



**BRUECKE  
&  
GEBÄUDE**  
ENGINEERS PVT. LTD.



***Post - Tensioning  
Pre - Tensioning  
Ground Anchors  
Repairs and Strengthening***

[www.bngindia.in](http://www.bngindia.in)

# Company Profile



## **ABOUT BnG**

BnG was established to provide modern specialize solution and cost-effective construction technologies, which are developed and updated by BnG expert ,R&D and technical team.

Our aim is always to offer not only the best post-tensioning solutions but also innovative construction techniques/products, designed to increase site safety, save time, improve durability, and reduce costs.

We are always keen to work in partnership with our clients right from conceptual stage and have our design and method engineers working closely with their estimating teams during tender stage.

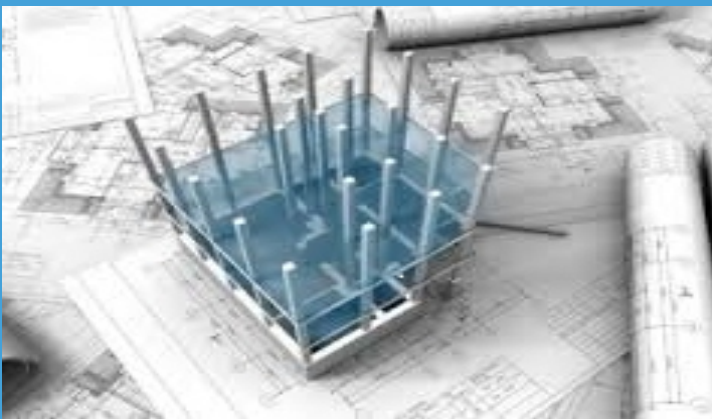
Our main strength is the quality of our highly experienced, multicultural staff. Our Marketing Staff is dedicated to listen and understand our client's needs and to prepare customized solutions for their projects.

The Company uses the latest design software, Technology which is continually updated to reflect current National and international construction codes of practice

Our ultimate goal is to deliver the best quality service to our clients, with top quality construction techniques, backed by our experience and well-trained specialists in design, methods and job site construction within time frame..

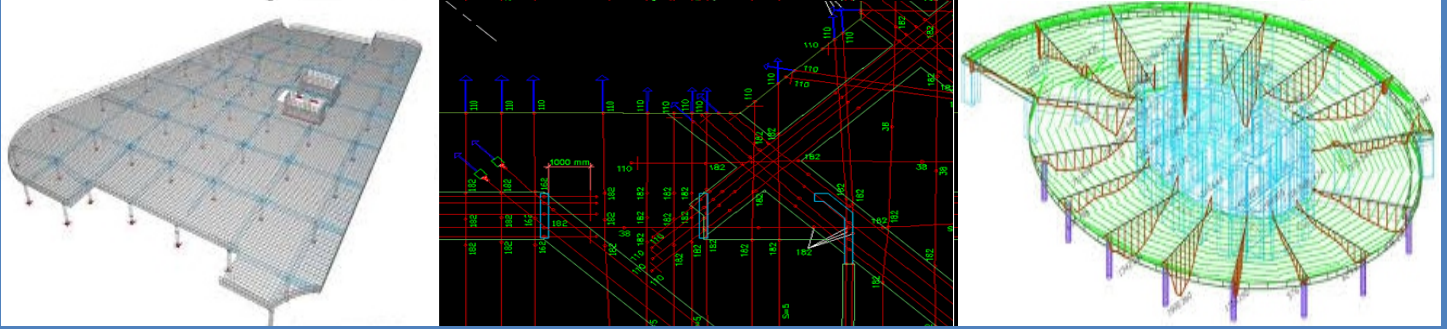
## **BnG Capabilities**

- **Post–Tensioning .**
  - (Bonded PT slab & Beam)
  - (Un bonded PT slab & Beam)
- **Ground anchors .**
- **Architectural Expansion Joints**
- **Post–Tension and Pre-Tension for Bridges.**
- **Repairs and Strengthening.**

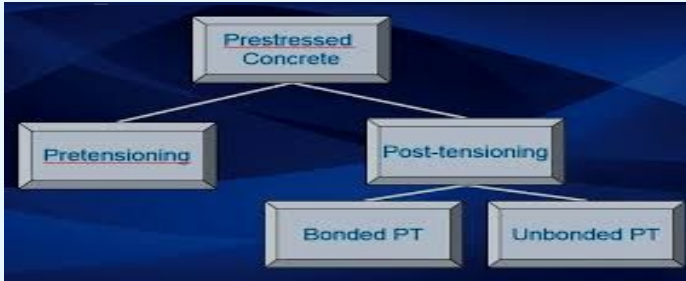




# PRESTRESSING INTRODUCTION



## PRESTRESSED CONCRETE.



Pre-tension simply means that the steel is stressed (pulled or tensioned) before the concrete has to support the service loads. Most precast, pre-stressed concrete is actually pre-tensioned-the steel is pulled before the concrete is poured.

Post-tensioned concrete means that the concrete is poured and then the tension is applied-but it is still stressed before the loads are applied so it is still pre-stressed.

### Post-Tension

The principle is easily observed when holding together several books by pressing them laterally. Under such pressure the whole row gains enough stiffness and strength to ensure its integrity.

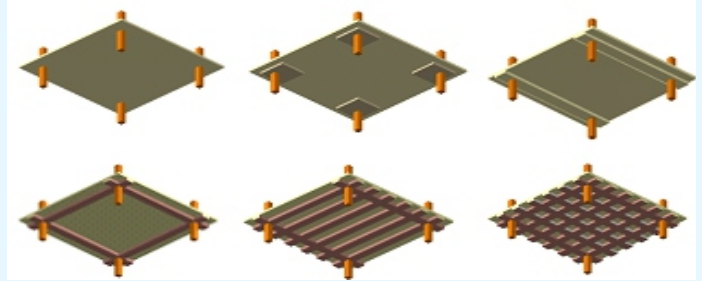
In concrete structures, this is achieved by placing high tensile steel tendons/cables in the element before casting. When the concrete reaches the desired strength, the tendons are pulled by special hydraulic jacks and held in tension using specially designed anchorages fixed at each end of the tendon.

This provides compression at the edge of the structural member that increases the strength of the concrete for resisting tension stresses. If tendons are appropriately curved to a certain profile, they will exert, in addition to compression at the perimeter, a beneficial upward set of forces (load balancing forces) that will counteract applied loads, relieving the structure from a portion of gravity effects.

### Applications of Post Tensioning slabs / beams in multistory building:

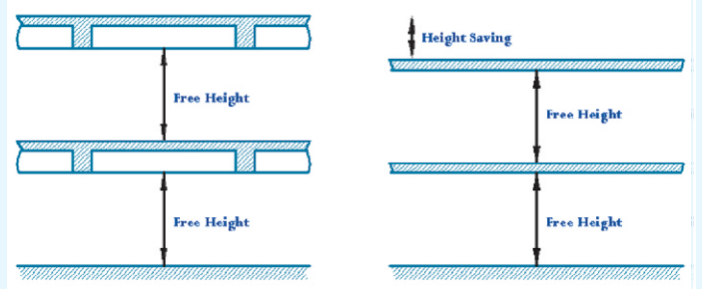
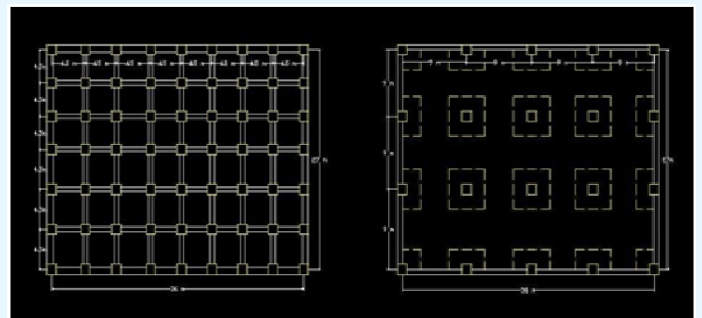
- Suspended slabs like floor slabs and terrace slabs
- Slab on Grade / Foundation slabs
- Cantilevers-Overhanging parts of building
- Facade elements of large area
- Podium slabs and parking slabs
- Major beams in the form of transfer girders, floating column loads on beams etc.

### Types of slab



### Benefits

- Savings in concrete and steel in comparison with reinforced concrete since more slender designs are possible due to high grade of materials.
- Thinner Slabs, increased clear spans, increased headroom, Height of Building, faster shuttering and de-shuttering.
- Minimized deflections compared to structural members with reinforced concrete.
- Good crack behavior and therefore better protection of the steel against corrosion
- Greater Architectural/Structural freedom in design of slab shapes and positioning of columns
- High fatigue strength since the amplitude of stress changes in pre-stressing steel under alternating loads are quite small.



# MULTI STRAND BONDED SYSTEM



## MULTI STRAND BONDED SYSTEM

BnG bonded systems (12.7 & 15.2 mm) incorporate groups of 3, 4, 5 strands contained within a tendon in a flat duct anchored at each end by BnG flat anchorages. This allows the tendons to be positioned close to the surface to obtain maximum eccentricity within the slab.

The tendons are laid in the slab according to specific profiles before pouring concrete. Ducts allow for free relative movement of the strand with respect to the surrounding concrete during stressing.

After the strands are locked within the anchorage by the wedge, they are individually stressed with BnG hydraulic jacks.

The ducts are then filled with a cement-based grout to fully bond the strands to the concrete through the duct wall and all along the length of the tendon.

The grout creates an alkaline environment around the steel for permanent corrosion protection.

The strands are attached at one end to a BnG flat anchorage, and can be left exposed at the other end and embedded in the concrete through enough length that ensures their anchoring by bonding.

BnG's bonded system requires a reduced amount of ordinary reinforcement as bonding allows the strands to reach higher stress at ultimate state.



## INSTALLATION METHODOLOGY

- The slab form work is laid.
- Live anchorage positions are marked to side shutters.
- Live end anchorages are fitted to side shutters.
- The bottom layer of reinforcement is fixed (where applicable).
- Ducts are laid out by connecting and sealing standard duct lengths.
- The appropriate number of strands are pushed through the ducts and cut to the required length; bonded dead ends are formed where required.
- Grout vents are installed and ducts are set upon chairs to the correct design profile.
- Top reinforcement is fixed over supports (where applicable).
- Concrete is poured and vibrated with care in order not to damage the tendons.
- Side shuttering is removed in preparation for stressing.
- Anchor heads and wedges are threaded onto the ends of the tendon.
- Tendon tails are marked for elongation measurement.
- Concrete strength is confirmed by crushing of cylinder (or cube) samples taken from the same pour.
- Calibrated BnG stressing equipment is assembled and set to the required force.
- BnG trained specialists stress the tendons according to required stressing sequence and check the elongation.
- Tendon tails are cut and stressing pockets are filled with non-shrink grout/mortar.
- Form work is stripped.
- Tendons are air tested.
- BnG trained specialists use BnG approved grout mixers / pumps to grout and seal the tendons.





# MONO STRAND UN BONDED SYSTEM



## MONO STRAND UN BONDED SYSTEM

BnG Un bonded (12.7 & 15.2 mm) single strand tendon system is quick to install; tendons can be easily deflected to avoid openings and to cope with irregular slab shapes. The system has reduced friction losses and increased eccentricity. It requires no grouting.

Single low relaxation PC 7-wire strands of 13mm or 15mm diameter are coated with permanent corrosion-inhibiting grease and encased in High Density Polyethylene (HDPE) sheathing, continuously extruded over the entire strand length to form a single strand tendon.

Tendons are laid in the slab according to specific profiles before pouring concrete.

The grease reduces friction and the sheathing allows for free relative movement of the strand with respect to the surrounding concrete during stressing. Both grease and sheathing provide long-term corrosion protection to the steel.

The strands are individually anchored at both ends to BnG Un bonded mono strand anchorages that are embedded in the concrete to transfer compression to the slab after stressing.

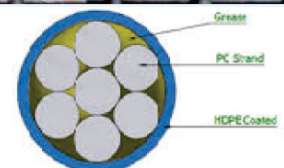
Plastic reusable fittings facilitate the fixing of live anchorages to the side shutters. Pocket formers are used to provide access for stressing at the edge of the slab.

Stressing is performed using BnG special hydraulic jacks.

Plastic caps filled with corrosion-inhibiting grease seal the strand end after stressing.

## INSTALLATION METHODOLOGY

- Grease coated and plastic sheathed strands are cut to the required length and fitted with dead end anchorages where applicable.
- The slab form work is laid.
- Live end anchorage positions are marked on the side shutters.
- The live end anchorages are fitted to the side shutters.
- The bottom layer of reinforcement is fixed (where applicable).
- Tendons are laid and profiled on chairs to the correct design profile.
- Top reinforcement is fixed over supports.
- Concrete is poured and vibrated with care in order not to damage the tendons.
- Side shuttering is removed in preparation for stressing.
- The wedges are installed and the ends of the strands are marked for elongation measurement.
- Concrete strength is confirmed by crushing of cylinder (or cube) samples taken from the same pour.
- Calibrated BnG stressing equipment is assembled and set to the required force.
- BnG trained specialists stress the tendons according to the required stressing sequence and check the elongation.
- Tendon tails are cut with BnG strand croppers or cutting discs
- The bottom form work is stripped.
- Tendon tails are capped and stressing pockets are filled with non-shrink grout/mortar.



# GROUND ANCHORS



## GROUND ANCHORS

Ground Anchors are basically devices used to transmit the forces to the soil by means of Pre-Stressed tendon to anchor the Structure to the ground or to retain the slopes from collapsing

### Types of Ground Anchors.

#### A) Based on the Anchorage Zone

**Rock Anchors** - Fixed length is anchored in the hard rock.

**Soil Anchors** - Fixed length is anchored in the Soil.

#### B) Based on Nature of Structure

**Permanent Anchors** – Permanent ground anchors have to guarantee their function during the lifetime of the structures to be anchored.

**Temporary Anchors** – Pre-Stressed anchors, which have to fulfill their function only for a limited time.

#### C) Based on how it is installed

**Vertical Anchors** – These anchors are provided vertically into the ground

**Inclined Anchors** – These anchors are provided at an angle into the ground.

#### D) Based on Application

**Test Anchors** – Test anchors are specially design anchors subject to extensive tests in order to obtain, either comprehensive information on anchor capacity and geo-Technical conditions. or to prove the quality and adequacy of design, material and construction.

**Control Anchors** – Control anchors are anchors in or beside the structure used for long-term observation.

### Applications.

Dam Tie-Downs.

Temporary Excavation Support.

Landslide Mitigation.

Permanent Tie back Systems.

Slope Surface Stabilization.

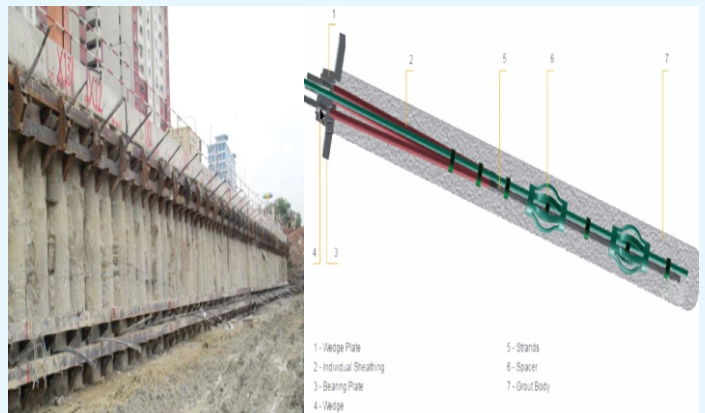
Foundations.

### Advantages

- High capacity - Anchors utilize a 0.5" & 0.6" (12.7mm/15.2mm) strand. The number of strands per anchor dictate the load carrying capacity of the anchor.
- Lightweight - For a Class I protected anchor, the corrugated duct is grouted in the field, greatly reducing the weight of the anchor. There is more load carrying capacity of 7-wire strand than solid bar.
- Anchors arrive to the jobsite fully fabricated and packaged in coils to allow for installation in areas where there are clearance issues or bench width constraints.
- Unlike bar systems, strand can be produced in any length.
- Strand anchors utilize a small diameter greased filled extruded high density polyethylene sheathing, allowing for a greater number of individual strands to be contained in a given drill hole size. Manual greasing and sheathing of individual strands require a larger free stressing sheath.



**Uplift Vertical Anchor**



**Inclined Anchor**





# MULTI STRAND SYSTEM FOR BRIDGES

## BnG MULTI STRAND SYSTEM.

The BnG multi strand system is characterized by the Following features:

- Standardized tendon units using up to Nineteen, 13mm (0.5") or 15mm (0.6") diameter strands.
- Wide selection of anchorage types.
- Bright Metal or HDPE ducts.
- Tendons manufactured on-site or in the factory.
- No need to determine tendon length in advance.
- Simultaneous stressing of all strands in a tendon, with individual locking of each strand at the anchorage point.
- Stressing carried out in any number of phases.
- Simple and reliable equipment for installation, stressing & Grouting.
- Light weight and Compact design of jacks & Power pack for easy Handling.



## REPAIRS & STRENGTHENING.

### REPAIRS & STRENGTHENING

BnG strengthening systems are providing economical solutions for structures.

BnG to prepare precise and comprehensive reports such as, Inspection of concrete structures.

Condition evaluation of concrete structures.

Root cause analysis.

Design of repair scheme.

Techno Commercial Proposal.

### Why Strengthening required ?

As a result of the higher load demands, existing structures need to be re analysis and may require strengthening to meet heavier service loads.

Structural strengthening may become necessary due to, seismic upgrade ,deficiencies that develop environmental effects such as corrosion, Deficiencies within the structure caused by errors in design and construction.

### BnG Strengthening Techniques.

External or internal Post Tensioned system.

Externally bonded steel.

Fiber reinforced polymer composites (FRP/CFRP), section enlargement.

or a combination of these techniques.

Strengthening systems must perform in a composite manner with the existing structure in order to be effective and share the applied loads.



Building Repairs & Strengthening



Heavy Lifting

Bridges External Pre stressing



Bridge Repairs & Strengthening



Silo, Chimney Repairs & Strengthening





# OUR SERVICES



**Bonded PT Slab**



**Architectural Expansion Joints**



**Un Bonded PT Slab**



**PT Bridges**



**Ground Anchors**



**Rehabilitation of Structures**



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&  
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**Post-Tensioning, Pre-Tensioning, Architectural Joints, Ground Anchors, Repairs and Strengthening**

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