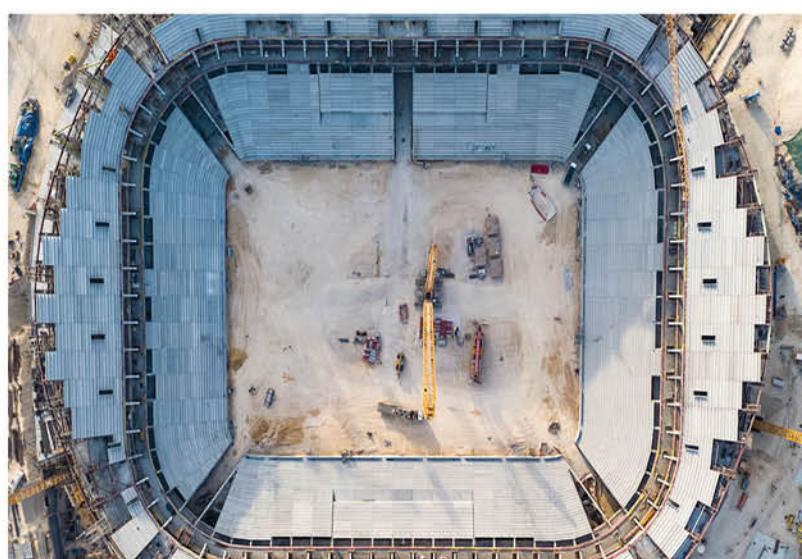
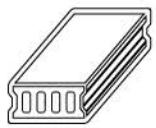




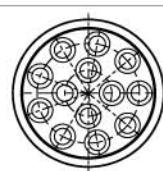
Posttension Concrete - Ground Anchors- PT bars-UHPC-BIM  
Bridge Bearings - Seismic Isolators - Multistrand anchorage



# SERVICES



PRECAST CONCRETE



POSTTENSION CONCRETE



BARS



BUILDING INFORMATION MODELING

Our Precast Structural Engineering Services include all Engineering and Detailing for the design of buildings employing total precast systems, or the design of the precast portions of buildings employing multiple building system

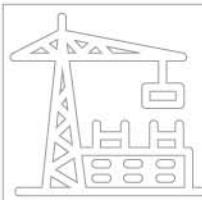
esolution operates the post-tension construction services in different countries, where the company provides the highest quality services for the posttension industry

esolution in association with ANP- Systems Austria provides the market with European approved High strength reinforcement and Post-tension bars

Our BIM services support all ranges of projects from low rise small scale projects to governmental large scale projects such as stadiums and authorities buildings to support the client maintenance requirements



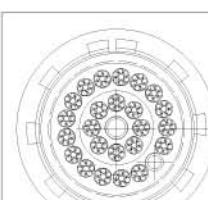
TILT UP CONCRETE



CONTRACTING



CONSULTANCY



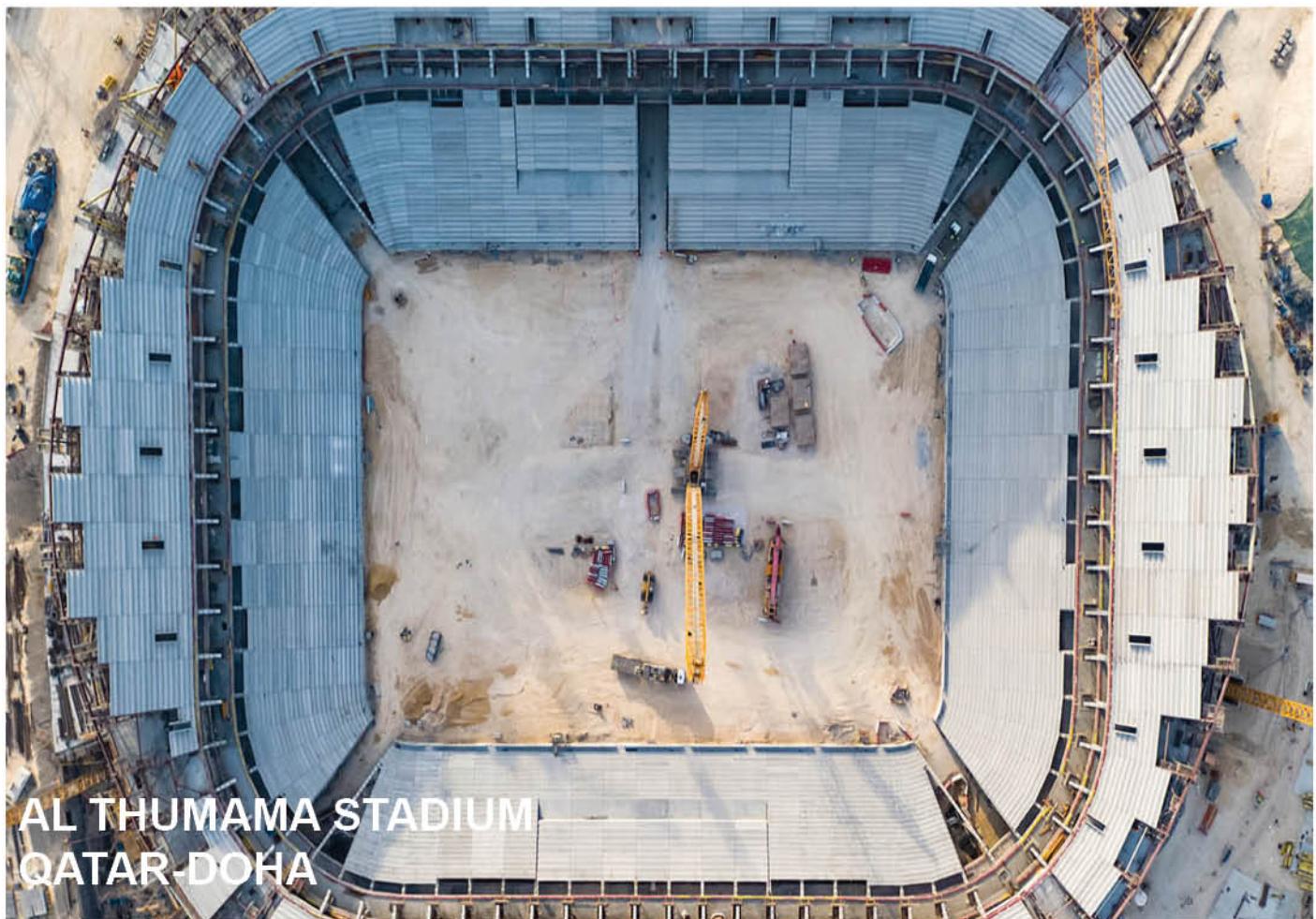
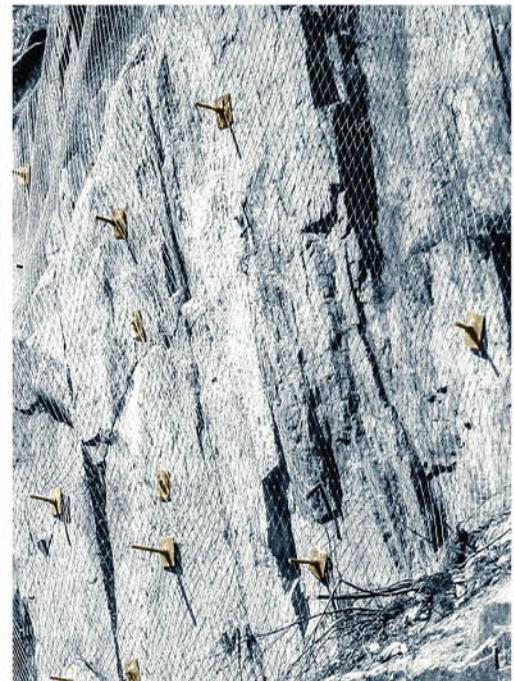
GEOTECHNICAL

esolution provides alternative solution to the precast concrete to eliminate the need of transportation and support remote project with a faster construction methodology

esolution accept contracting projects, through experience of past projects clients always been satisfied with the quality and the ability to meet project dead lines

Design services for all type of structures

esolution in association with ANP- Systems Austria provides solutions in the market with European approved Geo-technical Range, Hollow bars, Soil nails, self drilling hollow bars and micropiles



## AL THUMAMA STADIUM QATAR-DOHA

**UAE:** Business Bay - The Bi-nary Tower Office No. 1012  
Tel: +971(4)319016

**Saudi Arabia:** Bahrain Tower,King Fa-hed St., Olaia,Riyadh, Saudi Arabia  
Tel: +966 (11) 201 9858

**Egypt:** 43 Moaz Eldawla street  
Nasr City, Cairo  
Tel: +202-267-10250



## About Us



e-solution Construction & Engineering with its main branches in Saudi Arabia, United Arab Emirates and Cairo-Egypt Since 2004, we have been providing our clients with reliable solutions to their most complex construction challenges. Our strength lies in traditional construction methods and for our creative, fresh approach to cutting-edge technologies and delivery systems.

complex projects that met the client demands and within project budget. Our clients are turning to us for our ability to implement project management techniques and to serve as a reliable provider of knowledge-driven solutions for construction projects.

The people who make up the team at e-solution Construction & Engineering Company embody our values of strength, performance and passion. Our employees have strong connections to these ideas, which have contributed significantly to the progressive growth, success and leadership of our company. They have helped us develop the solutions, systems and project methods required to bring innovation, quality and value to the projects we deliver for our clients.





## CORE VALUES

### Performance

We demand excellence, deliver on our promises and continuously search for new and better ways to provide the best solutions for our customers and our stakeholders.



### Strength

We are a solid partner for our customers and all stakeholders based on the integrity and competence of our people, our decades of experience, our track record for delivering results and the backing of a global industry leader

### Passion

We care about and are personally committed to everything we do, our people safety and development, our customers and their success.

## OUR MISSION

To be the leading organization by providing through innovation the most innovative solutions to the construction field, our pledge is to establish lasting relationships with our customers by exceeding their expectations and gaining their trust through exceptional performance by our construction team.

## OUR VISION

To become the preferred supplier for engineering services and integrated solutions to our valued customers in the diversified market segments.



## INTRODUCTION

The principle is easily observed when loading 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 tensioning using specially designed anchorages fixed at each end of the tendon.

This provides compressions at the edges of the structural member that increase the capacity of the concrete resisting tension stresses.

If tendons are appropriately curved to certain profile they will exert in addition to the compression at the perimeter a beneficial upwards set of forces that will counteracts applied loads, relieving the structure from a portion of gravity effects Post tensioning is a process of pre-stressing with reinforced concrete or equivalent material that possesses high strength steel strands or bars commonly referred to as tendons. Concrete is strong in compression but weak in tension so to counter this, compression force is introduced to the concrete after casting, lending it strength to withstand slab weight and heavy loads. This also helps in minimal deflection and cracking under heavy load.

Post-tensioning process could be applied on any building, residential, commercial or office buildings. It could also be applied to parking structures slabs-on-ground, bridges, sports stadia, rock and soil anchors or water tanks.

Post tensioning even allows construction at sites where it is not feasible to build owing to site and architectural deficiencies. Post-tensioning as a process requires specialized knowledge and well trained staff.



## NOVOTEL-RIYADH



**Shoba One Park Avenue**  
**DUBAI-UAE**

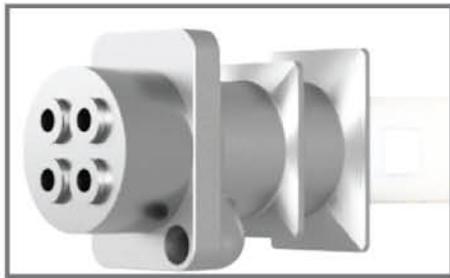
## Advantages

- Significant reduction in the amount of concrete and reinforcing steel required.
- Thinner structural members as compared to non-prestressed concrete, resulting in lower overall building heights and reduced foundation loads.
- Aesthetically pleasing structures that harness the benefits of cast-in-place structures with curved geometries, longer cantilevers and slender members with large spaces between supports.
- Superior structural integrity as compared to precast concrete construction because of continuous framing and tendon continuity.
- Monolithic connections between slabs, beams, and columns that can eliminate troublesome joints between elements that require maintenance.
- Profiled tendons that result in balanced gravity loads (typically a portion of dead load only), significantly reducing total deflection.
- Better crack control, which results from permanent compressive forces applied to the structure during prestressing.
- Reduction in overall building mass, which is important in zones of high seismicity.
- As compared to steel, non-prestressed concrete and precast construction offer faster floor construction cycles, lower floor weight, lower floor-to-floor height, larger spans between columns and reduced foundations.
- The high early-strength of post-tensioned concrete allows for faster floor construction cycles and the use of standard design details for post-tensioned elements, minimum congestion of prestressed and non-prestressed reinforcement, and earlier stripping of formwork after tendon stressing.



**Saudi Arabia:** Bahrain Tower, King Fahd Road, P.O. Box 201 9858  
Riyadh, Saudi Arabia

**Egypt:** 43 Moaz Eldawla street  
Nasr City, Cairo  
Tel: +202-267-10250



Bonded Post-Tensioning Slab System consists of fully encapsulated, bonded multi-strand (two to five strands) tendons contained in flat ducts filled with a high-performance cementitious grout that bonds the strands to the surrounding concrete.

Intermediate anchorages provide continuous encapsulation at construction joints. Tendons are protected by both duct and grout.

Bonded post-tensioned concrete is the descriptive term for a method of applying compression after pouring concrete and the curing process (*in situ*). The concrete is cast around plastic, steel or aluminum curved duct, to follow the area where otherwise tension would occur in the concrete element. A set of tendons are fished through the duct and the concrete is poured. Once the concrete has hardened, the tendons are tensioned by hydraulic jacks.

When the tendons have stretched sufficiently, according to the design specifications they are wedged in position and maintain tension after the jacks are removed, transferring pressure to the concrete. The duct is then grouted to protect the tendons from corrosion.



Adaptable to a variety of structures, un-bonded mono-strand post-tensioning can be easily, rapidly and economically installed.

Use 0.5" and 0.6" diameter strands coated with a layer of specially formulated grease with an outer layer of seamless plastic extruded in one continuous operation to provide protection against corrosion. Each tendon is precisely coiled, cut, labeled, color-coded and delivered to the construction site.

A wide variety of anchorage systems are available to meet design specifications. Encapsulated un-bonded mono-strand posttensioning systems are used in areas that are subject to corrosive conditions. Strands are protected at the anchorages using greased plastic sleeves and grease-filled end caps.

Additionally, anchorage components are fully encapsulated in a high density polyethylene plastic covering and an optional encapsulated intermediate coupler anchorage system can be used to protect the strand at construction joints.

The transfer of tension to the concrete is achieved by the steel cable acting against steel anchors in the perimeter of the slab.

The main disadvantage over bonded posttensioning is the fact that a cable can de-stress itself and burst out of the slab if damaged (such as during repair on the slab)



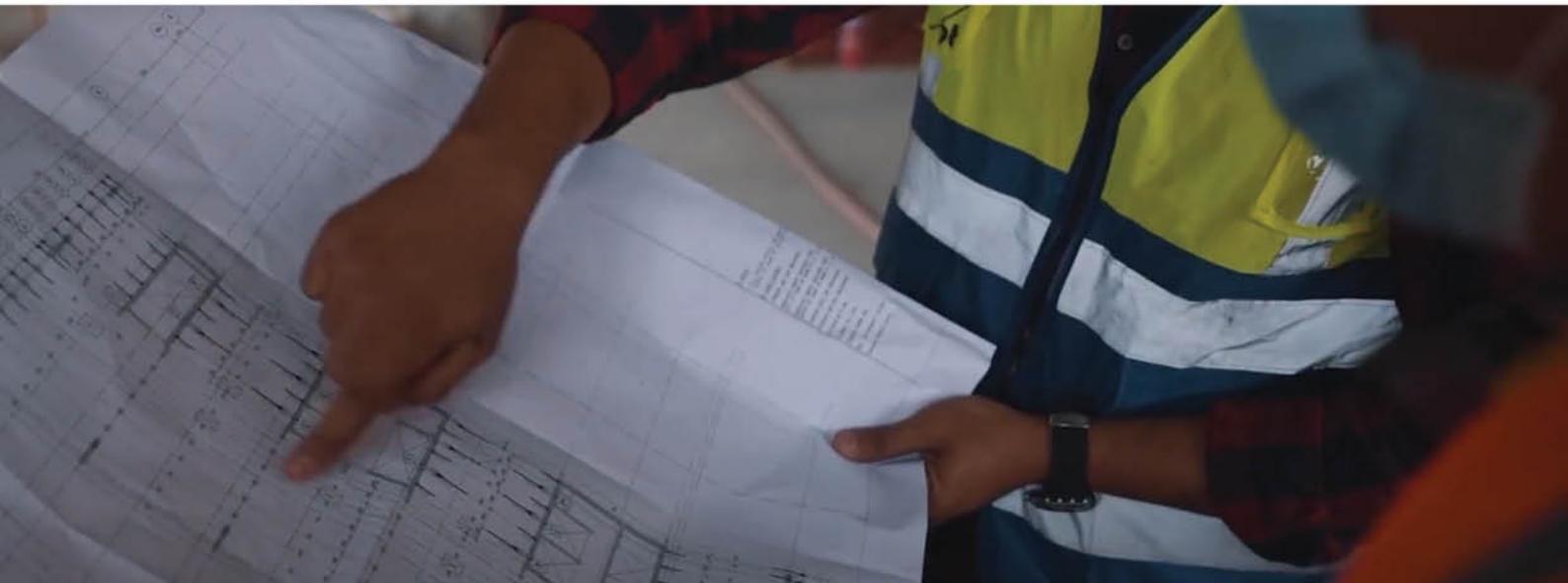
## Support

esolution is a specialist of post-tensioning; as a provider, a designer and a builder. Our experiences allow us to understand a project's environment in order to provide the best value and financial solution.

esolution provides post-tensioning design and build packages, pre-tendering design assistance, and/or the full execution of the post-tensioning project.

Preliminary design assistance at the conceptual stage to select the best option for the system (as well as providing preliminary sizing and quantities); Assistance throughout all detail design stages: We aim to achieve sustainability for the structure by reducing materials, cycle times and resources required.

The complete supply and installation of the post-tensioning materials, including a turnkey service package provided by esolution's teams on site.



**UAE:** Business Bay - The Bi-nary Tower Office No. 1012  
Tel: +971(4)319016

**Saudi Arabia:** Bahrain Tower,King Fa-hed St., Olaia,Riyadh, Saudi Arabia  
Tel: +966 (11) 201 9858

**Egypt:** 43 Moaz Eldawla street  
Nasr City, Cairo  
Tel: +202-267-10250

## **Internal post-tensioned structures**

The use of post-tensioning for bridges allows very demanding geometry requirements, including complex curves, variable superelevation and significant grade changes to be met. Bonded internal post-tensioning systems are comprised of tendons from 1 to 73 strands. They have been extensively used in bridge construction applications (both cast-in-situ and precast segmental). The advantages are:

- The tendon can be easily 'woven' in order to match exactly the designer's specifications Extremely long span bridges can be constructed without the use of temporary intermediate supports
- Increased load-carrying capacity
- Reduced structural depths
- A fully bonded tendon cannot completely lose its tension following accidents

---

## **Advanced shoring (Movable Scaffold System MSS)**

The advanced shoring method – or Movable Scaffold System MSS – has been developed for multi-span bridges over difficult terrain or water where scaffolding would be expensive or simply not feasible. A launching girder moves forward on the bridge piers, span-by-span to allow placing of the cast-in-situ concrete. The method – both underslung and overhead – is highly adaptable for a wide range of spans and types of superstructure.

Conventional falsework or scaffold is a suitable choice for construction of single-span bridges. For bridges that are considerably longer and have multiple spans, the scaffolding needs to be moved between the different sections of the bridge during construction. This has developed the advanced shoring technique. The construction method uses a movable supporting beam, gantry, for the falsework that reaches over at least one span but usually over the length of two spans. With the supporting beam in place, transverse beams along the gantry secure the formwork and working platform and the building process can be carried out efficiently. With special roller bearings and launching jacks the gantry can easily be moved forward along the bridge as the construction proceeds. The travelling gantry system is most suited for spans of 30 to 60m.

---

## **Balanced cantilever**

The proven and safe balanced cantilever method, is often appropriate and cost-effective for the construction of long span concrete bridges including various landmark structures where height, topography or geotechnical conditions render the use of conventional formwork uneconomical.

Balanced cantilever is one of the most popular bridge construction methods used by resolution Members on all continents. The economical range of span lengths for cast-in-situ cantilever construction begins at roughly 70m and extends to beyond 250m. Considerable savings can be achieved by using this method rather than conventional bridge construction.

Free cantilevering is a method of construction where a structure is built outward from a fixed point to form a cantilever structure, without temporary support, using staged cast-in-situ construction. When two opposing free cantilever structures are attached as a single structure and erected in the same step, it is known as 'balanced cantilever'.

In basic terms, cast-in-situ construction describes a process whereby segments are progressively cast on site in their final positions within the structure.

By comparison, for precast construction, the segments are prefabricated at a casting plant – either on site or at a remote facility – then transported to the project site and erected as a completed unit in their final positions.

---

## **Incremental launching**

Incremental launching of bridges can save time, money, space and disruption while easing access and delivering a high quality finish.

The incremental launching method is particularly suited to the construction of continuous post-tensioned multi-span bridges. It involves casting 15-30m long sections of the bridge superstructure in a stationary formwork behind an abutment and pushing a completed section forward with jacks or friction launching system along the bridge axis. The sections are cast contiguously and then stressed together. The superstructure is launched over temporary sliding bearings on the piers. To keep the bending moment low in the superstructure during construction, a launching nose is attached to the front of the bridge deck.

The main advantages for using this construction methodology, rather than other traditional methods, are:

- Minimal disturbance to environmentally sensitive areas
- Smaller assembly zone required
- Greater safety during construction which is mainly carried out at ground level
- Economy of transportation and general reduction in construction elements
- Higher quality finish and performance derived from easier working conditions and repeatability of tasks
- Ease of access to restricted or limited sites – such as over rivers, deep valleys, road or train lines, in poor soil conditions or environmentally protected areas

### Precast span-by-span

The precast span-by-span bridge construction method offers a very high speed of construction. It is most often used in conjunction with an erection truss under the bridge segments or an overhead erection gantry to guide the precast elements into position. The span-by-span construction technique consists of the following primary steps:

Erecting the segments for the entire span onto a temporary erection girder spanning between a pair of adjacent permanent piers

Installing and stressing longitudinal PT tendons enabling the segments to span on their own

Advancing the erection girder into place to erect the adjacent span

Since there is only one cycle of stressing and grouting of tendons per span, the method can be significantly faster than precast balanced cantilever construction, which requires one such cycle per pair of segments.

The most common use of span-by-span construction is to build long viaducts with spans of similar length. The method has been used most often for spans ranging from 25m to 45m. As spans increase, there is a significant increase in the cost of the erection girder. Erection girder can support the segment from below, or above – underslung and overhead launching gantries.

Alternatively, full-span precast beams can be delivered from the precast beam production to the erection front by the launching gantry. This method allows a fast rate of erection.





**AL SALAM BRIDGE  
MADINAH**

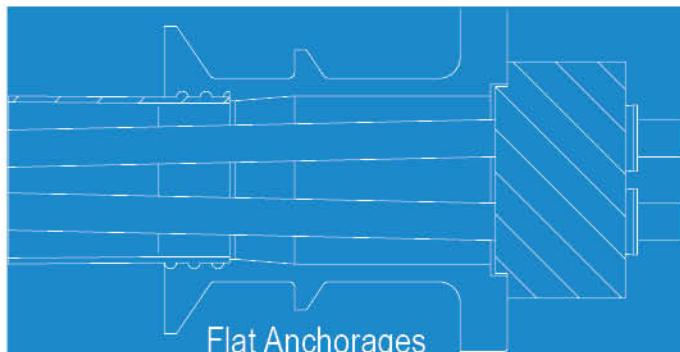




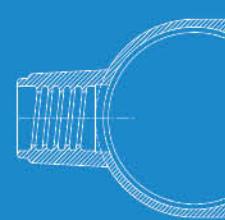
**UAE:** Business Bay - The Bi-  
nary Tower Office No. 1012  
Tel: +971(4)319016

**Saudi Arabia:** Bahrain Tower,King Fa-  
hed St., Olaia,Riyadh, Saudi Arabia  
Tel: +966 (11) 201 9858

**Egypt:** 43 Moaz Eldawla street  
Nasr City, Cairo  
Tel: +202-267-10250



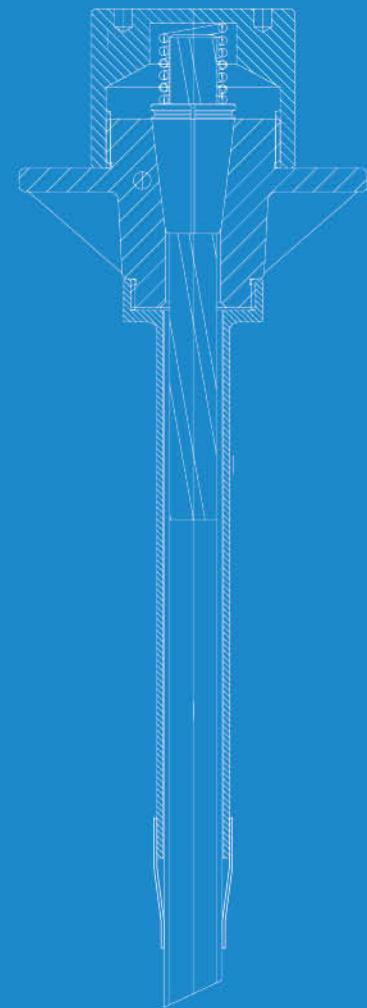
Flat Anchorages



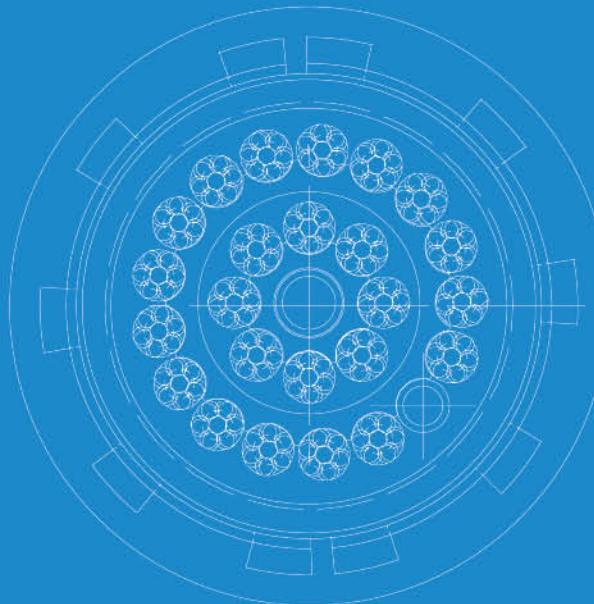
HDPE ACCESSORIES



MICROPILES-SINGLE OR DOUBLE PROTECTED

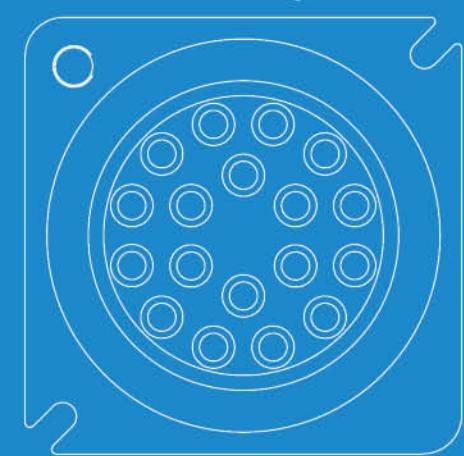


Unbonded Anchorages

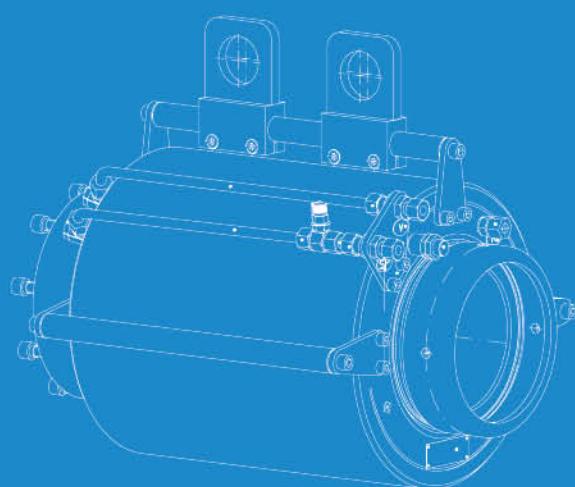


Ground Anchors

Bars 1050/890 1050/950



Multi Strand Anchorages



Stressing Machines



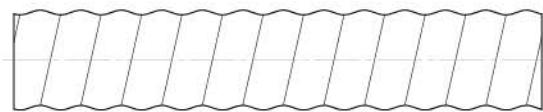
## Self Drilling Hollow Bars



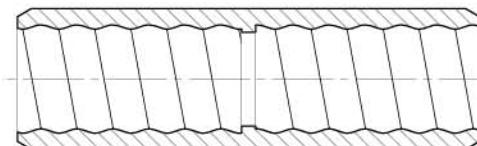
The hollow core bar system consists of three main components, the head, the steel tendon, and a single use drill bit. The steel tendon is a hollow core bar with continuous cold rolled threads throughout the bars 3) '10m) length. The continuous threads are beneficial in the fact that they allow the bar to be cut at any desired length, or joined with our exclusive coupling system to achieve your desired drill depth.

Designed to increase production, the hollow bar system can be simultaneously drilled and grouted into loose or collapsing soils without the need for a temporary casing. In order to insure smooth installation, we supply a large selection of drill bits, allowing our customers to install the hollow core bars in a variety of different soil conditions with most standard drill rig configurations.

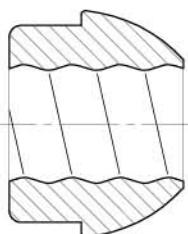
Due to the wide range of cross-sections and bar diameters available, we can design a system for you to carry almost any required load.



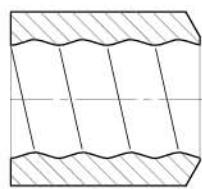
delivery length 2,0 m / 3,0 m / 4,0 m  
other length on request



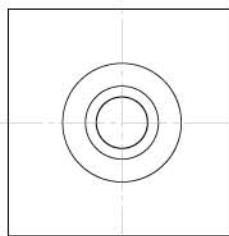
COUPLER H-3003XX



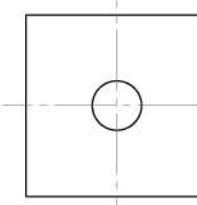
Domed Nut  
H2001



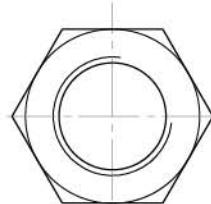
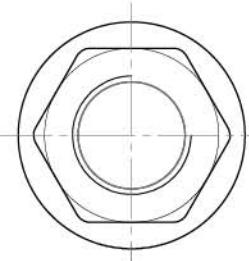
Flat Nut  
H2963



Domed Plate



Flat Plate



Dia 32 mm to Dia 51 mm  
Cold Rolled Bars  
Left Hand thread



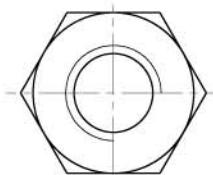
### Applications

- Soil Nails
- Micropiles
- Rock Bolts
- Tiedown Anchors
- Tieback Anchors

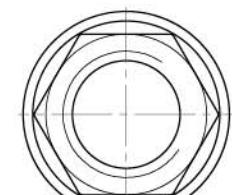
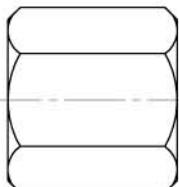
### Simultaneous Drill and Grout Installation

Grout is injected at all points of the borehole as drilling is advanced, permeating the local strata for increased bond performance and producing bulging between the strata and the hollow bar in the softer sections of the soil.

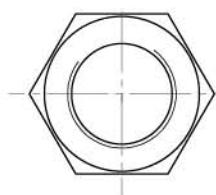
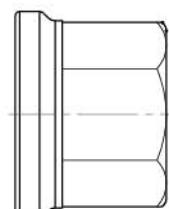
## Self Drilling Hollow Bars



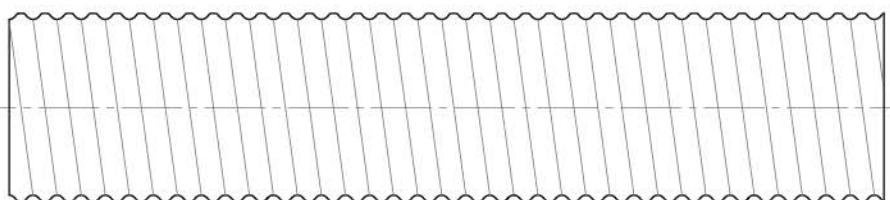
HEX NUT-H2002



HEX NUT-H2163

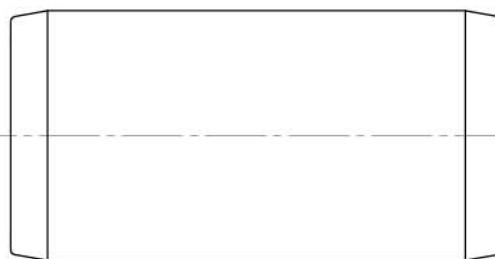


LOCK NUT



delivery length 2,0 m / 3,0 m / 4,0 m

other length on request

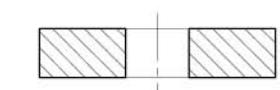
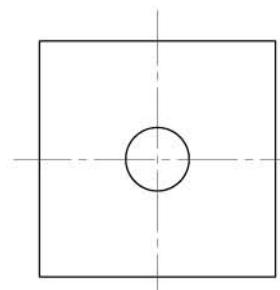


COUPLER H-3003XX



### Advantages

- Simple one-step installation
- Increased production through simultaneous drilling and grouting
- Allows tremie grouting, helping eliminate grout voids
- Can be installed in loose or collapsing soils without the need for a temporary casing to support the borehole
- Allows the use of smaller and less expensive drill rigs
- Can be installed in low overhead areas and sites with limited access
- Improves density of surrounding soils
- Promotes higher skin friction and soil bond due to rough pressure grouted borehole
- Fully threaded throughout the entire length to allow the bars to be cut at any desired length
- Additional corrosion protection can be provided
- Grout swivels can be used to retrofit standard rotary percussion drills

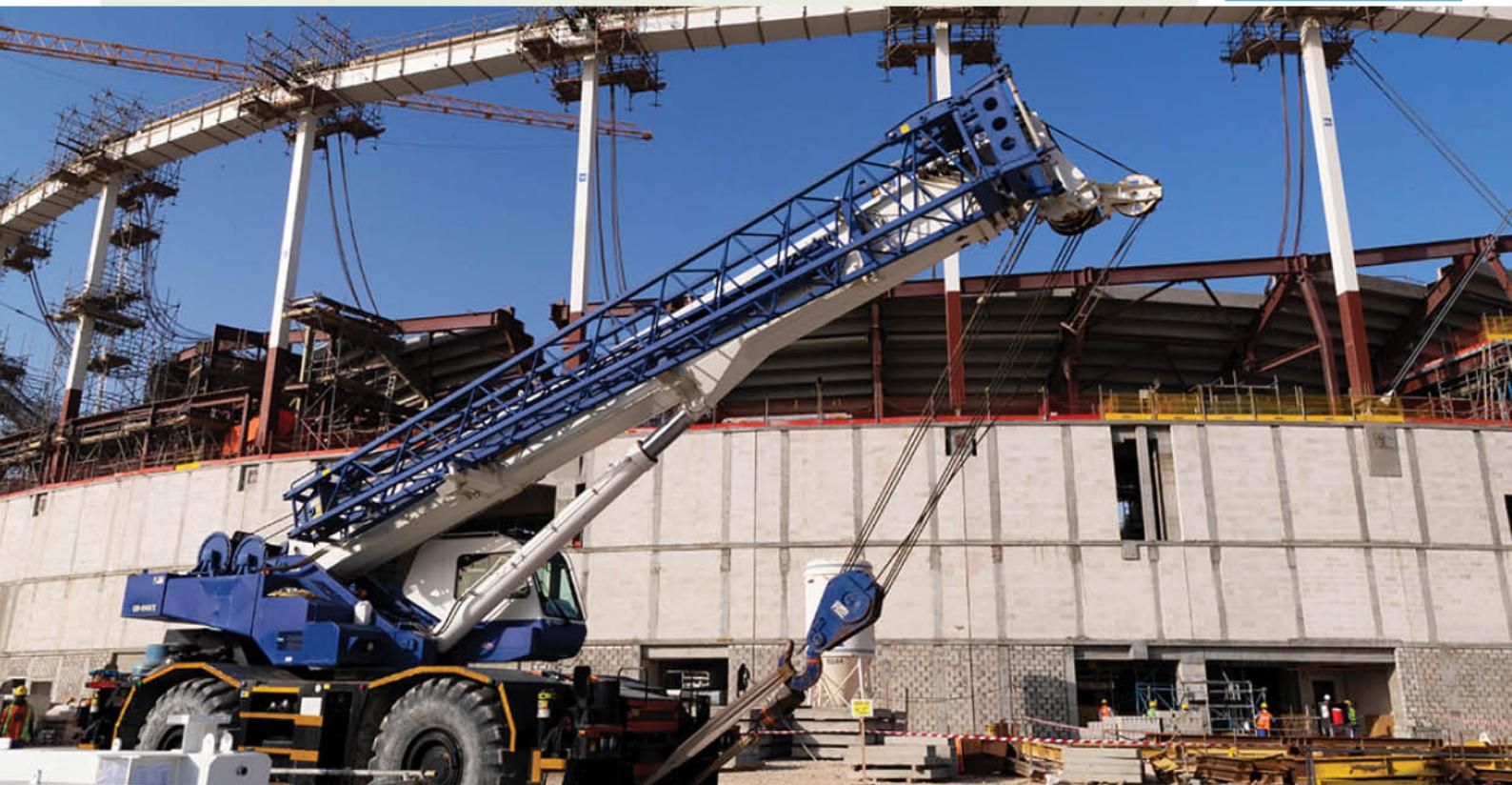


Flat Plate

# Global presence with a reputation you can rely on



e-solution Construction & Engineering with its main branches in Saudi Arabia, United Arab Emirates and Cairo-Egypt. Since 2004, we have been providing our clients with reliable solutions to their most complex construction challenges. Our strength lies in traditional construction methods and for our creative, fresh approach to cutting-edge technologies and delivery systems.



complex projects that met the client demands and within project budget. Our clients are turning to us for our ability to implement project management techniques and to serve as a reliable provider of knowledge-driven solutions for construction projects. The people who make up the team at e-solution Construction & Engineering Company embody our values of strength, performance and passion. Our employees have strong connections to these ideas, which have contributed significantly to the progressive growth, success and leadership of our company. They have helped us develop the solutions, systems and project methods required to bring innovation, quality and value to the projects we deliver for our clients.

## Company Address

**UAE:** Business Bay - The Binary Tower  
Office No. 1012

**Saudi Arabia:** Bahrain Tower,  
King Fahed St., Olaia,  
Riyadh, Saudi Arabia

**Egypt:** 43 Moaz Eldawla street  
Branched from Makram Ebied Nasr  
City, Cairo

## Phone & Fax

Dubai: + 971 (4)4319016  
Riyadh: +966 (11) 201 9858  
Cairo: +202-267-10250

## Online

Email: [info@esolution-pt.com](mailto:info@esolution-pt.com)  
Website: [www.esolution-pt.com](http://www.esolution-pt.com)