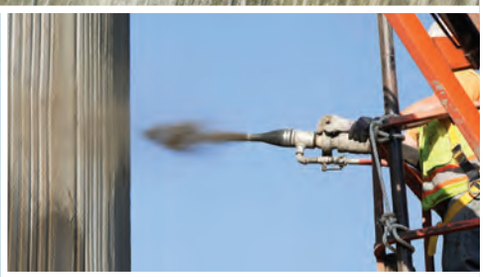
REPAIR AND STRENGTHENING



SPECIALISED ENGINEERED SOLUTIONS FOR STRUCTURES

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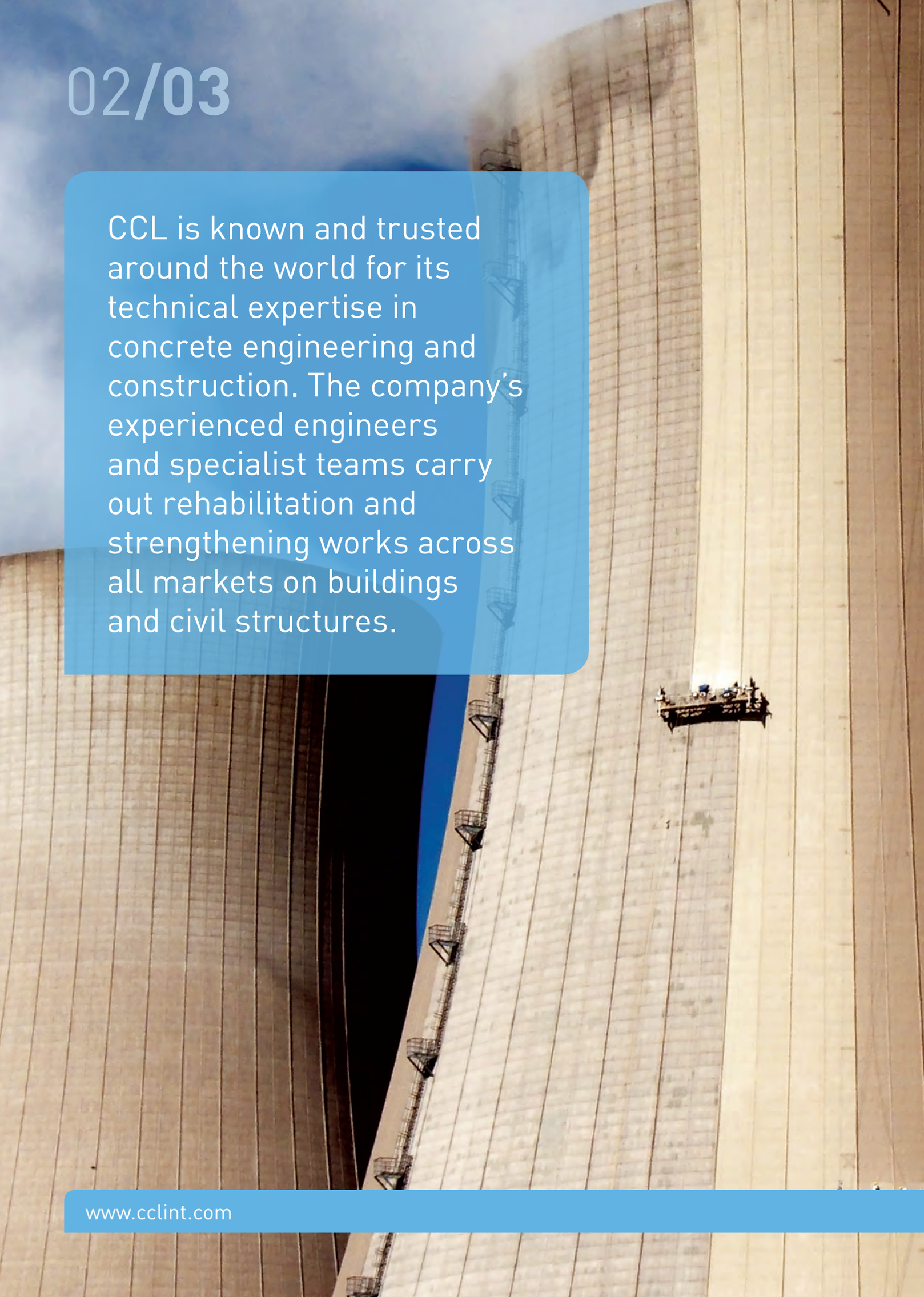


CCL is known and trusted around the world for its technical expertise in concrete engineering and construction. The company's experienced engineers and specialist teams carry out rehabilitation and strengthening works across all markets on buildings and civil structures.

REPAIR AND STRENGTHENING SOLUTIONS

Throughout the life of any structure inspection and maintenance will be required to ensure structural integrity is preserved. Most structures will have need of at least minor remedial action, but some will require a greater degree of intervention.

Maintenance carried out on a regular basis can reduce the need for major structural repairs but there will still be occasions when remedial action may be required.

Change of use, the need for additional capacity, design code changes or even site defects during construction can all call for intervention. Refurbishment and strengthening will also be required to deal with fire damage, while age and environmental factors may also cause deterioration.

CCL's specialist teams are able to assess the structure to identify the extent of the problem and understand its underlying cause. Taking into account the needs of the client and accurately interpreting their requirements, CCL will then develop the most appropriate solution.

INSPECTION, SURVEYING AND MONITORING

Prior to embarking on a repair project, condition surveys of the structure are undertaken to determine the cause of the problem.

Inspection takes the form of a visual survey and may involve carrying out destructive and/or non-destructive tests. CCL will liaise closely with the client to fully understand existing conditions and future requirements. Only then will CCL engineers compile their findings, assess the potential solutions and submit their proposals tailored to meet clients' needs.

Structural monitoring provides the basis on which to make assessments of a structure's condition and performance, affording guidance as to whether intervention is required.

CCL can provide and install bespoke systems to monitor load, movement and vibration in structures including bridges, viaducts and buildings. These systems can generate data over a long period of time which is transmitted to a central server and accessed by authorised users via a website, in real time if required.

HYDRODEMOLITION

When defective areas of concrete have been identified by a testing regime and clearly marked, they are removed to the required depth. Hand-held breakers can be used to take out small sections. Larger applications may require hydrodemolition techniques.

Hydrodemolition utilises high pressure water to remove the defective concrete while at the same time allowing the steel reinforcement beneath to remain intact. This vibration-free technique prevents cracking and microfracturing of the structure during the process. It also cleans the exposed steel reinforcement, eliminates dust and debris and can remove harmful chloride ions from areas which have become contaminated.

STRUCTURAL STRENGTHENING

CCL has the capability to deal with strengthening problems using a variety of techniques.

JACKETING

Jacketing is a widely used method of increasing the capacity of columns and beams by placing a concrete jacket around the original member using various reinforcement systems including post-tensioning and fibre reinforcement.

COMPOSITES

The retrofit application of composite material to structures for strengthening, increasing load bearing capacity and confinement is a well-proven technique. The materials include:

- Carbon-fibre reinforced polymer (CFRP)
- Aramids
- Basalt
- Glass fibre

Each is available in plate or sheet form and can be manufactured to suit for size and performance. They provide durable, maintenance-free, external reinforcement to give a long-term, corrosion-free solution. To determine the appropriate composite material and the required modulus for each scheme a design must be undertaken by a suitably qualified engineer.

POST-TENSIONING

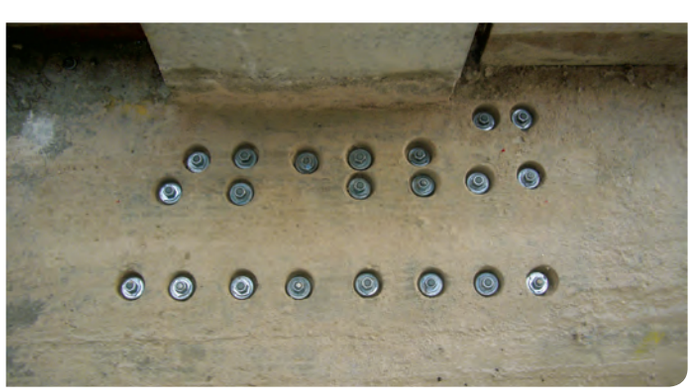
CCL post-tensioning systems provide an efficient means of structural strengthening. They are also used to control deflection, stresses and cracking of concrete.

STEEL

Steel plates provide a long-established means of strengthening concrete structures. The plates, usually mild steel, are bonded to external surfaces using epoxy adhesive and bolts. They can be used to improve load capacity, reduce deflection and provide greater resistance to bending.

PUNCHING SHEAR REMEDIALS

For existing concrete slabs where the punching shear strength is insufficient a number of methods can be applied to enhance the existing structural capacity. Options include post-installed headed bolts and steel.



SPECIALIST GROUTING

CCL's specialist grouting techniques include post-tensioned ducts on new and existing structures, and resin injected cracks in concrete.

VACUUM GROUTING

Vacuum grouting has been used to inject resin into fine cracks in concrete for more than 40 years and is a technique recognised throughout the repair industry. Recent studies have shown that crack widths as small as eight microns can be filled.

CCL can accommodate the combination of low pressure and vacuum grouting to fill voids beneath floor and road slabs, at the interface of concrete and steel members and within post-tensioning ducts.

LEAK SEALING

CCL uses chemical grouting for sealing leaks in water-retaining structures.

Specialist polyurethane grouts are injected into the areas exhibiting water ingress and expand to form an effective seal when making contact with moisture. This system can be used on brick and concrete structures.

PRESSURE GROUTING

Pressure grouting requires the gradual introduction of grout into the crack to ensure the void is completely filled. The technique is used for larger voids and can be vacuum assisted.

CONCRETE REPAIR

CCL offers a range of structural repair techniques designed to rehabilitate and extend structural life.

For small areas hand-applied methods are commonly used, but larger applications may require sprayed concrete or flowable concrete. All mortars are pre-bagged for quality control purposes.

SPRAYED CONCRETE

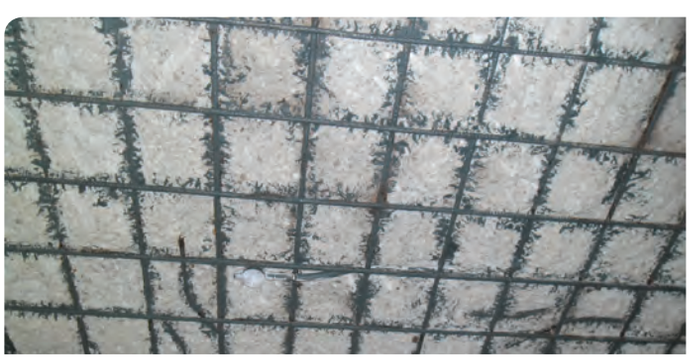
Sprayed concrete is a flexible method of applying concrete which is ideal for use on vertical and overhead surfaces. It is applied either robotically or by a certified nozzleman, depending on the size of the application. This versatile technique is applied quickly and gains strength rapidly, accelerating the process.

FLOWABLE CONCRETE

Flowable concrete is self-compacting and flows into the most difficult spaces often providing the optimal solution for applications where reinforcement is heavily congested. It can be placed with little or no vibration and delivers the mechanical and durability properties of concrete. Ideal for areas of dense reinforcement, or for complex sections, it also delivers a high quality finish.

HAND-APPLIED REPAIRS

For patching and where repairs are required to limited areas the repair mortars can be installed using hand-applied techniques.



CORROSION PREVENTION

The use of electrochemical systems to prevent or halt corrosion in reinforced concrete and steel structures has been in worldwide use for more than 30 years.

CATHODIC PROTECTION

Cathodic protection is an electrochemical technique used to protect metal from corrosion.

It is used on structures such as bridges, buildings, jetties, tunnels, car parks and steel framed buildings. There are numerous cathodic protection techniques available. Each structure must be assessed to determine the most appropriate system to obtain maximum protection.

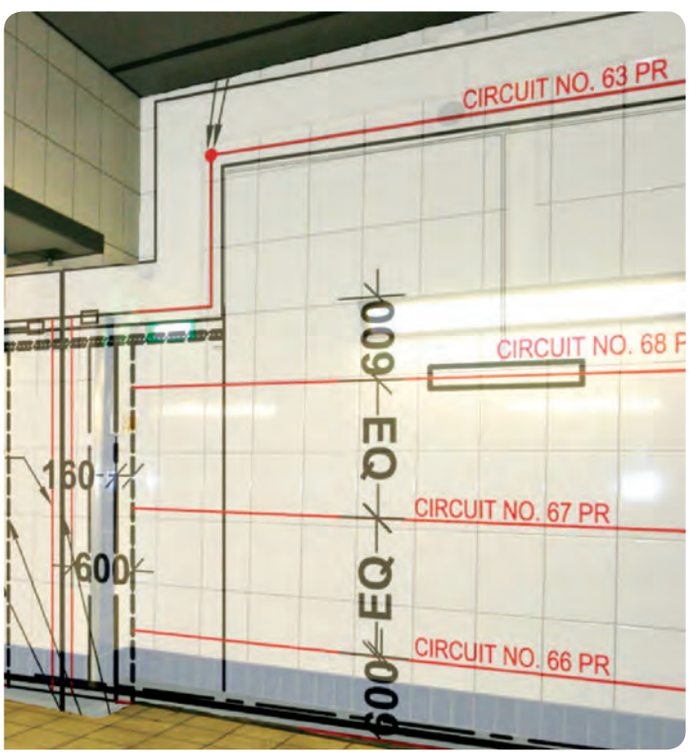
CCL uses cathodic protection systems to treat reinforced concrete and steel which is already corroding and can install cathodic protection on new structures as a preventative measure against future corrosion.

ELECTRO OSMOSIS

Electro osmosis is the movement of liquid, through a capillary tube or membrane under the influence of an electric field.

An electrical current is created through a series of titanium anode cables installed in the internal wall of a structure and cathodes installed externally in the water source. The system creates a pulsing effect and as the moisture tries to enter the structure it is positively charged and attracted towards the negative cathode away from the structure.

It has been successfully installed in basements, tunnels and underground rail networks worldwide.



PROTECTIVE SYSTEMS AND COATINGS

CCL's solutions for the protection of buildings and decks include systems which can be applied to new and existing structures.

They can be specified to provide slip resistance, waterproofing and durability and to deal with factors such as deterioration of the existing substrate.

JACKING, LIFTING AND WEIGHING

CCL offers a range of lifting, jacking and weighing services as either a stand-alone option or as part of a structural repair package for buildings or civil structures.

A full structural review will be conducted to identify the most appropriate method of propping, lifting, lowering, sliding or weighing a structure.

As part of the structural repair package a range of load testing techniques can be provided to prove the ability of a structure to carry additional loads. Testing can also be carried out to determine the safety of structures and to validate strengthening work.

STRUCTURAL BEARINGS SUPPLY AND MAINTENANCE

CCL's comprehensive structural bearings package includes inspection, design, supply, maintenance, replacement and installation.

The company specialises in the bespoke design of structural bearings which comply with relevant international standards to meet the individual requirements of each project. CCL can also offer a full programme of bearing installation, which may include the removal of existing bearings.

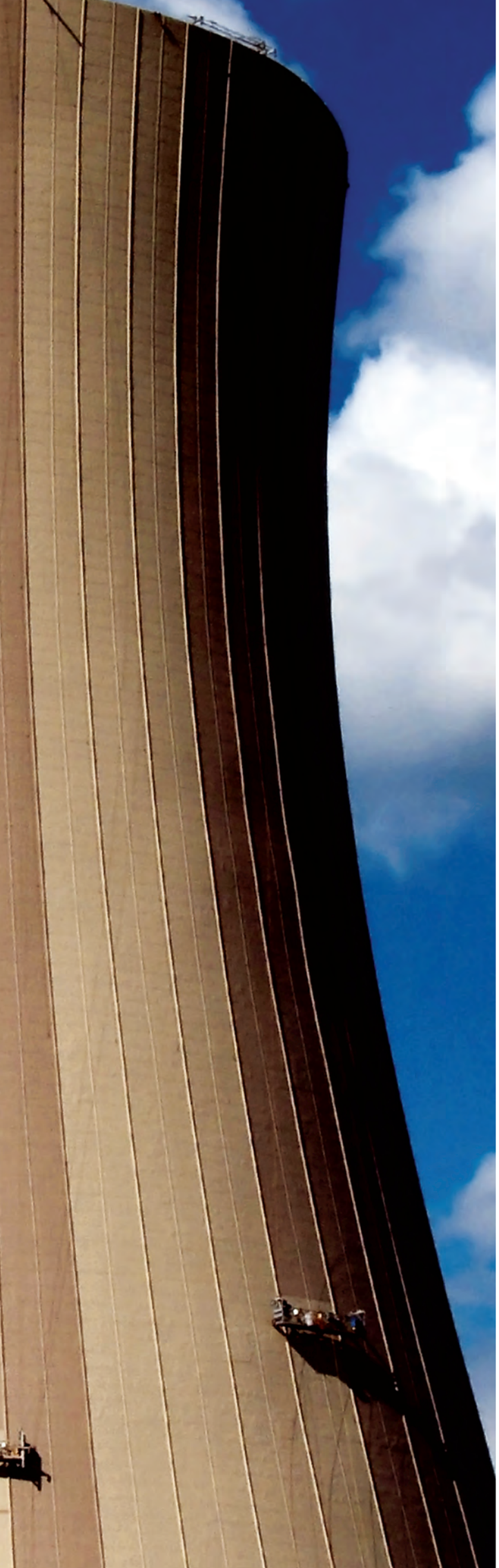
Where bearing maintenance is required CCL will carry out a detailed inspection prior to providing a report recommending appropriate action. Following this CCL can undertake any necessary remedial works including bearing replacement if required.

EXPANSION JOINTS

Expansion joints absorb vibration and enable movement between structures by accommodating expansion and contraction of construction materials caused by shrinkage, creep, temperature variations, settlement, seismic activity or distortion brought about by live load.

Bridge expansion joints allow sustained traffic between the sections of the prestressed concrete, reinforced concrete, composite or steel structure and can facilitate bearing replacement.

CCL provides a full expansion joint service including supply, installation, inspection and replacement.



Established in 1935, CCL has a long history of providing specialised engineered solutions for structures. Every day, CCL products and services are used in building and civil engineering structures across the world.

CCL's advanced solutions help engineers, planners and construction companies create and maintain these structures.

ASSOCIATIONS AND MEMBERSHIPS

CCL companies are members of a number of associations which are established to promote good practice in the repair and strengthening of structures.

CONCRETE REPAIR ASSOCIATION

cpa

STRUCTURAL CONCRETE ALLIANCE
ASSET PROTECTION & REPAIR

DANSK BETONFORENING

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