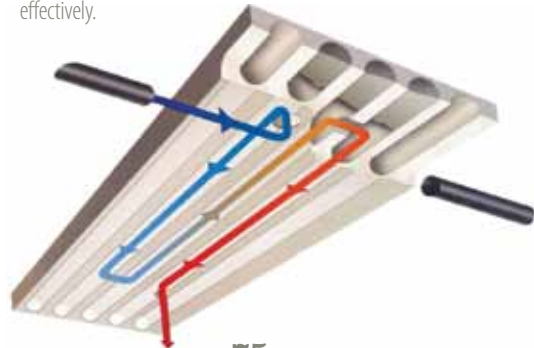
74

...and thermally versatile

Precast concrete can easily be used to create heating and cooling systems that use up to 50% less energy.

Ducting pipe systems can be cast into panels and slabs, or alternatively, the hollow cores in precast floors can be excellent conduits for circulating hot or cold air.

The concrete protects the heating or cooling system within and slowly absorbs the heat or cool, then releases it into the building's interior, further improving the effectiveness of the system. And the embedded ducting means that room spaces can be used more effectively.



75

Quiet...

As a dense material, precast elements in a building make for a peaceful lifestyle. It is the mass of concrete which helps to deaden noise, whether this arises from traffic, machinery, music or noisy neighbours.

Privacy and effective sound reduction are thus ensured, and with better acoustic separation between buildings, precast walls and floors are the ideal choice.

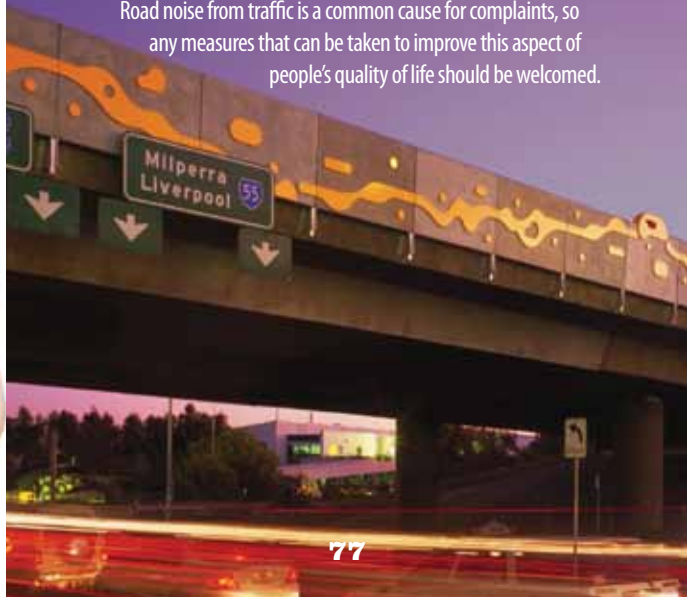


76

...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.

Road noise from traffic is a common cause for complaints, so any measures that can be taken to improve this aspect of people's quality of life should be welcomed.



77

...and better for neighbours during construction

The easy installation of precast products makes for much less noise from the construction site and this is of great benefit to those inhabiting or working in adjoining properties. Life is quieter and therefore much more tolerable during the construction period.

In addition, a precast site will emit virtually no dust – lessening the likelihood of problems with dirt and poor air quality, the most common causes for complaint from neighbours during construction.



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.



Hidden services ... ready to roll

Precast concrete can carry pre-installed services and fixtures, whether these are communications, electrical, plumbing or even windows! Services can be cast within a precast element and 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 a technology friendly material for homes and places of work.

Helps create healthy indoor environments

The simple lines and smart edges of precast concrete are easy to keep clean. Precast for buildings reduces diurnal temperature ranges meaning less need for artificial heating/cooling and less internal condensation; this provides a less friendly environment for dust mites that may trigger asthma and other respiratory conditions. Precast is also a very poor host for mould and mildew.



82



Making better places

It is vital that we invest in buildings and infrastructure which are long-lasting and robust – but we must also consider the overall quality of the built environment so that it is a healthy world for people to enjoy.

Constantly changing world climatic conditions mean that the future pressure on structures could be much greater than today.

Precast concrete allows us to build sustainably and with confidence in the face of such adversity.

83

Nurturing the environment

84

Incorporates local, abundant natural resources...

Precast concrete products consist predominantly of natural aggregates – sand, coarse and fine stones from rock quarries or river gravels. Australia has a fantastic range of aggregates to offer. Local sourcing supports regional economies and employment within Australia.

85

...with no need to import...

With imported precast products there are ethical, health and safety, quality and environmental factors to consider.

Because all of Australia's needs for precast products can be met locally, there's simply no need to import products from overseas. Supply of precast products tends to be well-coordinated and is easily transported within and between Australian states.

And buying locally supports the Australian manufacturing industry.

...which reduces the environmental impact of shipping transportation

It is estimated that shipping can significantly increase the carbon footprint of construction materials, so the associated environmental impact from shipping's fuel consumption and pollution is clearly cause for concern.

Recent UN reports show that shipping CO₂ and other pollution has been seriously underestimated by around 300% – all environmental profiles of imported materials will therefore need updating.

Using natural resources effectively

We have a responsibility to use our natural resources wisely by specifying building products carefully and ensuring that these have a high recycled content. The materials that are used to make precast concrete are available locally and are plentiful in Australia, but cannot be taken for granted.

Steps are being taken by the industry to encourage resource efficiency and to design out waste throughout the manufacturing and construction process. Specifiers can be confident that precast concrete products are sourced responsibly.

End-of-life destinies such as recycling for concrete aggregates or deconstruction for re-use in buildings or structures are increasingly being considered.



Using raw materials that undergo minimal processing

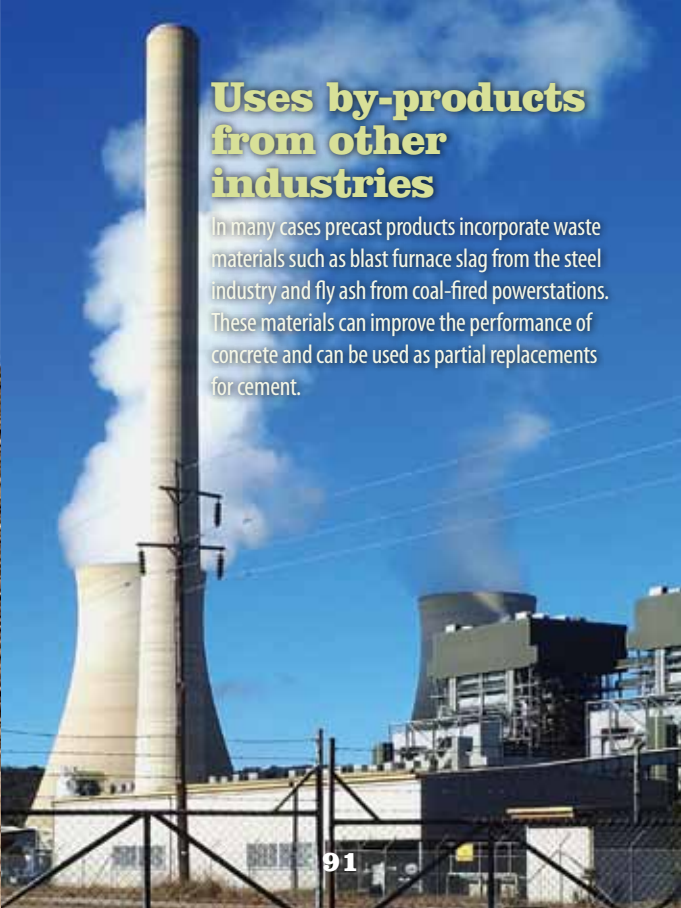
All the materials that go into precast concrete products come from natural and recycled sources, mainly inorganic.

This means they are subject to minimal processing and no chemical treatments to render them suitable for use, which results in concrete having a relatively low embodied energy value, unlike highly processed materials, such as plastics.



Uses by-products from other industries

In many cases precast products incorporate waste materials such as blast furnace slag from the steel industry and fly ash from coal-fired powerstations. These materials can improve the performance of concrete and can be used as partial replacements for cement.



Lower cementitious content using cement from a responsible industry...

The cement that goes into precast concrete is vital to both its durability and appearance.

The precast industry works hard to reduce cement use by the use of special mix designs including admixtures and to reduce water use by optimising water:cement ratios. The use of other cementitious materials such as ground granulated blastfurnace slag and pulverised fuel ash is also growing. Both these additions have much lower embodied CO₂ than cement.

In recent years, energy efficiency in Australian cement plants has improved under their Climate Change Agreements. Additionally, between 1998 and 2006 fossil fuel use per tonne of cement has reduced by 23%. This means that typical concrete now contains about 10% less embodied energy than it did just 10 years ago, purely on the basis of these improvements in cement manufacture.

Actual specific energy consumption (kWh/t)

92

...which is reducing its carbon emissions

Making cement in a kiln requires a great deal of heat energy, but the amount of non-renewable fossil fuels used to produce this heat is being reduced.

The great majority of precast concrete mixes are made up of low carbon footprint sand, gravel or crushed rock meaning that the carbon content of cement is diluted many times over.



93



Less cement reduces embodied energy...

Precast concrete flooring systems use less concrete than insitu concrete floors, due to the incorporation of void formers or hollow cores.

Less concrete means less cement, and less cement means savings in embodied energy. Precast flooring also delivers savings in operational energy for heating and cooling.



...and maximises Green Star credits

By substituting some of the cement with slag and/or flyash and using recycled aggregates and recycled water, CO₂ emissions will be reduced and maximum Green Star concrete credits can be achieved.



Uses recycled steel to make recyclable steel reinforcement

All reinforcing steel is made from a high percentage of steel scrap. The reinforcing steel that is used in precast is mainly processed in Australian based mills. And at the end of a precast element's life the reinforcement can be recycled.



Manufacturing benefits for the environment

Being manufactured in a factory environment, precast allows the use of special mix designs which:

- can reduce cement content (reduces carbon emissions)
- improve flowability of concrete mixes (means less need for vibration and saves electricity)
- improve early strength (increases productivity), and
- reduce water:cement ratios (saves water and improves durability).

Manufacture is not reliant on oil based products

Precast concrete is not as vulnerable as plastics and asphalt to increases in oil and gas prices and is well-positioned for the post-oil age.

A good quality precast 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.



The majority of factory waste is recycled...

The highly effective recycling systems used in precast factories enable virtually all process water, slurry, aggregates or cement to be safely re-captured and put back into production. This minimises any outgoing waste materials, thereby eliminating unnecessary disposal costs and energy use from transport miles.



...and site waste is minimal

Every year, millions of tonnes of carbon emanate from waste on construction sites where traditional insitu concrete is used. Insitu concreting involves separate deliveries of concrete, steel and formwork which adds to the energy cost of the transport miles for a project. As well, carbon is produced from disposal of surplus wet concrete, formwork and steel waste.

Using precast is a highly effective strategy to reduce waste and energy. Executing all of the necessary finishing tasks in the factory allows any waste to be controlled, recycled and reused.

Using ready-made precast elements means no waste on site and prevents waste disposal costs being incurred.



Precast is emission free...

In its daily use, precast concrete is an inert substance, so it doesn't emit or give off any gases, toxic compounds or volatile organic compounds. This all means allergy sufferers can breathe easy because precast does not contribute to the symptoms of 'sick building syndrome' — SBS costs Australian businesses every year in lost productivity.



...and reabsorbs CO₂

During its lifetime precast concrete elements will re-absorb the carbon dioxide that was used to create them in the first place, a process called carbonation. This process accelerates when products are crushed for recycling at end of life.



102



Does not melt

Just like many 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. Concrete will not drip molten particles in a fire, and this helps protect human life by providing safe escape routes and preventing fire spread.

103



Does not leach.

Precast concrete is an inert family of products, so it does not leach out any harmful chemicals. This means it is safe to use in applications like distribution of drinking water through pipe networks. Further, segmental precast tunnels are extensively used in desalination plants. When precast concrete is used to store or transport potentially harmful fluids, these will be contained securely although specialist advice is always recommended.

Precast concrete pipes have been subjected to extensive testing in this respect, and are successful because they are very robust and long-lasting. European studies have confirmed the importance of concrete pipeline systems in ensuring safe supply networks for sewage effluent.

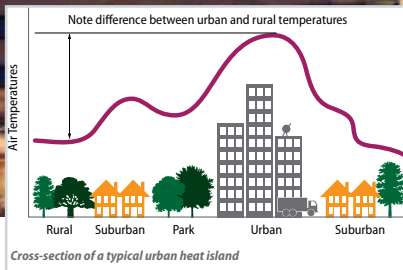
104

Energy efficient...

Recent research on energy efficiency shows that using sandwich panels maximises thermal mass benefit. Savings between 14 – 28% in energy demand for heating and cooling (compared to other building methods) can be achieved. This means on-going cost savings over the life of the building.



105



...and saves energy in our cities

On a hot day, pale coloured concrete finishes reflect more sunlight and heat than dark surfaces, so keeping buildings cooler and mitigating the 'urban heat island' effect. This reduces urban energy use because people are less likely to use air conditioning, potentially saving many tonnes of carbon and millions of dollars every year.

...which minimises long term operational energy

The energy associated with construction typically accounts for just 10% of a building's energy use over its lifetime or carbon footprint, so emphasis is more often placed on operational energy consumed. Over 60 years, a concrete home emits up to 15 tonnes less CO₂ than a lightweight alternative, so providing a better long term solution.

Research by Currie and Brown on commercial buildings shows that, over a 30-year period, concrete structures are more cost-efficient than steel and glass because they require less energy to heat and cool.



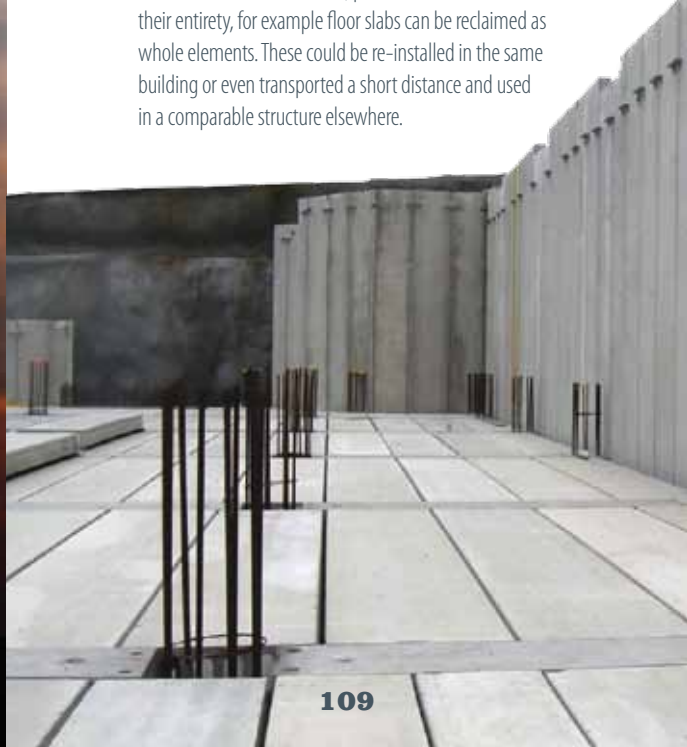
...and in the future - thermal mass will ease summer overheating

The future effects of climate change are now dominating the way we build. Recent studies show that lightweight structures suffer significant overheating when summer temperatures are high. By contrast, precast concrete buildings with solar shading will be more comfortable to occupy and less likely to become reliant on air conditioning systems to maintain habitable temperatures inside.

Precast's thermal mass lowers the energy demands of a building at peak times, thereby reducing demands on energy infrastructure.

Can be re-used...

At the end of a structure's life, precast units can be re-used in their entirety, for example floor slabs can be reclaimed as whole elements. 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 – almost 100% of a concrete building can be recycled, no matter how heavily reinforced. Demand for recycled materials has more than doubled in the last decade and is growing every year in Australia.

Precast is proven

Peace of mind

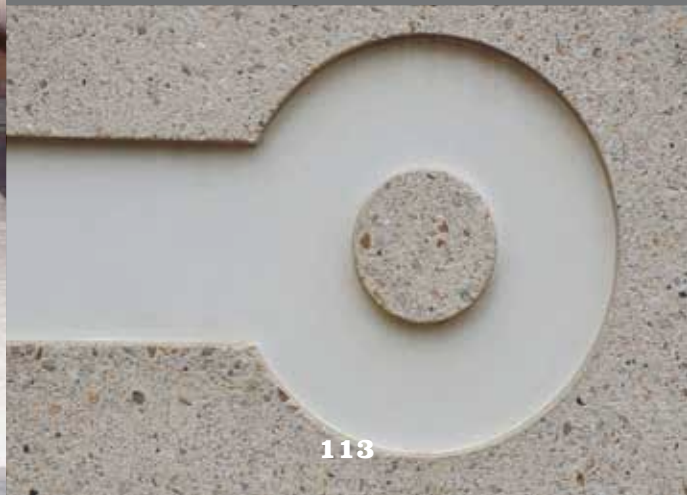
Precast production, design and construction technology has evolved over hundreds of years, so customers can be assured of peace of mind when specifying precast products.



112

Innovating for tomorrow

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 factory investments demonstrate this forward thinking attitude. Innovation is an everyday part of the precast world.



113

Good for life...

The choice to use precast concrete in a building or structure builds in resilience. The inherent properties of the material help it to withstand all manner of weather conditions, infestations and other less common threats such as explosions.

Quality of life is a clear priority in sustainability as is ensuring that we are constructing a built environment that will last for successive generations, not just for today. Precast concrete offers significant sustainable benefits in these areas.



...with impressive whole of life value

There's no doubt that all 100 advantages of using precast concrete 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 stunning finishes, reduced risk and robust structures which are good for people and the environment.

