Welcome all for the Presentation on Structural connection in prestressed elements

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The prestressing technology is emerging to be a fast growing field in the construction industry particularly for buildings, bridges, metro rail, flyovers, nuclear power plants, LNG tanks, cement plant etc. Dynamic Prestress, a specialist agency in the field of prestressing accredited with an ISO 9001 certification, has state of the art facility for development, production and testing of related products and equipments required for prestressing industry.

This company has been providing tailor made solutions for the construction industry in the field of prestressing since last two decades. It has technically qualified engineers and technical supervisors having vast experience in the prestressing industry. Dynamic has completed several projects in UAE, OMAN, SAUDI ARABIA, MONGOLIA, MAURITIUS and SOUTH EAST ASIA & all over INDIA. The company has also supplied materials and technical expertise for various international projects in many countries.

The company has implemented ERP (Enterprise Resource Planning) programme for the key areas of operations. Various departments like design, development, production, contracts monitoring, procurement, technical services and marketing have periodical interactions based on the feedback from the clients, industry experts and internal departments of organization and accordingly the revised policy decision are taken.
Dynamic is associated with many segmental construction works of metro rail and flyovers. The company has executed several prestressing works of structures on National Highways, Public Works Departments, Nuclear Power Corporation projects, Cement Plant projects, Irrigation projects etc.

Considering its tie ups with international firms in specific specialized areas, the company is able to improve its exports and provide products and services of international standards to the contractors.

During last decade, the company has registered phenomenal growth in terms of turnover, profitability, production capacity, equipment and client base etc.
AREAS OF SPECIALISATION

- Execution of Prestress works
- HDPE Duct
- POT bearings and elastomeric bearings
- Well Sinking by Jack Down Method
- Prestressed rock anchors
- Bar splicing system
- Void Formers for voided slabs

AND MANY OTHER SERVICES
The use of Multi Strand Coupler becomes necessary for continuous bridge deck construction built in several phases to extend prestressing cables as construction proceeds.

The internal prestressing cable which are stressed and grouted in the previous section can be connected to the next section by couplers. The multi-strand anchorage couplers are available for various strand configuration.

There are three types of coupler, mono-strand coupler, multi-strand coupler and flat coupler. Mono-strand coupler is used to extend single strand without tensioning with wedges at both ends separately to grip two tensions and link with each other. Multi-strand coupler is used to extend multi-strand tendon, with wedges at the stressing end of a tendon to be extended and extruded sleeve gripping strands at the dead end of another tendon.

This strand coupler consists of active anchorage at one side and swaged strand system on the other side. The whole assembly is protected by a tube, which is seated on the concrete with a rubber gasket and covers the entire bearing plate and the other end is connected to the sheathing of the next phase. The arrangement of a typical strand coupler is as shown below in the cut view.
Sketch & Sample of Swaged Strand Coupler
The following broad procedure should be adopted for use of multi strand couplers at site.

The end anchorages shall be provided at the one end (say ‘A’) of the girder and the other end is provided with the strand coupler (say ‘B’). After carrying out the stressing at ‘B’ location and subsequent to laying of shuttering, reinforcement and supports for cable ordinates.

Cables shall be threaded from the ‘B’ end towards ‘C’ end (next end). The strands at the coupler location shall be swaged and kept in position till such time that the tube unit and sheathing is brought to the final location. The tube unit is fixed with the rubber gasket at the coupler location and it is ensured that the bearing plate is fully covered and the other end is connected to the sheathing of next phase. Suitable grout vent is provided on the tube unit connecting the coupler.

The rigorous testing has been carried out at the R & D / manufacturing unit of Dynamic Prestress at Nasik and the efficiency of the swaged strands has been observed to be more than 95% (as per the FIP recommendations).
The technical team of Dynamic Prestress is fully equipped to carry out the prestressing work of continuous bridge deck.

The execution work of continuous spans using multi strand coupler is a bit different from the regular multi strand anchorages and hence special precautions needs to be taken.

As the couplers are embedded in the concrete there is likelihood of strands getting corroded in the anchorage zone due to extensive exposure to slurry & water. The strands if excessively corroded will loose the grip of wedges & during the stressing activity of next stage, the strands may slip from the other end. It is therefore mandatory & absolutely essential to complete the concreting and stressing activity in shortest possible time preferably within 3 months from the date of placement of strands for continuous cables.

As per the specification for road and bridge works of Ministry of Road Transport & Highways (MORTH), the section 1014.6 related to prestressing material clearly specifies that the contractor should ensure that prestressing steel shall be used within 3 months of its manufacture. The casting program should be chocked out in this respect precisely, so as to avoid corrosion of strands placed in the structure.
Although concreting is not a part of prestressing, it plays a vital role in successful stressing of structure. Following points should be considered while concreting.

A) Main contractor should ensure proper vibration and compaction of concrete. It should be noted that needle is not directly placed on sheathing pipe, which may damage the duct & thereby blocking the path of strands.

B) The portion of the end block of the girder should be properly concreted. Weak concrete leads to puncture of tube unit & hence stressing should be done only if concrete is capable of taking the load.

C) It should be ensured that the bursting reinforcement in the end block zone is adequately & properly installed.
Swaging Jack & Swaged Coupler

Coupler Production Unit at Nasik.

Monostrand Coupler with Wedges at both ends.

Singlepull Jack
Rebar Spliced Joint using Crimping Jack

Crimping Jack for Rebar Couplers
Testing Of Couplers at Nasik Factory
Installation of Multi Strand Couplers at Project Site.
**COMPLETE RANGE OF DYNAMIC ANCHORAGE SYSTEM**

Dynamic Multi-strand anchorages suitable for 12.7mm Ø, 15.2mm Ø, 15.7mm Ø, etc. H. T. Strands are available with strand configuration varying from 4 nos. to 55 nos. The capacity of the anchorages vary from 60 MT to 1400 MT.

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Guided POT/PTFE Bearing
A type of Pot bearing which bears and transmit horizontal force in one direction only and allows movement perpendicular to that direction and allows rotation about any axis in horizontal plane.

PTFE Sliding Assembly

Pin Bearing

Metallic Guide Bearing

Basically Dynamic Pot Bearing are available ranging from 500 KN load to 6000 KN load capacity. The dimension tables of various types of bearings will be provided on request.
Bearings are the vital part of any bridge superstructure. The primary function of Bridge Bearings is to accommodate expansion and contraction due to changes in temperature and humidity and to reduce friction caused by the traffic loads on substructure of the bridge.

Neoprene (elastomeric) bearings are manufactured in the Polymer Products factory which is pre-qualified by

- **Strong**
- **Hard still Flexible**
- **Weatherproof**
- **Economical**
- **Durable**
- **Maintenance Free**
Well Sinking by Jack Down Method

In this method specially made prestressing equipments and other accessories like gripper rod assembly, reaction beam etc. are used for driving the well to the required depth. The capacity and number of equipments is decided considering driving force, number of feasible anchors, etc. Driving force imparted on well depends on cutting shoe resistance, float and negative skin friction of surrounding strata.
Rock Anchoring is an effective method, which can be used for resisting water thrust in high-rise buildings and passive earth pressure acting on diaphragm and retaining walls. Design of rock anchor is done considering resisting force, bond stress value and permeability value.

Typical rock anchors consists of H. T. Strands of required capacity, packer to separate fixed and free length, protective shoe, spacers, thrust plate, anchorage etc.
Dynamic Bar Splicing System

Dynamic Bar Splicing System is a method of joining deformed reinforcement bars end to end by using specially manufactured steel sleeves, which are hydraulically swaged onto the ribs of the deformed bars by means of hydraulic bar grip jacks operating at high pressure.

Features of Dynamic Bar Splicing System:

- Joints achieve the mechanical strength of bars.
- No wastage of steel.
- Less congestion of reinforcement bars.
- Reinforcement laying & jointing time drastically reduced.

Dynamic bar splicing system can be extensively used for splicing of reinforcement bars for Beams, Columns, Reservoirs, Tanks, Silos, Tunnels, Shafts, Roofs, Floor slabs, Towers & Dams etc.
Introduction:

Void forming tubes are highly suitable as voidformers in concrete structures, but can be used in culverts and casting forms for piles, plinths and columns. Slabs bridges voided with tubes are true structures that possess the low weight of the load-distributing properties of the homogenous slab. Slab bridges with void-formers tubes have proved economical all range of for slack reinforced slabs and for tendon reinforced slabs. This bridge type is economical for road bridges, pedestrians viaducts and bridges for rail traffic.

Features of Void formers:

- Void former tubes are embedded to reduce the concrete cross sectional area, useful to save the volume of concrete.
- The reduction in dead weight is around 40% thereby having economy in design of sub structure.
- Void formers tubes obtain very high radical rigidity by means of special corrugations used in concrete structures.
Heavy Load Handling

Specially made prestressing equipments can be used for Heavy Load handling purpose.

- In Strand Lifting system prestressing equipments and accessories like reaction beam are mounted on top of the structure and strands of required capacity are attached to the lifting element by desirable means / bracket, and the element is lifted step by step taking into account stroke height of Jack and height of element.

- Schematic diagram showing arrangement for strand lifting. Suitable lifting tackle and jacks are designed as per the requirement of the project. This technique has been successfully used in India and abroad, for lifting heavy structures, multiflue cans, steel and Concrete girders etc.
Prestigious Projects
INDIA
INDIA (NEW DELHI)

Elevated Corridor for Delhi Metro Rail Corporation
INDIA (MAHARASHTRA)

Tarapur Atomic Power Project 3 & 4
INDIA (Andra Pradesh)

Nellore Bypass & Krishna Bridge Project on BOT basis Andra Pardesh
INDIA (Andra Pradesh)

Project: AP 19 & 20 Packages on NH-5 for NHAI
INDIA *(New Dehli)*

Ilnd Nizamuddin Bridge
Prestigious Projects
INTERNATIONAL
OMAN

Construction of AL Mawaleh Interchange
SAUDI ARABIA

Construction Of Silos in Quassim Cement Plant

2005/02/12

12/12/2004
DUBAI U.A.E
Post Tensioned Slab for Building
Thank You