



# concrete

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## Surface Finishes with a Difference

*There is no doubt that many designers love to play with concrete. Around the world, architects and specifiers are challenging public perceptions of concrete with interesting surface finishes.*

To help ensure that New Zealand designers continue to have access to the most current information on architectural surface finishes, the Cement and Concrete Association of New Zealand (CCANZ) is currently updating the following three Information Bulletins:

IB 18: Architectural Surface Finishes

IB 33: Specification of Concrete Surface Finishes

IB 37: Weathering of Concrete Buildings

The revised IB 18 will provide inspiration to designers through images of a variety of finishes used in contemporary buildings.

In addition to presenting examples of the range of finishes available, the bulletin will describe how the finishes can be achieved in practice. IB 33 was originally written as a user guide for NZS 3114: Specification for Concrete Surface Finishes. NZS 3114 specifies limits for variations in colour, surface tolerances and physical irregularity for the three common formats of concrete; off-the-form, exposed aggregate and unformed surfaces.

Although requirements set out in the Standard have not changed since it was last updated in 1987, the aim of the IB revision has been to present the information more clearly and to take account of developments in concrete production.

The updating of these bulletins has been informed by ongoing research at the Victoria University School of Architecture. This research has been undertaken with the support of CCANZ and aims to identify and examine the new directions of architectural concrete finishes. It has been useful to group the finishes to look for patterns and the following examples help illustrate these developments.

### Texture

The surface texture of concrete can be modified through the formwork or by working the concrete once it has been cast. A common method is to expose the aggregate after the formwork has been removed. This can be particularly effective in New Zealand given the wide variety of aggregates.



*Mexican Embassy in Berlin  
Serrano & Gonzalez de Leon - Architects*

Our sharp daylight helps to highlight even the lightest surface texture. Designers are also experimenting with variegation across a surface with the aid of surface retarding agents. (In some cases it has been possible to etch a distinct image into the surface.)

The surfaces of the rhythmic concrete columns of the Mexican Embassy in Berlin were heavily textured using a hammering technique.

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**ccanz**

Cement & Concrete Association of New Zealand

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## Colour

Typically the colour of concrete is modified with the addition of oxides into the mix or by sprinkling the colouring agent across a cast and still wet surface before trowelling. The former renders a uniform surface colour while the latter leaves the surface somewhat variegated. Architects have begun to use staining agents to achieve subtle and more transparent concrete colour.



*Stephen Holl Architects*

A big advantage with the use of stains is that the process can be completed at any time after the concrete has been cured. This can often lead to better and more controlled outcomes.

## Pattern

Cast concrete is an exact reflection of the form it is cast against. Some contemporary work shows a willingness to modify the surface of the formwork to achieve interesting surface patterns. A method that uses computer generated sculpted surfaces as formwork is being pioneered by Objectile in France. A less technical but equally stunning example can be seen at a recently completed university building in Lyon, France.



The concrete was cast against fabric laid against the formwork. The fabric was bunched and crumpled leaving similar patterns across the cast surface.

*Sculpted surfaces that can be used as concrete formwork, Lyon University*

## Technical Excellence

Of course the Japanese have been producing concrete with immaculate surface finish for years and now, with the aid of technology, it is possible that all concrete be rendered in this way. The emerging use of self compacting concrete and absorbent form liners allow the surfaces to be rendered like glass. A recent project in Southern California demonstrates the potential of new materials used in combination with excellent workmanship.



*Additions to the Salk Institute in la Jolla, California  
A.C. Martin Architects*

## Combining with Other Materials

Several researchers at the recent fib Symposium in Avignon, France presented examples of concrete containing other materials for architectural effect. One of these was the proposal to use glass as an aggregate. The project sought to recycle glass which would otherwise have gone to a landfill site and in the process the researcher realised the architectural potential.

Other materials have been used to great effect in New Zealand concrete, including Paua shell, and consider the use of steel fragments in the cladding of the Christchurch Casino several years ago.

These and other recent developments around the world, and here in New Zealand, demonstrate the potential for new and interesting surface finishes to be achieved with concrete. With the release of the updated Information Bulletins, designers, specifiers and suppliers will have additional tools to enable imagined finishes to be realised.



## Upfront... Call of the South



David Gray  
Chief Executive

Construction is a varied, vibrant and energetic industry full of people who make things happen. The physical fabric of modern society exists as a result of their creativity, talents and skills being carefully applied to provide a vast range of construction solutions, from compact inner city apartments to monolithic infrastructure facilities.

Concrete has been chosen as a primary construction material for over 3,000 years and usage is increasing each year. Recently, we have seen over 20 percent growth in the per capita consumption of concrete in New Zealand. Although not specifically measurable, CCANZ can legitimately claim some credit for this strong growth performance.

My involvement with CCANZ will end in early October after nearly four years as Chief Executive. I have chosen to redirect my career towards the "sharp end" of construction again, by accepting a role with a Christchurch based mechanical services contracting company.

I leave being well satisfied with the progress and achievements of CCANZ over this time and remain equally confident in the ability of the team to deliver on the strategic issues facing our industry in the future.

This issue of 'concrete' is accompanied by our Annual Report for the year ending June 2004 which reflects another outstanding year for CCANZ.

Going forward, our new Integrated Business Plan for the year ending June 2005 was approved by our Board in May. We worked very closely with our industry sector associations during the development of our business

plans, hence the term "integrated". This allows us to leverage the collective knowledge and experience of our industry when identifying strategic issues and prioritising the resources of CCANZ.

Areas of strategic focus include Competitive Construction Systems, Education and Training, and Growth - Transport/ Residential.

Our support activities will continue to target Industry and Strategic Relationships, Alternative Funding Model, Communications and Public Relations, Standards and Legislative Overview.

CCANZ is deservedly well recognised and respected throughout the wider construction industry. Through active engagement with our own sector associations we have developed a collaborative model for effectively identifying and addressing industry wide issues. We can also demonstrate sound working relationships with external bodies such as BIA, BRANZ and SNZ.

It has been my pleasure and privilege to lead CCANZ over the last four years. I offer my sincere thanks to the many individuals who have generously given their time and knowledge to assist me in this role. I also acknowledge the support of the wider concrete industry in contributing to the positive development of CCANZ over this time.

I mentioned at the beginning of this column "people who make things happen". I have been fortunate to work with six "make it happen" people at CCANZ. You could not find a more dedicated, skilled and professional team. Angelique, Cathy, Nancy, Alan, Chris and Dene - thank you for your commitment, expertise, advice and support for the goals of CCANZ during my time as Chief Executive.

My very best wishes to you all.

## Cook's Clinic... Cement burns

*From time to time it pays to remind ourselves of some of the health and safety considerations of working with wet concrete.*

Dreadful injuries can occur when wet concrete is left in contact with skin for a period of time.

The worker, pictured below, was wearing overalls on an inclement day. The knees of the overalls were caked in concrete and were wet through. The only indication that something was wrong was a slight irritation of the skin. However, after the job was finished the pain became unbearable and hospital treatment was necessary.

Cement burns occur when skin comes into contact with fresh concrete for a period of 45 minutes to a few hours - usually through permeable clothing. The clothing holds the caustic cement in contact with the skin, slowly penetrating and destroying the skin.

Just like sunburn, the burns occur with little warning, the pain is usually not felt for hours and may not be severe for several days.

By the time medical attention has been sought, a serious burn has occurred, often causing permanent disfigurement, and continuing pain.

We can prevent burns by-

- Providing information that warns people of the hazard,

- Preventing prolonged exposure to skin,
- Wearing rubber boots and water resistant clothing,
- Ensuring any affected areas of skin are washed in water, rinsed in diluted vinegar, and then rinsed in water again.

Employers have a legal obligation to employees to provide information and training, warning of all hazards relating to the handling of cement and concrete. Employees also have a legal obligation to protect themselves and others from injury.



Cement burns from wet concrete



Permanent disfigurement can occur

# An Honest use of Concrete

## St Joseph's Church is history in the making

Studio of Pacific Architecture's design for St Joseph's Church near Wellington's Mt Victoria Tunnel has brought a new lease of life to the fashionable 1960's design method of moulding and texturing concrete.

The precast concrete panels, supplied by Unicast Concrete in Hastings, that form the exterior walls of this \$2.6 million Catholic church, are imprinted with an innovative design based on the Christian symbol of the fish. Interlinked around the new church, this eye-catching motif provides a stunning visual for passersby.

In former times, church building in New Zealand was prolific - as a result, our urban and rural landscapes are now peppered with time-honoured examples of fine Edwardian and Victorian architecture. Nowadays, church construction is at a much slower pace, and chancing across the building of a new Christian place of worship is very rare.

The very fact that so few churches are built in modern times, sets St Joseph's Church apart from what has gone on before, as well as from current trends being applied to new public buildings - particularly from a design perspective.

The architectural challenge here, for architects at Studio of Pacific Architecture, was to create a simple but modest building, to derive beauty from its material and form rather than from its ornamentation, and to meet the liturgical requirements of the Catholic Church within a multi-purpose building that can be used as a community facility.

Named The Carpenter Project, Fr Michael McCabe of St Joseph's Parish envisaged a beautiful but useful and meaningful community church for the people of Mt Victoria, Wellington.

In response to this unique building opportunity, architects Stephen McDougall, Michael Davis and Marc Woodbury of Studio of Pacific



*The Sanctuary's 7 m high precast concrete panels.*

Architecture first looked to the role symbolism could play in the design process.

"We wanted to capture the sanctity of the building in the design and aimed to create the same sense of reverence found in older, established churches," says senior associate Michael Davis.



*MDF form for precast units.*

Their design began with the four major spatial elements of the church, the baptistery, the nave, the gathering space and the chapel, expressing each architecturally as the quadrant of a circle. Together, these forms represent an abstract koru - the unfolding fern of the Maori - and symbolise growth and journey, birth and life. A cruciform shaped circulation space links these areas together, continuing the spiritual theme.

The next stage was to look at materials and how natural forms of wood, steel and precast concrete could be integrated within the design and the spiritual concept.

A heavy timber construction provides a frame for the new church, laminated veneer lumber (LVL) and plywood panels form the structural diaphragm,

while the chapel is supported by steel - the structural engineers for the project were Romulus Consulting Group of Wellington. A curved, solid concrete exterior creates a series of protective shells around the building, providing insulation, durability, structure and aesthetic appeal. And the cast-in-place concrete floors have been polished to provide a superior finish.

"Concrete was a natural for this project," says Marc Woodbury.

"Its diversity means that we were able to create a good looking and practical building, that will provide protection against external noise and that will withstand the tests of time.

"Using precast concrete also meant that we were able to limit the mess on site, as well as speed up the



*Finished precast concrete panel.*

whole construction process, since the concrete panels, weighing up to 8.5 tonnes each, were transported ready-made to the site and then lifted into place, with each lift taking approximately 20 minutes.

"Employing concrete in its honest form was also in keeping with the original brief, which required a modest but useful building, constructed from raw materials."

The 7 m high precast concrete panels used for the Sanctuary are of 'sandwich' construction - 75 mm exterior concrete, 50 mm polystyrene and 200 mm structural concrete - for thermal efficiency.

St Joseph's Chapel will be open to the public on 9 October for National Architecture Day.

# Concrete Benchtops

For a truly creative surface finish

*Concrete is one of the most extensively used building materials in the world. Applauded for its versatility, it is no surprise that concrete has become part of our every day lives, providing a backdrop to our outdoor living as well as forming the basis of many of our home essentials.*

The use of concrete within bathrooms and kitchens is gaining in popularity. In particular, advances in the design and fabrication of concrete benchtops over recent years has led to a new trend in using concrete for kitchen workspaces.

Concrete benchtops comprise cement, aggregates, water and a combination of admixtures. Other additives that can be used include fibre reinforcement, silica fume pozzolan and acrylic.

Solid, practical and durable, concrete benchtops provide an economical as well as attractive workspace alternative to more traditional materials such as marble, granite and plastic laminate. The flexibility of concrete lends itself well to incorporating a range of different effects and surface finishes: raw or highly polished, natural greys tinted or integrally coloured, surfaces patterned or stamped, acid-etched or crazed sand/glass blasted or with exposed polished aggregates - the list is endless. There are also a wide range of pigments, stains and aggregate colours that can be used to create unique and individual concrete benchtops.

The beauty of concrete also means that it can easily be formed to integrate additional practical features such as sinks, draining boards, backsplashes and wet walls.

As a general rule of thumb, benchtops are around 50 mm thick. A 50 mm thick concrete slab weighs approximately 120 Kg/m<sup>2</sup>. Therefore, floors and standard cabinetry should be checked for structural soundness before the benchtop is designed.

Benchtops are either precast in a factory, where conditions are easily controlled and where the benchtop is cured and sealed, or built on site. Precasting is a popular method since it can help to speed up the installation of a new kitchen or bathroom and limits mess - once in place precast benchtops only require a light sanding, polishing or coating with sealers.



*Concrete benchmarks are gaining in popularity. Photo by Ross Bannan*

By contrast, benchtops built on site can readily be formed to specific requirements such as radius edges or curved corners. However, this method can prove time-consuming since the concrete needs to be hand-trowelled then left to harden prior to cutting, polishing and coating with sealers.

Sometimes, concrete benchtops can develop hairline cracks as a result of the natural shrinkage of concrete. These hairline cracks tend to be non-structural and will not affect the durability of the concrete. To minimize the risks of this happening, reinforcement materials such as steel, wire mesh, fibreglass and/or fibres can be used.

Concrete benchtops should always be cured and then sealed. If left in its natural, unsealed state, the surface will stain and scratch. It should be noted, however, that staining can occur if the sealant is damaged, say from a hot pan.

There are two types of sealants that can be used, non-absorbing sealers and penetrating sealers. Non-absorbing sealers, for example epoxies, urethanes, lacquer and acrylic-based products, provide the concrete with a protective skin and act as an effective barrier to stains but they can look artificial. Penetrating sealers, whether water, silicone or solvent based, give an enhancing low sheen finish but usually require several coats to improve stain resistance.

Cleaning and caring for concrete benchtops is straightforward. Spillages should be wiped up as soon as they occur and only a mild, non-abrasive, non-ammoniated cleaner should be used - although mild soap and water is adequate.

If, over time, the concrete surface does become stained and scratched, then repolishing is always an option - particularly as this will restore the benchtop to its original finished condition.

# People...

## Stevenson Appoints New CEO

Stevenson, one of Auckland's oldest construction businesses, has recently appointed a new CEO, Claire Eeles, to head up Stevenson Building Products. With some 13 years experience of executive management in the US, Australia and New Zealand, Claire has worked across a diverse range of major corporations including The Warehouse, Mobil, Fletcher Challenge and US global management software company, DiamondCluster International.

Claire's appointment is the first of many changes at Stevenson, as the company moves into the future with a new group focus and five stand-alone businesses Engineering, Property Development, Resources, Agriculture and Building Products.



*Claire Eeles, CEO  
Building Products  
Stevenson*

## New Chief Executive Appointed to BRANZ Ltd

Peter Robertson's appointment as company CEO was recently announced by BRANZ Ltd Chairman, Stuart Kendon. Peter, who has a wealth of experience in the finance and economics sectors as well as considerable commercial expertise, will play a key role in developing BRANZ's research and information capability into a commercial commodity.

"Peter's strong background in the effective management of highly skilled engineering resources within Transpower, together with his experience in financial management as a former Chief Finance Officer with Transpower, and consulting and audit partner with Ernst & Young, is just what we are looking for to unlock the creative and commercial potential that undoubtedly exists within BRANZ," says Stuart Kendon.

## Bary Williams Joins Golden Bay Cement

Golden Bay Cement has recently recruited Bary Williams as New Zealand Customer Services Manager. Bary started his career in the electronics industry, where he spent 12 years with Bell Radio Corporation, before moving onto HW Smith and Email Industries.

Bary entered the building industry when he joined the sales team at Firth Industries. He then moved to Roberts Cavitex, where he became General Manager. Prior to joining Golden Bay Cement, Bary worked at Stevenson & Sons for over 17 years, quickly progressing through the company from Sales Manager to General Manager to CEO.

Bary is a council member of the New Zealand Ready Mixed Concrete Association and was a former board member of the Cement and Concrete Association of New Zealand.

## NZCS Fellowship Awarded

The New Zealand Concrete Society Study Fellowship, which provides \$1000 per year for a maximum of up to three years, has been awarded to University of Canterbury student Kathryn Robertson. Kathryn, who is interested in concrete as "a widely used and innovative building material", is currently working towards a Masters of Engineering (Civil).

After completing the required coursework for her Masters, Katherine intends to research the formulation of a design procedure for the new generation of damage-resistant structures (for which experimental work has already been performed at the University). "I will be looking into performance-based design for my research - hopefully the knowledge gained will be applicable to existing structures as well as damage-resistant structures," she says.



*Kathryn Robertson,  
University of  
Canterbury*

## News...

### Paraparaumu Public Library Scoops Supreme Design Award

Paraparaumu Public Library has won an NZIA Resene Supreme New Zealand Award for Architecture. Designed by Warren and Mahoney and applauded by the NZIA for its elegant composition and its engagement of the human spirit, this exceptional building represents one of the very best buildings in New Zealand to emerge out of 2004.

Using innovative and environmentally-friendly design techniques, the Library

incorporates an energy-saving air conditioning method. This employs a system whereby a ventilated concrete floor slab is used to cool air at night and then circulate it through the building during the day, providing a year-round comfortable atmosphere. External sun louvres and roof overhangs also help to shade the building in summer, while interior wood paneling helps insulation in winter.



### CCANZ Submits Feedback on Clause G6

In June 2004 the Building Industry Authority (BIA) published a discussion paper entitled 'Proposed Changes to Building Code Clause G6, Airborne and Impact Sound'. The BIA invited interested parties to express their views on the proposals canvassed in the document.

CCANZ has reviewed the proposed changes and has forwarded its comments and recommendations to the BIA. CCANZ agrees that there is a growing number of buildings that fail to meet occupant expectations with respect to neighbour noise and is pleased that on-site compliance testing is being proposed.

However, CCANZ would like this to be extended to include hotel, motel and aged care units where the same basic noise nuisance levels exist. CCANZ also believes that an Accredited Testing Scheme would need to be established to ensure on-site verifications are conducted by suitably qualified personnel, and that the proposed changes in the G6 document should be harmonised with The Building Code.

CCANZ's submission can be viewed online at [www.cca.org.nz](http://www.cca.org.nz).

### New Standards for Concrete Masonry

Standards New Zealand has revised NZS 4230:2004 Design of Reinforced Concrete Masonry Structures Standard to specify the minimum requirements for the design of masonry buildings and other masonry structures.

Also applicable to the design of buildings that are only partly constructed of masonry, the content of NZS 4230 is heavily influenced by seismic considerations - and improving performance of masonry buildings in a major earthquake is a key objective.

A series of seminars on NZS 4230: 2004 will be held later in the year. In the meantime, those wishing to purchase NZS 4230:2004 can do so at [www.standards.co.nz](http://www.standards.co.nz), or by calling the sales team on 0800 735 656.

### Weathering the Storm

The Building Industry Authority (BIA) has announced changes to Clause E2 of the Building Code. Known as E2/AS1 and often called the Weathertightness Solution, the clause aims to provide formal industry guidelines on how buildings may be built to ensure that rain and run-off water do not leak through roofs and walls.

The changes apply to all timber-framed buildings up to three stories or 10 m in height, and consider aspects of design complexity including flashings, drained cavities and decks and balustrades.

The new Clause contains detailed information on specific materials to show designers, builders and building inspectors how to prevent leaks and how to manage them if they occur.

BIA and BRANZ Ltd are hosting a series of seminars to further explain the changes. Details are available by contacting Gail King on 04 238 1369 or at [GailKing@branz.co.nz](mailto:GailKing@branz.co.nz).

# NEWS from the ASSOCIATIONS

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## DIARY:

2004

### September

- 16-19 Combined Concrete Industry Conference, Queenstown
- 16 CCANZ Board Meeting & AGM, Queenstown
- 16 PCNZ AGM, Queenstown
- 16 NZCMA AGM, Queenstown
- 16 NZCS 40th Annual General Meeting, Queenstown
- 17 NZRMCA AGM, Queenstown

### December

- 7 CCANZ Board Meeting, Wellington
- 7 NZRMCA Meeting, Wellington

### Prison Precast

PCNZ

In July, representatives of the Executive of PCNZ met with the Minister of Corrections, Paul Swain, corrections staff and Ray Bianchi of the Northern Amalgamated Workers Union, to discuss concerns about the precast operation at Paremoremo and the supply of precast concrete in the commercial market place. The Minister was receptive to the arguments put forward and offered to consider alternative ways of achieving his objectives whilst taking into account the concerns of both PCNZ and the Union. A further meeting is planned for the second week of September.

### Conditions of Sub-Contract

PCNZ

A draft of the "Precast Standard Conditions of Quotation" has now been prepared and issued for comment. It is intended that this document, which covers precast specific terms and conditions, will become an industry Standard and will be available for use by members in conjunction with the NZ Building Subcontractors Federation "Terms and Conditions of Contract for Construction Work".

### BIA - Proposed Changes to G6 - Airborne and Impact Sound

PCNZ

Keith Norgate (Stresscrete) presented the Executive with a summary of issues affecting the precast industry. The Executive decided to prepare a submission to the BIA using Keith's recommendations as a basis.

### Recent Publications from fib

#### *Seismic Design of Precast Concrete Building Structures. Bulletin No. 27*

NZCS

This document, published late last year, provides a comprehensive state of the art report on current practices for the use of precast and prestressed concrete in the main seismic regions of the world. The intent of the document is to assist designers and constructors to provide safe and economical building solutions in structural precast concrete, while at the same time encouraging innovation.

New Zealand was well represented by the Working Group that prepared this bulletin and readers from NZ will recognise some of the examples in the text.

#### *Environmental Design. Bulletin No. 28*

NZCS

This document has been prepared to assist in leading the construction industry towards 'sustainable construction'. It provides a framework by which 'Best Available Technology' can be applied to concrete structures, from an environmental point of view, and it presents methodologies for the environmental impact evaluation and subsequent optimisation of these structures.

Written by European and Japanese authors, the Bulletin has been collated using information from a multitude of sources. Europe and Japan are in the vanguard of legislation focused on environmentally sustainable construction. The document gives a timely introduction to future building trends.

#### *Environmental Issues in Prefabrication. Bulletin No.21*

NZCS

New legislation in parts of Europe, setting standards for dealing with environmental matters and often influencing the choice of building materials, was the driver for the production of this document. There is also a growing customer base that requires documented evidence of sound environmental behaviour of all materials used in construction.

Fortunately, precast concrete performs very well compared to competing materials and although New Zealand has not legislated for sound environmental practices, this Bulletin provides an international peer reviewed methodology for evaluating the use of precast concrete in construction.

All fib bulletins can be loaned by CCANZ members, contact [library@cca.org.nz](mailto:library@cca.org.nz)